The 21st International Conference on Representations of Algebras

第 21 届国际代数表示论大会

Programme 程序册

July 31 - August 9, 2024

Shanghai 上海

Content

General information

The 21st International Conference on Representations of Algebras (ICRA 21) will be held in Xuhui Campus (Huashan Road No. 1954) of Shanghai Jiao Tong University (SJTU):

Workshop: July 31 to August 3, 2024. July 30 is the registration day, and the workshop will close on August 3 at 16:30.

Conference: August 5 - August 9, 2024. August 4 is the registration day, and the conference will close on August 9 at 16:00.

On the registration days, the participants please go to their hotels for registration (sign your name and take your bag), which starts from morning 10:00 to night 22:00:

Jianguo Hotel 建国宾馆： North Caoxi Road No. 439 (20 minutes by walk to Xuhui Campus) 上海市徐汇区漕溪北路 439 号（步行 20 分钟可达校园）

Mia Hotel 宓亚酒店： Panyu Road No. 955 (10 minutes by walk to the campus) 上海市徐汇区番禺路 955 号（步行 10 分钟可达校园）

Faculty Club of SJTU 上海交通大学教师活动中心: Huashan Road No. 1954 (Inside Xuhui Campus) 上海市徐汇区华山路 1954 号（上海交通大学徐汇校区内）

If you will arrive in Shanghai, not on the registration days, there will be a registration desk in Wen Zhi Hall 8:45-9:15 on July 31, and 8:15 - 8:40 on August 5. If you arrive on the other time, please call the contact persons.

The **website** of ICRA21 is https://icra21.sjtu.edu.cn

The **email address** of ICRA 21 is icra21@sjtu.edu.cn

The public free **Wifi** during July 31 - August 9 in Xuhui Campus:

username: 2024icra21 Code: icra21sjtu

Workshop and the plenary talks of the conference will be in **Wen Zhi Hall (文治堂)**, and the parallel sessions will be in **Engineering Building (工程馆)**, both in Xuhui Campus.

The information of the registration fee and the hotels as well as the programme, could be also found in the website.

Important:

- The conference name card is **the unique certificate** for entering the campus, lunches on the working days, the welcome reception, and the conference banquet.

• On **July 31, 8:30**, and **August 5, 8:00**, there will be buses from Jianguo Hotel to Wenzhi Hall 文治堂; (No buses on the other days.) and there will be also volunteers in Mia Hotel and Faculty Club, guiding the direction to Wenzhi Hall.

• Lunches on working days (July 31 - August 3, August 5 - 9) are included in the registration fee (no lunches on July 30 and August 4). Lunches are at Graduate student restaurant (徐汇校区研究生餐厅).

• The Welcome Reception is on July 31, 18:30 -, at Graduate student restaurant.

• The Conference Banquet is on August 5, 18:30 -, at Jianguo Hotel.

• The Welcome Reception and the Conference Banquet are included in the registration fee; no dinners will be provided for the rest nights.

• If you have family members with you and you have informed about this to the local organizing committee when you registered, then your family members are welcome to join the Welcome Reception on July 31 evening, without extra fees.

• If you have family members with you and you have informed about this to the local organizing committee when you registered, and your family members would like to join the Conference Banquet on August 5 evening, you need come to Jianguo hotel and ask them to add the names of your family members.

Questions

How to get to the hotels? The easiest way is by taxi.

It is also easy if you would like to take the public transportation: wherever you live, you can first take Metro Line 1 地铁一号线 to Xujiahui Station 地铁徐家汇站, then to Jianguo Hotel by walk 150 meters, and then try to get to your hotel. The suggested details are as follows.

From Pudong International Airport (PVG) 浦东国际机场 to Xujiahui Station: please first take Metro Line 2 in Pudong International Airport Station to People's Square Station 人民广场站, and then transfer to Metro Line 1 to Xujiahui Station.

From Shanghai Hongqiao International Airport (SHA) 虹桥国际机场 to Xujiahui Station: the same way: please first take Metro Line 2 in Hongqiao International Airport Sation to People's Square Station 人民广场站, and then transfer to Metro Line 1 to Xujiahui Station.

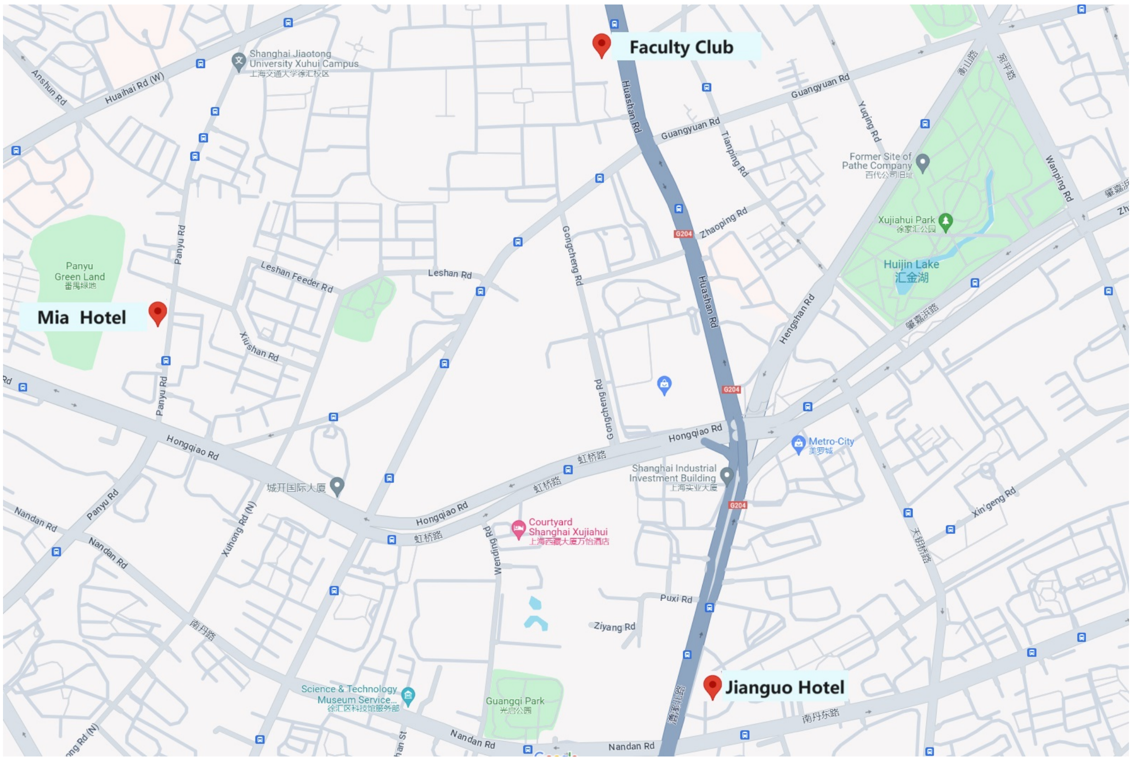
From Railway Shanghai Station 上海火车站 to Xujiahui Station: directly take Metro Line 1, to Xujiahui Station.

From Railway Hongqiao Station 虹桥火车站 to Xujiahui Station: please first take Metro Line 2 in Railway Hongqiao Station to People's Square Station, and then transfer to Metro Line 1 to Xujiahui Station.

Suppose that you are already in Xujiahui Station 地铁徐家汇站 of Metro Line 1, please use Gate 9 Escalators 自动扶梯 to the ground 地面.

Suppose that you are already on the ground of the Xujiahui Station of Metro Line 1, it is already not so far to the hotels. It is about 150 meters to the Jiaoguo Hotel.

If you live in Mia Hotel or Faculty Club, you could first go to Jianguo Hotel, there will be volunteers in Jianguo hotel, and they will help you going to your hotel (you can also take taxi from Jianguo Hotel to your hotel; and if you walk yourself, it will take about 20 minutes).



How to enter the campus? Just show your name card of the conference, or instead, the Conference Announcement 会议通知 we sent you by email，to the gate guard.

The public email box: icra21@sjtu.edu.cn

Contact persons:

Jian Cui 崔健： Tel. 15821192598 (specially for guests in Faculty Club)

Nan Gao 高楠: Tel. 13917364705

Hai Jin 金海: Tel. 18621125715 (specially for guests in Mia Hotel)

Xue-Song Lu 陆雪松: Tel. 17811914739 (specially for guests in Jianguo Hotel)

Shi Rong 荣石：Tel. 13510291764

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Sponsors

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With great acknowledgements! 特此致谢!

ICRA 21 Workshop Programme

July 31	August 1	August 2	August 3
8:45 - 9:15 Registration, Video 9:15 - 10:00 **Opening Ceremony** Welcome address by Dean of School of Math., SJTU Henning Krause: International Conferences on Representations of Algebras - the first 50 years Photo	9:00 - 9:50 Yukari Ito L2	9:00 - 9:50 Sira Gratz L2	9:00 - 9:50 Bernhard Keller L3
10:00 - 10:50 Bernhard Keller L1	9:50-10:10 Coffee, tea	9:50-10:10 Coffee, tea	9:50-10:10 Coffee, tea
10:50-11:10 Coffee, tea	10:10 - 11:00 Gustavo Jasso L2	10:10 - 11:00 Ming Lu L2	10:10 - 11:00 Sira Gratz L3
11:10 - 12:00 Yukari Ito L1	11:10 - 12:00 Andrew Hubery L2	11:10 - 12:00 Gustavo Jasso L3	11:10 - 12:00 Ming Lu L3
12:00 - Lunch **at Graduate student restaurant** 徐汇校区研究生餐厅	12:00 - Lunch	12:00 - Lunch	12:00 - Lunch
15:00 - 15:50 Sira Gratz L1	15:00 - 15:50 Ming Lu L1	15:00 - 15:50 Yukari Ito L3	15:00-16:30 **SJTU** **Master Distinguished Lecture** Efim Zelmanov
15:50-16:10 Coffee, tea	16:00 - 16:50 Bernhard Keller L2	16:00 - 16:50 Andrew Hubery L3	
16:10-17:00 Andrew Hubery L1			
17:10 - 18:00 Gustavo Jasso L1			
18:30 - **Welcome Reception** **at Graduate student restaurant** 徐汇校区研究生餐厅			

All the talks of the workshop will be in **Wen Zhi Hall (文治堂)** in Xuhui Campus.

On **July 31, 8:30** there will be buses from Jianguo Hotel to Wenzhi Hall 文治堂; (No buses on the other days.) and there will be also volunteers in Mia Hotel and Faculty Club, guiding the direction to Wenzhi Hall.

Workshop Lectures

- Sira Gratz (Aarhus University): Lattices and thick subcategories

- Andrew Hubery (Bielefeld University): The Deligne - Simpson Problem via weighted projective lines and deformed preprojective algebras

- Yukari Ito (IPMU, The University of Tokyo): Crepant resolution and the McKay correspondence in dimension three

- Gustavo Jasso (Lund University): Minimal A_∞-algebras of endomorphisms

- Bernhard Keller (Université Paris Cité): On Higgs categories for cluster algebras arising in higher Teichmuller theory

- Ming Lu (Sichuan University): Hall algebras and quantum symmetric pairs

Public: Master Distinguished Lecture of SJTU

- Efim Zelmanov (Southern University of Science and Technology): What do mathematicians think about?

I will discuss the unique features of Mathematics using examples from history and from our time.

Abstracts of workshop lectures

Sira Gratz (Aarhus University): Lattices and thick subcategories

Computing lattices of thick subcategories has emerged as a popular and worthwhile pass-time and for good reason: They provide a tangible, and in good cases computable, invariant of a category K describing all possible kernels of maps out of K.

In these lectures, we discuss properties and examples of lattices of thick subcategories. Our particular focus are triangulated categories that rightfully deserve a spot at ICRA: those coming from representations of finite dimensional algebras. We, as a community, are faced with a challenge invisible to the classical theory, which so far has concerned itself chiefly with monoidal categories: Our lattices are not usually controlled by a topological space.

We discuss how we can enjoy this fact as well as how to manage it when we don't.

Andrew Hubery (Bielefeld University): The Deligne - Simpson Problem via weighted projective lines and deformed preprojective algebras

The Deligne - Simpson Problem arose out of Deligne's solution in 1970 of the Riemann -Hilbert Problem, concerning existence of differential equations with prescribed monodromy. Suitably translated, the problem asks whether, given an ordered k-tuple of conjugacy classes $\mathcal{C}_i$ in $\mathrm{GL}_n(\mathbb{C})$, we can find matrices $M_i \in \mathcal{C}_i$ satisfying $M_1 \cdots M_k = 1$.

The additive version, where we take conjugacy classes $\mathcal{C}_i$ in $M_n(\mathbb{C})$ and ask for matrices $M_i \in \mathcal{C}_i$ satisfying $M_1 + \cdots + M_k = 0$, was solved by Crawley-Boevey in 2003 using his work on simple modules for deformed preprojective algebras. An analogous approach to the original version led to the introduction, by Crawley-Boevey and Shaw, of multiplicative preprojective algebras, where they proved various reduction techniques, but fell short of a complete solution.

Returning to the original formulation of Deligne's solution to the Riemann - Hilbert Problem, giving a tuple of matrices $M_i \in \mathcal{C}_i$ with $M_1 \cdots M_k = 1$ is the same as giving a rank n locally-free sheaf E on $\mathbb{P}$ together with a logarithmic connection ∇ on E whose residues at the fibres of E at the singular points essentially recover the matrices M_i. Asking that each M_i lies in a fixed conjugacy class $\mathcal{C}_i$ is then the same as asking that the residues of the connection are compatible with prescribed flags in the fibres of E, a so-called parabolic structure on E.

We can now use that the category of such 'parabolic sheaves' is equivalent to the category of locally-free sheaves on a weighted projective line, and hence can be embedded into the hereditary abelian category of all coherent sheaves. The realisation problem can thus be formulated in terms of connections on sheaves on weighted projective lines. In particular, we have an abelian length category of sheaves equipped with a connection (E, ∇), and the 'irreducible' solutions to the Deligne–Simpson Problem correspond precisely to the simple objects in this category.

Locally, each Serre subcategory $\mathcal{A}$ of coherent sheaves having only finitely many simple objects is equivalent to the finite dimensional nilpotent modules for the path algebra of some quiver $\mathbb{C}Q$, and equipping a sheaf in $\mathcal{A}$ with a connection is equivalent to lifting the corresponding nilpotent module to a module for the deformed preprojective algebra $\Pi^\lambda Q$ (for a suitable deformation parameter λ). In this way we may then describe completely the classes $[E]$ in the Grothendieck group of the simple objects (E, ∇), and thus complete the proof of the Deligne - Simpson Problem.

Yukari Ito (IPMU, University of Tokyo): Crepant resolution and the McKay correspondence in dimension three

The original McKay correspondence is acorrespondence between finite subgroup G of $\mathrm{SL}(2, \mathbb{C})$ and the minimal resolution of the quotient singularity $\mathbb{C}^2/G$ in dimension two. In these three lectures, I will introduce several constructions of crepant resolutions like toric resolution and G-Hilbert scheme, and the McKay correspondence in dimension three.

Gustavo Jasso (Lund University): Minimal A_∞-algebras of endomorphisms

The overarching problem that motivates the topic of this lecture series is that of reconstructing an ambient category (satisfying suitable assumptions) from the endomorphism algebra of a generating object. For example, a module category can be reconstructed from the endomorphism algebra of any compact projective generator. When the ambient category is a triangulated category, such as the derived category of an algebra, the situation is more subtle since, beyond the case of tilting objects, in general it is not possible to reconstruct the ambient category from the graded endomorphism algebra of a compact generator alone. Notwithstanding, a fundamental result of B. Keller states that if the ambient triangulated category is algebraic, then it can be reconstructed from the derived endomorphism algebra of a compact generator, which is a differential graded (=DG) algebra whose quasi-isomorphism type depends on the choice of a DG enhancement.

This lecture series addresses the question of what can be said about a compact generator in a DG-enhanced triangulated category in terms of properties of its derived endomorphism algebra. As a possibile approach to this problem we propose to investigate a different avatar of the derived endomorphism algebra - the minimal A-infinity algebra of endomorphisms. The relevance of this approach was brought forward by recent results of F. Muro and F. Muro and myself that are collected under the moniker "The Derived Auslander-Iyama Correspondence", which will be discussed in some detail during the lectures.

Bernhard Keller (Université Paris Cité): On Higgs categories for cluster algebras arising in higher Teichmuller theory

Higher Teichmuller spaces are associated with pairs (G, S) consisting of a split semi-simple Lie group G and a marked surface S. The classical case is the one where G is the group $\mathrm{PGL}(2, \mathbb{R})$. In the 2000s, Fock and Goncharov have developed a cluster-theoretic approach to higher Teichmuller theory for groups of type A. Their work was extended to all classical groups by Ian Le and to arbitrary split semi-simple groups by Goncharov-Shen in 2019 (preprint). In particular, they construct a cluster algebra $A(G, S)$ for each pair (G, S). In this lecture series, we will report on the ongoing efforts aiming at the additive categorification of these cluster algebras. For $G = \mathrm{PGL}(2, \mathbb{R})$, this was achieved thanks to the work of Fomin–Shapiro–Thurston, Derksen–Weyman–Zelevinsky and Labardini-Fragoso. An alternative approach, based on Kapranov-Schechtman's idea of perverse schober and techniques from higher category theory, is due to Merlin Christ. The category he constructs is equivalent, as an extriangulated category, to the Higgs category (in the sense of Yilin Wu) associated to the ice quiver with potential due to Labardini-Fragoso (at least if the surface does not have punctures). Christ's construction admits a natural conjectural generalization to (simply-laced) groups G of higher rank. In the case where the surface is a triangle, recent work by Miantao Liu will likely confirm that Christ's conjectural category is the Higgs category associated with Goncharov-Shen's ice quiver endowed with a natural potential. In particular, it contains a canonical cluster-tilting object with the expected endomorphism algebra. If this holds, the conjectural categorification will result from a glueing theorem for cluster-tilting objects.

Ming Lu (Sichuan University): Hall algebras and quantum symmetric pairs

The $\imath$quantum groups arising from quantum symmetric pairs can be viewed as a natural generalization of Drinfeld - Jimbo quantum groups. As suggested by Bao-Wang, most of the fundamental constructions in the theory of quantum groups should admit generalizations in the setting of $\imath$quantum groups.

This mini-course addresses the Hall algebra realization of $\imath$quantum groups. As quantum groups can be viewed as $\imath$quantum groups, this construction includes a reformulation of Bridgeland's Hall algebra realization for the whole quantum group, and Bridgeland's construction is in turn built on Ringel's Hall algebra realization for halves of quantum groups.

To that end, we introduce a class of finite-dimensional algebras called $\imath$quiver algebras, and develop its representation theory. We shall also explain the $\imath$divided powers, Serre presentation, Drinfeld type presentation, braid group symmetries for $\imath$quantum groups in the setting of Hall algebras.

This mini-course should be accessible to graduate students with background in representation theory.

ICRA 21 Conference Programme

August 5	August 6	August 7	August 8	August 9
8:15 - 8:40 Registration, Video	8:30 - 9:20 Plenary	8:30 - 9:20 Plenary	8:30 - 8:55 9:00 - 9:25 Room 102, 103, 104, 107 Room 108, 110, 111	8:20 - 9:10 Plenary
8:40 - 10:00 **Openning Ceremony** Welcome address by President of SJTU Welcome address by President of CMS Address by Founder of ICRA Introduction to Science China Mathematics ICRA Award: Announcement Photo	9:30 - 10:20 Plenary	9:30 - 10:20 Plenary	9:30 - 9:55 10:00 - 10:25 Room 102, 103, 104, 107 Room 108, 110, 111	9:20 - 10:10 Plenary
10:00 - 10:20 Coffee, tea	10:20 - 10:40 Coffee, tea	10:20 - 10:40 Coffee, tea	10:25 - 10:35 Coffee, tea	10:10 - 10:30 Coffee, Tea
10:20 - 11:10 Plenary	10:40 - 11:30 Plenary	10:40 - 11:30 Plenary	10:35 - 11:00 11:05 - 11:30 Room 102, 103, 104, 107 Room 108, 110, 111	10:30 - 11:20 Plenary
11:20 - 12:10 Plenary	11:40 - 12:30 Plenary	11:40 - 12:30 Plenary	11:35 - 12:00 12:05 - 12:30 Room 102, 103, 104, 107 Room 108, 110, 111	11:30 - 12:20 Plenary 12:20 - 12:30 **Announcement of ICRA 22**
12:10 - Lunch at **Graduate student restaurant** 徐汇校区研究生餐厅	12:30 - Lunch	12:30 - Lunch	12:30 - Lunch	12:30 - Lunch
14:00 - 14:50 Plenary 大会	14:00 - 14:25 14:30 - 14:55 Parallel Room 102, 103, 104, 107 Room 108, 110, 111		14:00 - 14:25 14:30 - 14:55 Room 102, 103, 104, 107 Room 108, 110, 111	14:00 - 14:25 14:30 - 14:55 15:00 - 15:25 15:30 - 15:55 Room 102, 103, 104 107, 108, 110, 111
14:50 - 15:10 Coffee, tea	14:55 - 15:15 Coffee, tea		14:55 - 15:15 Coffee, tea	
15:10 - 16:00 Plenary	15:15 - 15:40 15:45 - 16:10 Parallel Room 102, 103, 104, 107 Room 108, 110, 111		15:15- 15:40 15:45 - 16:10 16:15 - 16:40 Room 102, 103, 104, 107 Room 108, 110, 111	
16:10 - 17:00 Plenary	16:15 - 16:40 16:45 - 17:10 Parallel Room 102, 103, 104, 107 Room 108, 110, 111			
18:30 - **Conference Banquet** **ICRA Award Ceremony** Award Citation 1 Award Citation 2 **at Jianguo Hotel** 建国宾馆				

All the plenary talks of the conference will be in **Wen Zhi Hall (文治堂)**, and the parallel sessions will be in **Engineering Building (工程馆)**, both in Xuhui Campus.

On **August 5, 8:00** there will be buses from Jianguo Hotel to Wenzhi Hall 文治堂; (No buses on the other days.) and there will be also volunteers in Mia Hotel and Faculty Club, guiding the direction to Wenzhi Hall.

August 5: Plenary

8:15-8:40	Registration, Video
8:40 - 10:00	Openning Ceremony Welcome address by President of SJTU Welcome address by President of CMS Address by Founder of ICRA Introduction to Science China Mathematics ICRA Award Announcement Photo
10:00 - 10:20	Coffee, tea
10:20 - 11:10	Sergey Fomin: Cyclically ordered quivers
11:20 - 12:10	Bernard Leclerc: Shifted quantum affine algebras and cluster algebras
12:10 -	Lunch at Graduate student restaurant 徐汇校区研究生餐厅
14:00 - 14:50	Yu Zhou: Geometric models of graded skew-gentle algebras
14:50 - 15:10	Coffee, tea
15:10 - 16:00	Zhengfang Wang: Derived equivalence classes of skew-gentle algebras via deformation theory
16:10 - 17:00	René Marczinzik: Cohen-Macaulay algebras in the sense of Auslander and Reiten
18:30 -	Conference Banquet ICRA Award Ceremony Award Citation 1 Award Citation 2 at Jianguo Hotel 建国宾馆

August 6 Morning: Plenary

8:30 - 9:20	Henning Krause: Local dualisable modular representations and local regularity
9:30 - 10:20	Daniel Labardini-Fragoso: Mutations of infinite-dimensional quiver representations
10:20 - 10:40	Coffee, tea
10:40 - 11:30	Vanessa Miemietz: Categorification in representation theory
11:40 - 12:30	Peigen Cao: F-invariant in cluster algebras
12:30 -	Lunch at Graduate student restaurant 徐汇校区研究生餐厅

August 6 Afternoon: Parallel sessions

	14:00-14:25 14:30-14:55	14:55-15:15	15:15-15:40 15:45-16:10	16:15-16:40 16:45-17:10
Room 102	Changchang Xi Tomasz Ciborski	Coffee, tea	Hernán Giraldo Xianhui Fu	N. Williams Pierre Bodin
Room 103	Christof Geiss Xueqing Chen	Coffee, tea	Fan Qin Merlin Christ	Min Huang Shengfei Geng
Room 104	M. Schmidmeier Xue-Song Lu	Coffee, tea	Nan Gao Li Liang	Jian Cui Yajun Ma
Room 107	Jie Xiao Alessandro Contu	Coffee, tea	Jie Du Shiquan Ruan	Miodrag C. Iovanov Jiangsheng Hu
Room 108	Andrea Solotar Claude Cibils	Coffee, tea	L. Rubio y Degrassi Can Wen	M. Hellstrøm-Finnsen J. Lindell
Room 110	Lutz Hille Takumi Otani	Coffee, tea	Shiping Liu Ivon Dorado	Yuming Liu Yingying Zhang
Room 111	Giovanni Cerulli Irelli A.-C. van Roosmalen	Coffee, tea	Zheng Hua Yongzhi Luan	Daniel Bissinger Haigang Hu

August 7 Morning: Plenary

8:30 - 9:20	Eleonore Faber: Frieze patterns in representation theory
9:30 - 10:20	Steve Oudot: Stability for homological approximations in persistence theory
10:20 - 10:40	Coffee, tea
10:40 - 11:30	Xiuping Su: Categorification and mirror symmetry for Grassmannians
11:40 - 12:30	Rudradip Biswas: Bounded t-structures, finitistic dimensions, and singularity categories of triangulated categories
12:30 -	Lunch at **Graduate student restaurant** 徐汇校区研究生餐厅

August 7 Afternoon

Free

August 8 Morning: Parallel sessions

	8:30-8:55 9:00-9:25	9:30-9:55 10:00-10:25	10:25-10:35	10:35-11:00 11:05-11:30	11:35-12:00 12:05-12:30
Room 102	Yu Qiu Junyang Liu	Xiuli Bian Yilin Wu	Coffee, tea	N. Hanihara Zhe Han	Li Fan Suiqi Lu
Room 103	Hugh Thomas Jiarui Fei	Gleb Koshevoy Bing Duan	Coffee, tea	M. Pressland Leizhen Bao	Liqian Bai Mara Pompili
Room 104	Zhaoyong Huang Yuya Otake	Shijie Zhu Xiu-Hua Luo	Coffee, tea	Satoshi Usui Gang Yang	Xiaoyan Yang Ryu Tomonaga
Room 107	Xiao-Wu Chen Álvaro Sánchez	Zengqiang Lin M. Kaipel	Coffee, tea	Wei Hu D. Dramburg	M. H. Keshavarz Esha Gupta
Room 108	Sibylle Schroll Severin Barmeier	Peter Webb Sebastian Opper	Coffee, tea	Greg Stevenson Xiaoxiao Xu	Yongyun Qin Xukun Wang
Room 110	Yu Ye Wen Chang	Guiyu Yang Haru Negami	Coffee, tea	Jianmin Chen Jiepeng Fang	Qi Wang Yumeng Wu
Room 111	Xiaojin Zhang Laertis Vaso	Piotr Malicki R. F. Rosada Canesin	Coffee, tea	Adam Skowyrski Ren Wang	Yu Liu Jan H. Thomm

12:30 - : Lunch at **Graduate student restaurant** 徐汇校区研究生餐厅

August 8 Afternoon: Parallel sessions

	14:00-14:25 14:30-14:55	14:55-15:15	15:15-15:40 15:45-16:10 16:15-16:40
Room 102	Ming Fang Kai Meng Tan	Coffee, tea	Kay Jin Lim Yixin Lan Hai Jin
Room 103	Shunsuke Kano Lang Mou	Coffee, tea	Xiaoyue Lin Mikhail Gorsky Miantao Liu
Room 104	Ryo Kanda Sondre Kvamme	Coffee, tea	Shengyong Pan Panyue Zhou Nengqun Li
Room 107	Hongxing Chen Souvik Dey	Coffee, tea	Alicja Jaworska - Pastuszak Grzegorz Pastuszak Ryota Iitsuka
Room 108	Guodong Zhou Jun Chen	Coffee, tea	Haiyan Zhu Hyungtae Baek Zhibing Zhao
Room 110	Liping Li Kaveh Mousavand	Coffee, tea	Giovanna Le Gros Marina Purri Brant Godinho Tuan Anh Pham
Room 111	Peter Symonds František Marko	Coffee, tea	Ruslan Muslumov Jialin Wang Jingcheng Dong

August 9 Morning: Plenary

8:20 - 9:10	Wahei Hara: Semibricks and spherical objects
9:20 - 10:10	Grzegorz Zwara: On transversal slices for modules over representation finite algebras
10:10 - 10:30	Coffee, tea
10:30 - 11:20	Fernando Muro: On the classification of triangulated categories with finiteness conditions
11:30 - 12:20	Efim Zelmanov: Superconformal algebras
12:20 - 12:30	Announcement of ICRA 22
12:30 -	Lunch at Graduate student restaurant 徐汇校区研究生餐厅

August 9 Afternoon: Parallel sessions

	14:00-14:25	14:30-14:55	15:00-15:25	15:30-15:55
Room 102	Xuefeng Mao	Edson Ribeiro Alvares	Qiang Dong	
Room 103	Monica Garcia	Lujun Zhang	Huihui Ye	
Room 104	Difan Deng	Oyeyemi Oyebola	Bohan Xing	Jacob Grevstad
Room 107	Francesca Mantese	Calvin Pfeifer	Zhen Zhang	
Room 108	Xi Wang	Yanping Hu	Junpeng Wang	
Room 110	R. Parackal Govindan	Arjun Sujatha Narayanan	Gangyong Lee	
Room 111	Haicheng Zhang	Jiajun Xu	Xiaoqiu Zhong	

Titles of plenary talks

1. Rudradip Biswas (University of Warwick): Bounded t-structures, finitistic dimensions, and singularity categories of triangulated categories
2. Peigen Cao (University of Science and Technology of China): F-invariant in cluster algebras
3. Eleonore Faber (University of Leeds): Frieze patterns in representation theory
4. Sergey Fomin (University of Michigan): Cyclically ordered quivers
5. Wahei Hara (The University of Tokyo): Semibricks and spherical objects
6. Henning Krause (Bielefeld University): Local dualisable modular representations and local regularity
7. Daniel Labardini-Fragoso (National Autonomous University of Mexico): Mutations of infinite-dimensional quiver representations
8. Bernard Leclerc (Universitéde Caen Basse-Normandie): Shifted quantum affine algebras and cluster algebras
9. René Marczinzik (University of Bonn): Cohen-Macaulay algebras in the sense of Auslander and Reiten
10. Vanessa Miemietz (University of East Anglia): Categorification in representation theory
11. Fernando Muro (Universidad de Sevilla): On the classification of triangulated categories with finiteness conditions
12. Steve Oudot (National Institute for Research in Computer Science and Control, France): Stability for homological approximations in persistence theory
13. Xiuping Su (University of Bath): Categorification and mirror symmetry for Grassmannians
14. Zhengfang Wang (Nanjing University): Derived equivalence classes of skew-gentle algebras via deformation theory
15. Efim Zelmanov (Southern University of Science and Technology): Superconformal algebras
16. Yu Zhou (Tsinghua University) : Geometric models of graded skew-gentle algebras
17. Grzegorz Zwara (Nicolaus Copernicus University in Toruń): On transversal slices for modules over representation finite algebras

Abstracts of plenary talks

1. **Rudradip Biswas (University of Warwick): Bounded t-structures, finitistic dimensions, and singularity categories of triangulated categories**

   Recently, Amnon Neeman [3] settled a bold conjecture by Antieau, Gepner, and Heller regarding the relationship between the regularity of finite-dimensional noetherian schemes and the existence of bounded t-structures on their derived categories of perfect complexes. In my talk, I will report on a joint work [1] with Hongxing Chen, Kabeer Manali Rahul, Chris Parker, and Junhua Zheng, where we, with different methods, prove some very general results about the existence of bounded t-structures on (not necessarily algebraic or topological) triangulated categories and their invariance under completion. We show that if the opposite category of an essentially small triangulated category has finite *finitistic dimension* in our sense, then the existence of a bounded t-structure on it forces it to be equal to its *completion* in the sense of Neeman. We also prove a parallel result regarding the *equivalence* of all bounded t-structures on any intermediate triangulated category between the starting category and its completion.

   When specialized to the case of schemes, our work immediately gives us Neeman's theorem as an application and significantly generalizes another remarkable theorem from the same paper [3] by Neeman about the equivalence of bounded t-structures on the bounded derived categories of coherent sheaves. When specialized to other cases like (not necessarily commutative) rings, nonpositive DG-rings, connective $\mathbb{E}_1$-rings, triangulated categories without models, etc., we get many other applications. Under mild finiteness assumptions, these results give a categorical obstruction, i.e. the singularity category in our sense, to the existence of bounded t-structures on a triangulated category. The two key tools used in our treatment are the use of a new concept of finitistic dimension for a triangulated category that we introduced in our paper (this notion is different from the finitistic dimension introduced by Henning Krause [2]) and lifting t-structures along completions of triangulated categories.

   [1] Rudradip Biswas, Hongxing Chen, Kabeer Manali Rahul, Chris Parker, and Junhua Zheng. *Bounded t-structures, finitistic dimensions, and singularity categories of triangulated categories.* Preprint, arXiv:2401.00130.

   [2] Henning Krause. *The finitistic dimension of a triangulated category.* Preprint, arXiv:2307.12671.

   [3] Amnon Neeman. *Bounded t-structures on the category of perfect complexes.* Acta Math. to appear, arXiv:2202.08861.

2. **Peigen Cao (University of Science and Technology of China): F-invariant in cluster algebras**

   A cluster algebra is a $\mathbb{Z}$-subalgebra of a rational function field generated by a special set of generators called cluster variables, which are grouped into overlapping subsets of fixed size, called clusters. One can travel from one cluster to the others by a recursive process called mutation. Cluster monomials are monomials in cluster variables from a single cluster. A fundamental problem in cluster algebras is to characterize when two cluster variables are contained in the same cluster. A more general problem is to characterize when the product of two cluster monomials is still a cluster monomial. In this talk, we introduce F-invariant in cluster algebras and use it to characterize when the product of two cluster monomials is still a cluster monomial.

3. **Eleonore Faber (University of Leeds): Frieze patterns in representation theory**

Friezes are infinite arrays of numbers, in which every four neighbouring vertices arranged in a diamond satisfy the same arithmetic rule. Introduced in the late 1960s by Coxeter, and further studied by Conway and Coxeter in their remarkable papers from 1973, this topic has been nearly forgotten for over thirty years. But since the discovery of connections to cluster algebras and categories of type A, interest in friezes has exploded, several generalizations have been studied, and links to geometry and combinatorics have been explored.

In this talk I will focus on recent results on frieze patterns appearing in connection with Grassmannian cluster categories and an application in singularity theory.

4. **Sergey Fomin (University of Michigan): Cyclically ordered quivers**

We initiate the study of cyclically ordered quivers and their mutation invariants. This is joint work with Scott Neville.

5. **Wahei Hara (The University of Tokyo): Semibricks and spherical objects**

The aim of this talk is to share our result that any semibrick complex in the derived category of a silting discrete algebra can be completed to a simple minded collection. Roughly speaking, a silting discrete algebra is a finite dimensional algebra whose derived category is everywhere τ-tilting finite, and there are a lot of example of such an algebra from both geometry and representation theory. It also will be explained that, if the geometric setting is relevant, the question about semibrick complexes is connected to the classification of spherical objects, which also has a connection to mirror symmetry and McKay correspondence. This is all joint work with Michael Wemyss.

6. **Henning Krause (Bielefeld University): Local dualisable modular representations and local regularity**

The stable module category of a finite group over a field is a tensor triangulated category. The minimal localising tensor ideals are the building blocks; they correspond to the non-maximal homogeneous prime ideals in the cohomology ring of the group. Given such a prime ideal, a number of characterisations of the dualisable objects in the corresponding tensor ideal are given. A key insight is the identification of a special property of the stable module category that controls the cohomological behaviour of local dualisable objects. This property can be considered for general triangulated categories and is called local regularity, it is related to strong generation. The talk is devoted to developing this notion and investigating its ramifications for various special classes of objects in tensor triangulated categories. This is a report on joint work with Dave Benson, Srikanth Iyengar, and Julia Pevtsova.

7. **Daniel Labardini-Fragoso (National Autonomous University of Mexico): Mutations of infinite-dimensional quiver representations**

Over 16 years ago, Derksen-Weyman-Zelevinsky defined mutations of quivers with potential and their finite-dimensional representations, generalizing Bernstein-Gelfand-Ponomarev's reflections along the way, and ultimately expressing cluster variables in skew-symmetric cluster algebras as Caldero-Chapoton functions of what years later would become known as τ-rigid pairs.

As shown by several authors, various classes of finite-dimensional representations are reproduced under these mutations, e.g., τ-rigid pairs, τ-reduced irreducible components, finite-dimensional projectives and injectives, and string and band representations in the case of triangulations of unpunctured surfaces.

After briefly recalling DWZ's setup, in this talk I will present joint work with Rosie Laking, Bea de Laporte and Lang Mou, devoted to extending DWZ's mutations of representations to the infinite-dimensional situation, and to establishing the good mutation behavior of several classes of infinite-dimensional representations and their F- and CC-series.

8. **Bernard Leclerc (Université de Caen Basse-Normandie): Shifted quantum affine algebras and cluster algebras**

This is a report on a joint work with Christof Geiss and David Hernandez (arXiv:2401.04616). Shifted quantum affine algebras have been introduced by Finkelberg and Tsymbaliuk in their study of quantized K-theoretic Coulomb branches of certain quiver gauge theories. Their representation theory has been studied by Hernandez, who constructed a category $\mathcal{O}$ containing finite-dimensional and infinite-dimensional representations. We introduce a new class of infinite rank cluster algebras associated with A-D-E root systems, and show that suitable completions of these cluster algebras are isomorphic to the Grothendieck rings of the category $\mathcal{O}$ of the corresponding shifted quantum affine algebras. In this isomorphism, the cluster variables of the initial seed are mapped to certain Q-variables and the most interesting first step mutations are instances of the QQ-system relations studied recently by Frenkel and Hernandez (arXiv:2312.13256). We conjecture that the images of all cluster monomials are classes of simple objects of $\mathcal{O}$. We prove the conjecture in type A_1. We also show that it holds for the subcategory $\mathcal{C}$ of $\mathcal{O}$ whose objects are the finite-dimensional representations.

9. **René Marczinzik (University of Bonn): Cohen-Macaulay algebras in the sense of Auslander and Reiten**

Auslander and Reiten gave a definition of Cohen-Macaulay rings for general noetherian rings. In the special case of complete local commutative rings this definition is equivalent to the classical notion of Cohen-Macaulay rings in commutative algebra. For Artin algebras, Cohen-Macaulay algebras include Iwanaga-Gorenstein algebras and algebras that have finitistic dimension zero on both sides as well as tensor products of such algebras. Apart from these examples it seems that no non-trivial classes of Cohen-Macaulay Artin algebras have been discovered. We show that contracted preprojective algebras of Dynkin type are Cohen-Macaulay and use this class of algebras to answer a question of Auslander and Reiten about the relation of syzygy modules and maximal Cohen-Macaulay modules for Cohen-Macaulay Artin algebras of positive finitistic dimension. This is joint work with Aaron Chan and Osamu Iyama.

10. **Vanessa Miemietz (University of East Anglia) : Categorification in representation theory**

I will explain some of the ideas behind the theory of finitary 2-representations of finitary 2-categories, which attempts to categorify the representation theory of finite dimensional algebras. I will illustrate these on the example of the categorification of Hecke algebras via Soergel bimodules.

11. **Fernando Muro (Universidad de Sevilla): On the classification of triangulated categories with finiteness conditions**

Let k be an algebraically closed field, Λ a finite-dimensional basic k-algebra, and $\operatorname{proj}\Lambda$ the category of finite-dimensional projective Λ-modules.

The category $\operatorname{proj}\Lambda$ is triangulated in many cases of interest, e.g. if Λ is a preprojective algebra of generalized Dynkin type. Hanihara, building on Heller and Amiot, showed that $\operatorname{proj}\Lambda$ admits a triangulated structure if and only if Λ is twisted 3-periodic. For those $\operatorname{proj}\Lambda$ which are triangulated, the Auslander-Reiten quiver was determined by Xiao and Zhu. Moreover, Amiot gave sufficient conditions for $\operatorname{proj}\Lambda$ to be standard and produced non-standard examples. In the standard and algebraic case, Keller squeezed Amiot's results to show that $\operatorname{proj}\Lambda$ is equivalent to the perfect derived category $\operatorname{per}\mathcal{A}$ of an essentially unique DG category $\mathcal{A}$.

In this talk, I will present two classification theorems. The first one is for algebraic triangulated categories $\mathcal{T}$ of the form $\mathcal{T} \simeq \operatorname{proj}\Lambda$. It resembles the Auslander correspondence. Part of it shows that there is an essentially unique DG algebra A such that $\mathcal{T} \simeq \operatorname{per} A$ identifying Λ on the left with A on the right.

An interesting consequence of this theorem, which was previously unknown, is that Amiot's non-standard examples are all algebraic.

The second one, obtained in collaboration with Jasso, classifies algebraic triangulated categories $\mathcal{T}$ equipped with a d-cluster tilting subcategory $\mathcal{C} \subset \mathcal{T}$ of the form $\mathcal{C} \simeq \operatorname{proj}\Lambda$ such that $\mathcal{C}[d] = \mathcal{C}$. This one is similar to the Auslander-Iyama correspondence. It contains the proof of the existence of an essentially unique DG algebra A such that $\mathcal{T} \simeq \operatorname{per} A$ mapping Λ to A.

As Keller noticed, the latter provides the missing piece in the proof of the Donovan-Wemyss conjecture in singularity theory, after August, Hua, Hua-Keller and Wemyss.

Both theorems work actually over an arbitrary perfect field k. Their proofs rely on connections between the triangulated structure of $\mathcal{T}$, the Hochschild cohomology of Λ, the minimal model of a DG algebra A with $\mathcal{T} \simeq \operatorname{per} A$, the n-angulated categories of Geiss-Keller-Oppermann and the obstruction theory for A-infinity algebras, which is homotopical in nature.

We finally analyze, in the context of both theorems, the relation between the Calabi-Yau property of $\mathcal{T}$, the bimodule right Calabi-Yau property of A, and the Batalin-Vilkovisky operator Δ in Hochschild cohomology.

12. **Steve Oudot (National Institute for Research in Computer Science and Control, France): Stability for homological approximations in persistence theory**

As the mathematical foundation of topological data analysis, persistence theory deals with representations of finite products of totally ordered sets, whose corresponding algebras are generally of wild representation type. Thus, a central question in persistence theory is to define incomplete invariants for poset representations, with the following objectives in mind: to make the invariants as strong as possible, yet computable at scale and parametrizable in a stable and interpretable way for the purpose of applications. At the 20th ICRA in 2022, Eric Hanson introduced a new family of such invariants using relative homological algebra. In this talk we study the sensitivity of these invariants to perturbations of the representations in a certain universal metric coming from persistence theory, highlighting the role played by the global dimension of the exact structure under consideration. The talk assumes no prior knowledge of persistence theory. Its central development is based on recent joint work with Magnus Botnan, Steffen Oppermann and Luis Scoccola [Adv. Math. 451 (2024) 109780].

13. **Xiuping Su (University of Bath): Categorification and mirror symmetry for Grassmannians**

In this talk I will explain a categorical version of Rietsch-Williams' mirror symmetry for the Grassmannian $Gr(k, n)$, focusing on the following points: the construction of an invariant kappa on the Grassmannian cluster category for $Gr(k, n)$ and how that invariant changes under mutations of cluster tilting objects. that a convex body defined by kappa is the Newton-Okounkov body for $Gr(k, n)$ constructed by Rietsch-Williams. a categorical interpretation of the Marsh - Rietsch's superpotential for $Gr(k, n)$. that the Newton-Okounkov cone is the same as the potential cone, obtained by tropicalising Marsh - Rietsch's superpotential. This talk is based on joint work with B. T. Jensen and A. King (arXiv:2404.14572).

14. **Zhengfang Wang (Nanjing University): Derived equivalence classes of skew-gentle algebras via deformation theory**

Gentle algebras are a class of associative algebras introduced by Assem and Skowroński in the context of the representation theory of finite dimensional algebras. More recently, they appeared in the work of Haiden-Katzarkov-Kontsevich as the endomorphism algebra of a formal generator in the partially wrapped Fukaya category of a surface with stops. Around the same time Opper-Plamondon-Schroll independently gave a geometric model of their derived categories based on the same surfaces with stops. This allows us to use the surface models to study the derived categories of gentle algebras.

In this talk, we give a complete description of the A-infinity deformations of (graded) gentle algebras using their surface models. As a result, we show that an A-infinity deformation of a graded gentle algebra is equivalent to the partially wrapped Fukaya category of an orbifold surface obtained by partially compactifying the original surface along some boundary components.

We also show that the latter category admits a formal generator whose endomorphism algebra is a graded skew-gentle algebra. On the other hand, exotic choices of formal generators give rise to algebras which are derived equivalent to skew-gentle algebras. As an application, we may construct a family of non skew-gentle algebras which are derived equivalent to skew-gentle algebras. This is based on a joint work with Severin Barmeier and Sibylle Schroll.

15. **Efim Zelmanov (Southern University of Science and Technology): Superconformal algebras**

In 80s physicists endeavoured to find proper superextensions of the celebrated Virasoro algebra. The resulting structures became known as superconformal algebras and attracted a lot of attention. We will discuss

(1) cuspidal representations of superconformal algebras;

(2) their cohomological properties;

(3) further generalisations.

16. **Yu Zhou (Tsinghua University): Geometric models of graded skew-gentle algebras**

To each finite-dimensional graded skew-gentle algebra A, there is an associated graded punctured marked surface S. We classify the isomorphism classes of indecomposable objects in a certain subcategory P of the perfect derived category $per(A)$ of A via graded curves on S with local system. When the grading of A is non-positive, the subcategory P is the entire perfect derived category $per(A)$. When the grading of A is arbitrary, the subcategory P contains arc objects. We apply the binary model of S to determine a basis for the morphism space between two arc objects in the $per(A)$ via intersections. This is based on my joint work with Yu Qiu and Chao Zhang, as detailed in arXiv:2212.10369v2.

17. **Grzegorz Zwara (Nicolaus Copernicus University in Toruń): On transversal slices for modules over representation finite algebras**

The talk is based on a joint work with Grzegorz Bobiński.

Let k be an algebraically closed field of arbitrary characteristic, $A = kQ/I$ be a finite dimensional k-algebra, and $\mathrm{rep}_{Q,I}(\mathbf{d})$ denote the affine variety of (Q, I)-representations with a fixed dimension vector $\mathbf{d}$, equipped with a base change action of the product $\mathrm{GL}(\mathbf{d})$ of general linear groups. Let $\mathcal{X}$ be a $\mathrm{GL}(\mathbf{d})$-subvariety of $\mathrm{rep}_{Q,I}(\mathbf{d})$ (for example, $\mathcal{X}$ is the closure of a $\mathrm{GL}(\mathbf{d})$-orbit) and $N \in \mathcal{X}$. In order to study local geometric properties of the pointed variety $(\mathcal{X}, N)$ one replaces it by a smoothly equivalent pointed variety $(\mathcal{Y}, N')$ with dimension reduced by the dimension of the orbit $\mathrm{GL}(\mathbf{d}) * N$ of N. A standard method to construct such $(\mathcal{Y}, N')$ is provided by transversal slices, where $\mathcal{Y}$ is chosen to be a subvariety of $\mathcal{X}$ transversal to the orbit $\mathrm{GL}(\mathbf{d}) * N$ at the point $N = N'$. But we want to have a nice interpretation of the variety $\mathcal{Y}$ in terms of representation theory.

Assume now that the algebra A is of finite representation type with a complete set $\{L_1, \dots, L_n\}$ of (isomorphism classes of) indecomposable A-modules. We will define a finitely generated k-algebra $B = k\widetilde{Q}/\widetilde{I}$ with the set of vertices $\widetilde{Q}_0 = \{1, \dots, n\}$, and for each point $N \simeq \bigoplus L_i^{n_i}$ in $\mathrm{rep}_{Q,I}(\mathbf{d})$ a morphism

$$\Phi_N \colon \mathrm{rep}_{\widetilde{Q},\widetilde{I}}((n_i)) \to \mathrm{rep}_{Q,I}(\mathbf{d})$$

such that $\Phi_N(0) = N$, $\dim \mathrm{rep}_{\widetilde{Q},\widetilde{I}}((n_i)) = \dim_N \mathrm{rep}_{Q,I}(\mathbf{d}) - \dim \mathrm{GL}(\mathbf{d}) * N$, and the following induced map

$$\mathrm{GL}(\mathbf{d}) \times \mathrm{rep}_{\widetilde{Q},\widetilde{I}}((n_i)) \to \mathrm{rep}_{Q,I}(\mathbf{d}), \qquad (g, \widetilde{M}) \mapsto g * \Phi_N(\widetilde{M}),$$

is smooth. As a consequence, we get a required replacement of $(\mathrm{rep}_{Q,I}(\mathbf{d}), N)$ by $(\mathrm{rep}_{\widetilde{Q},\widetilde{I}}((n_i)), 0)$, and more generally, replacement of $(\mathcal{X}, N)$ by $(\Phi_N^{-1}(\mathcal{X}), 0)$, for any $\mathrm{GL}(\mathbf{d})$-subvariety $\mathcal{X}$ of $\mathrm{rep}_{Q,I}(\mathbf{d})$ containing N.

We also discuss the variety $\Phi_N^{-1}(\mathcal{X})$ for $\mathcal{X}$ being an orbit closure, and its potential applications.

Titles of contributed talks

1. Hyungtae Baek (Kyungpook National University): ω-operation on the Anderson rings
2. Liqian Bai (Northwestern Polytechnical University): Generalized quantum cluster algebras: The Laurent phenomenon and upper bounds
3. Leizhen Bao (Zhejiang University): Cluster symmetry and Diophantine equations
4. Severin Barmeier (University of Cologne): Deformation theory via reduction systems and applications
5. Xiuli Bian (University of Cologne): Classifying recollements of derived module categories for derived discrete algebras
6. Daniel Bissinger (Kiel University): Uniform Steiner bundles and adjoint pairs of reflection functors for Kronecker representations
7. Pierre Bodin (Université de Sherbrooke): Recollements for partially wrapped Fukaya categories from spherical band objects
8. Giovanni Cerulli Irelli (Sapienza-Università di Roma): Specialization map for quiver Grassmannians
9. Wen Chang (Shaanxi Normal University): Tilting-completion, τ_n-finiteness and n-completeness for gentle algebras
10. Hongxing Chen (Capital Normal University): Self-orthogonal modules and Tachikawa's second conjecture
11. Jianmin Chen (Xiamen University): Geometric model for vector bundles via infinite marked strips
12. Jun Chen (Nanjing University): (De)Coloring in operad theory with applications to homotopy theory of relative Rota-Baxter algerbas
13. Xiao-Wu Chen (University of Science and Technology of China): An introduction to module factorizations
14. Xueqing Chen (University of Wisconsin-Whitewater): On the acyclic quantum cluster algebras with principle coefficients
15. Merlin Christ (IMJ - Paris Rive Gauche): Cluster categories for higher Teichmüller theory
16. Claude Cibils (IMAG Université de Montpellier): τ-tilting Happel's question
17. Tomasz Ciborski (Nicolaus Copernicus University in Toruń): Derived equivalences for derived discrete algebras of infinite global dimension
18. Alessandro Contu (Université Paris Cité): A quantum cluster algebra structure on the semiderived Hall algebra
19. Jian Cui (Shanghai Jiao Tong University): Cotorsion pairs and model structures on Morita rings

20. Difan Deng (Southwest Jiaotong University): On τ-rigid modules over string algebras
21. Souvik Dey (Charles University): Finitistic dimension and singularity categories
22. Eduardo do Nascimento Marcos (University of Sao Paulo): Strongly stratifying ideals, Morita contexts and Hochschild homology
23. Jingcheng Dong (Nanjing University of Information Science and Technology): Near-integral fusion
24. Qiang Dong (Shanghai Jiao Tong University): Equivariant approach to simple singularities
25. Ivon Dorado (Universidad Nacional de Colombia): Preprojective component in a suitable Krull-Schmidt category
26. Darius Dramburg (Uppsala University): Classifying n-representation infinite algebras of type $\tilde{A}$
27. Jie Du (University of New South Wales): Constructing the quantum queer supergroup using Hecke-Clifford superalgebras
28. Bing Duan (Lanzhou University): Cluster algebras, quantum affine algebras, and categorifications
29. Li Fan (Tsinghua University): On relative Koszul duality and dg enhanced orbit categories
30. Jiepeng Fang (Peking University): Sheaf realization of Bridgeland's Hall algebra of Dynkin type
31. Ming Fang (Chinese Academy of Sciences): Projective-injective modules of Temperley-Lieb algebras
32. Jiarui Fei (Shanghai Jiao Tong University): Crystal Structure of Upper Cluster Algebras
33. Xianhui Fu (Northeast Normal University): Ghosts, phantoms and Cartan-Eilenberg DG-modules for a DG-ring
34. Nan Gao (Shanghai University): Chains of model structures arising from modules of finite Gorenstein dimension
35. Monica del Rocio Garcia Gallegos (Université de Versailles Saint-Quentin-en-Yvelines): Cotorsion pairs, thick subcategories and g-finiteness in the category of projective presentations
36. Christof Geiss (National Autonomous University of Mexico): Bangle functions are the generic basis for cluster algebras from punctured surfaces with boundary
37. Shengfei Geng (Sichuan University): Denominator conjecture for some surface cluster algebras
38. Hernán Giraldo (Universidad de Antioquia): Auslander-Reiten triangles in Frobenius categories and applications
39. Mikhail Gorsky (University of Vienna): Deep points in cluster varieties
40. Esha Gupta (Université de Versailles Saint-Quentin-en-Yvelines): d-term silting objects, torsion classes, and cotorsion classes

41. Zhe Han (Henan University): Groupoids from moduli space of quadratic differentials on Riemann surfaces

42. Norihiro Hanihara (Kyushu University): Cluster categories from roots of Auslander-Reiten translations

43. Magnus Hellstrøm-Finnsen (Østfold University College): Hochschild cohomology of monads

44. Lutz Hille (Universität Münster): Polynomial invariants for full exceptional sequences

45. Haigang Hu (University of Science and Technology of China): Point Varieties of noncommutative Conics

46. Jiangsheng Hu (Hangzhou Normal University): Resolving dualities and applications to semi-derived Ringel-Hall algebras

47. Wei Hu (Beijing Normal University): Rigidity dimensions and the Euclidean algorithm

48. Yanping Hu (Hunan Normal University): n-slice algebras of finite type

49. Zheng Hua (The University of Hong Kong): A modular construction of positroid varieties

50. Min Huang (Sun Yat-sen University): Positivity for quantum cluster algebras from orbifolds

51. Zhaoyong Huang (Nanjing University): Auslander-type conditions and Gorenstein algebras

52. Ryota Iitsuka (Nagoya University): Triangulated structures induced by mutations

53. Miodrag Cristian Iovanov (Yeshiva University/University of Iowa): Quantum groups of discrete representation type

54. Alicja Jaworska - Pastuszak (Nicolaus Copernicus University in Toruń): Galois coverings and Krull-Gabriel dimension of algebras

55. Hai Jin (Shanghai Jiao Tong University): Bi-Frobenius algebras structures on quantum complete intersections

56. Maximilian Kaipel (University of Cologne): Torsion lattices and the τ-cluster morphism category

57. Ryo Kanda (Osaka Metropolitan University): Dualizable Grothendieck categories and idempotent rings

58. Shunsuke Kano (Tohoku University): Entropy of cluster DT transformations and the finite-tame-wild trichotomy of acyclic quivers

59. Mohammad Hossein Keshavarz (Nantong University): Tilting and Cotilting Subcategories in Categories of Quiver Representations

60. Gleb Koshevoy (Russian Academy of Sciences): Maximal green sequences and q-characters of Kirillov-Reshetikhin modules

61. Sondre Kvamme (Norwegian University of Science and Technology): d-exact categories and d-cluster tilting

62. Yixin Lan (Chinese Academy of Sciences): Lusztig sheaves and tensor products of integrable highest weight modules

63. Giovanna Le Gros (Charles University): Tor-pairs and tensor-orthogonal pairs over commutative noetherian rings

64. Gangyong Lee (Chungnam National University): On Utumi rings

65. Liping Li (Hunan Normal University): A torsiont theoretic interpretation of sheaf theory over ringed sites

66. Nengqun Li (Beijing Normal University): Fractional Brauer configuration algebras

67. Li Liang (Lanzhou Jiaotong University): A method to construct model structures

68. Kay Jin Lim (Nanyang Technological University): Projective modules and cohomology for the integral basic algebras

69. Xiaoyue Lin (Shanghai Jiao Tong University): H-based quiver potentials and their representations

70. Zengqiang Lin (Huaqiao University): Inhomogeneous tubes and a conjecture by Geiss-Leclerc-Schröer on root systems

71. Jonathan Lindell (Uppsala University): Relative Hochschild cohomology and contracted fundamental group

72. Junyang Liu (Tsinghua University): On Amiot's conjecture

73. Miantao Liu (Université Paris Cité): Categorification of Goncharov-Shen's basic triangle

74. Shiping Liu (University of Sherbrooke): A new approach to Auslander-Reiten formulas and almost aplit sequences in abelian categories

75. Yu Liu (Shaanxi Normal University): Relative cluster tilting theory and τ-tilting theory

76. Yuming Liu (Beijing Normal University): A generalization of Dugas' construction on stable auto-equivalences for symmetric algebras

77. Suiqi Lu (Tsinghua University): Categorification of collapsing subsurfaces

78. Xue-Song Lu (Shanghai Jiao Tong University): Model structure from one cotorsion pair

79. Yongzhi Luan (Shandong University): Dirac cohomology, branching laws and Wallach modules

80. Xiu-Hua Luo (Nantong University): Auslander-Reiten translations in the monomorphism categories of exact categories

81. Yajun Ma (Lanzhou Jiaotong University): Model structures and Q-shaped derived category

82. Piotr Malicki (Nicolaus Copernicus University in Toruń): Characterizations of tame algebras with separating families of almost cyclic coherent components

83. Francesca Mantese (University of Verona): Irreducible representations of free algebras through Leavitt path algebras

84. Xuefeng Mao (Shanghai University): Calabi-Yau connected cochain DG algebras

85. František Marko (The Pennsylvania State University): Blocks of rational supermodules over some quasi-reductive supergroups in positive characteristic

86. Lang Mou (University of Cologne): Generic bases of skew-symmetrizable cluster algebras in affine types

87. Kaveh Mousavand (Okinawa Institute of Science and Technology): brick-Brauer-Thrall Conjectures and some applications

88. Ruslan Muslumov (ADA University): Simple functors over the Green biset functor of section Burnside rings

89. Haru Negami (Chiba University): Construction of representation of braid groups and integral transformation

90. Sebastian Opper (Charles University): Derived Picard groups and integration of Hochschild cohomology

91. Yuya Otake (Nagoya University): On the existence of counterexamples for vanishing problems of Ext

92. Takumi Otani (Tsinghua University): The numbers of full exceptional collections for extended Dynkin quivers

93. Oyeyemi Oyebola (Brandon University): Extra polyloop-II and its representations

94. Shengyong Pan (Beijing Jiaotong University): Cohen–Montgomery duality for bimodules and singular equivalences of Morita type

95. Romeo Parackal Govindan (Cochin University of Science and Technology): Normality of Lie categories and category of bundles

96. Grzegorz Pastuszak (Nicolaus Copernicus University in Toruń): On covering theory of functor categories and its applications

97. Calvin Pfeifer (Universität zu Köln): On generic τ-reduced wildness of algebras associated to symmetrisable Cartan matrices of indefinite type

98. Tuan Anh Pham (University of Edinburgh): The orbit method for the Witt algebra

99. Mara Pompili (University of Graz): Factorization theory of cluster algebras

100. Matthew Pressland (University of Glasgow): Representation theory and positroid varieties

101. Marina Purri Brant Godinho (University of Glasgow): Twist autoequivalences arising from periodic suspension

102. Fan Qin (Beijing Normal University): A proof of $A = U$ for cluster algebras from class P quivers

103. Yongyun Qin (Yunnan Normal University): Categorical properties and homological conjectures for bounded extensions of algebras

104. Yu Qiu (Tsinghua University): Deformed 3-Calabi-Yau categories and partial compactifications with orbifolding

105. Edson Ribeiro Alvares (Universidade Federal do Paraná): Stratifying systems via nested family of torsion pairs

106. Ricardo Felipe Rosada Canesin (Université Paris Cité): Categorifying twisted Auslander-Reiten quivers

107. Shiquan Ruan (Xiamen University): Hall algebra approach to iquantum groups

108. Lleonard Rubio y Degrassi (Uppsala University): On the first Hochschild cohomology and the fundamental groups

109. Álvaro Sánchez Campillo (Universidad de Murcia): Abstract representation theory via coherent Auslander-Reiten diagrams

110. Markus Schmidmeier (Florida Atlantic University): Invariant subspaces of nilpotent operators. Level, Mean, and Colevel: The Triangle $\mathbb{T}(n)$

111. Sibylle Schroll (University of Cologne): The Tamarkin-Tsygan calculus for gentle algebras

112. Adam Skowyrski (Nicolaus Copernicus University in Toruń): Periodicity shadows: a new combinatorial insight in studying periodic algebras

113. Andrea Solotar (Universidad de Buenos Aires and GTIIT): On the first τ-tilting Hochschild cohomology of an algebra

114. Greg Stevenson (Aarhus University): Some thoughts on Han's conjecture

115. Arjun Sujatha Narayanan (Cochin University of Science and Technology): On irreducible representation of cover of Lie algebras

116. Peter Symonds (University of Manchester): The module structure of a group action on a ring

117. Kai Meng Tan (National University of Singapore): e-cores and e-weights of multipartitions and blocks of Ariki-Koike algebras

118. Hugh Thomas (Université du Québec á Montréal): u-equations and quotients of algebras

119. Jan Henrik Thomm (Lund University): Auslander–Reiten sequences in minimal A_∞-structures of the module category of a directed algebra

120. Ryu Tomonaga (The University of Tokyo): Cohen-Macaulay representations of invariant subrings

121. Satoshi Usui (Tokyo Metropolitan College of Industrial Technology): Stable categories of Gorenstein-projective modules over monomial algebras

122. Adam-Christiaan van Roosmalen (Xi'an Jiaotong-Liverpool University): Holomorphic vector bundles for quantum Grassmannians

123. Laertis Vaso (Norwegian University of Science and Technology): Higher τ-tilting theory for Nakayama algebras

124. Jialin Wang (City University of London): Some endotrivial module for the symmetric group

125. Junpeng Wang (Northwest Normal University): Homotopy equivalence over rings with finite Gorenstein weak global dimension

126. Qi Wang (Tsinghua University): Representation type of cyclotomic quiver Hecke algebras

127. Ren Wang (Hefei University of Technology): Preprojective algebras, skew group algebras and Morita equivalences

128. Xi Wang (Beijing University of Technology): The λ-pure singularity categories on a Grothendieck category

129. Xukun Wang (Chinese Academy of Sciences): The lax functoriality of Hochschild cochain complex

130. Peter Webb (University of Minnesota): Biset functors defined on categories

131. Can Wen (Beijing Normal University): The first Hochschild cohomology groups under glu-ings

132. Nicholas Williams (Lancaster University): Donaldson–Thomas invariants for the Bridgeland–Smith correspondence

133. Yilin Wu (University of Science and Technology of China): Group actions on relative cluster categories and Higgs categories

134. Yumeng Wu (Tsinghua University): The parity of Lusztig's restriction functor and Green's formula for a quiver with automorphism

135. Changchang Xi (Capital Normal University): Derived equivalences of algebras VS equiva-lence relations of matrices

136. Jie Xiao (Beijing Normal University): Lie algebras arising from two-periodic projective complex and derived categories

137. Bohan Xing (Beijing Normal University): Generalized parallel paths method with applica-tions to Brauer graph algebras

138. Jiajun Xu (Shanghai Jiao Tong University): Quiver locus, Kazhdan-Lusztig variety and Zelevinsky map

139. Xiaoxiao Xu (East China Normal University): A recollement approach to Han's conjecture

140. Gang Yang (Lanzhou Jiaotong University): Homological theory of representations having pure acyclic injective resolutions

141. Guiyu Yang (Shandong University of Technology): Quasi-hereditary slim cyclotomic q-Schur algebras

142. Xiaoyan Yang (Zhejiang University of Science and Technology): G-dimensions for DG-modules over commutative DG-rings

143. Huihui Ye (Sichuan University): On F-polynomials for generalized quantum cluster algebras and Gupta's formula

144. Yu Ye (University of Science and Technology of China): On quasi-diagrams and gentle algebras

145. Haicheng Zhang (Nanjing Normal University): Periodic derived Hall algebras of hereditary abelian categories

146. Lujun Zhang (Zhejiang University): The maximality of weakly separated collections under boundary map

147. Xiaojin Zhang (Jiangsu Normal University): Self-orthogonal τ-tilting modules and tilting modules

148. Yingying Zhang (Huzhou University): Mutation of Brauer configuration algebras

149. Zhen Zhang (Beijing Normal University at Zhuhai): Simple modules and quasi-tubes on self-injective algebra of polynomial growth

150. Zhibing Zhao (Anhui University): n-torsionfree objects and Frobenius functors

151. Xiaoqiu Zhong (Shanghai Jiao Tong University): Quasi-hereditary orderings of Nakayama algebras

152. Guodong Zhou (East China Normal University): Minimal models in algebra and operad theory

153. Panyue Zhou (Changsha University of Science and Technology): Right triangulated quotient categories

154. Haiyan Zhu (Zhejiang University of Technology): Frobenius extensions about centralizer matrix algebras

155. Shijie Zhu (Nantong University): Defect invariant Nakayama algebras and homological dimensions

Abstracts of contributed talks

1. **Hyungtae Baek (Kyungpook National University): ω-operation on the Anderson rings**

   Let D be an integral domain and let $D[X]$ be the polynomial ring over D. Consider the multiplicative subset $A = \{f \in D[X] | f(0) = 1\}$. Then we obtain the quotient ring $D[X]_A$ of $D[X]$ by A, which is called the *Anderson ring* of D.

   In this talk, we investigate star-operations on the Anderson rings. More precisely, we examine the following questions:

   (1) Can we characterize the maximal ω-ideals of $D[X]_A$?

   (2) Is there a ω-local property of $D[X]_A$?

2. **Liqian Bai (Northwestern Polytechnical University): Generalized quantum cluster algebras: The Laurent phenomenon and upper bounds**

   We define a quantum analogue of a class of generalized cluster algebras which can be viewed as a generalization of quantum cluster algebras, and prove the Laurent phenomenon of these generalized quantum cluster algebras. Under certain coprimality conditions, the upper bounds do not depend on the choice of the initial cluster. It is jointed work with Xueqing Chen, Ming Ding and Fan Xu.

3. **Leizhen Bao (Zhejiang University): Cluster symmetry and Diophantine equations**

   In this talk, we will show a class of Diophantine equations with cluster symmetry.

   On the one hand, given a seed of a cluster algebra, if there exists a cluster symmetric map of length 1 and the corresponding system of homogeneous linear equations with non-trivial solutions, then we can construct a Laurent polynomial which is invariant under the cluster symmetric map.

   On the other hand, given a Diophantine equation, there exists an algorithm to determine whether the equation possesses a cluster symmetric map of length 1. In this case, we can use the cluster symmetric map to study the solution of the Diophantine equation.

   This is based on the joint work with Fang Li.

4. **Severin Barmeier (University of Cologne): Deformation theory via reduction systems and applications**

   Reduction systems go back to the theory of abstract rewriting systems which are used in a variety of disciplines including computer science, logic and linguistics. In algebra, they were popularized by Bergman's 1978 paper titled "The Diamond Lemma in ring theory".

   From a homological perspective, reduction systems give rise to projective resolutions of path algebras of quivers with relations and thus they can be used to compute Hochschild cohomology. These resolutions are often close to being minimal and the corresponding cochain complex can be endowed with higher structures via homotopy transfer. One consequence is that there is an equivalence between deformations of associative algebras and deformations of reduction systems. Besides excellent practical properties, reduction systems also bear theoretical advantages. For example, they can be used to give sufficient criteria for algebraization of formal deformations. Deformations of reduction systems can sometimes even detect nontrivial deformations of formally rigid algebras such as the Weyl algebra.

This perspective has also allowed us to give applications in several different areas, such as concrete descriptions of deformations of Abelian categories of coherent sheaves, strict deformation quantizations of Poisson structures, and A∞deformations of Khovanov arc algebras.

5. **Xiuli Bian (University of Cologne): Classifying recollements of derived module categories for derived discrete algebras**

We study a class of derived discrete Nakayama algebras. All indecomposable compact objects in the derived module category are determined and all recollements generated by the indecomposable compact exceptional objects are classified. It reveals that all such recollements are derived equivalent to stratifying recollements. As a byproduct, this confirms a question due to Xi for these recollements.

6. **Daniel Bissinger (Kiel University): Uniform Steiner bundles and adjoint pairs of reflection functors for Kronecker representations**

Let k be an algebraically closed field and $n \in \mathbb{N}$. A vector bundle $\mathcal{F}$ on projective space $\mathbb{P}^n = \mathbb{P}^n(k)$ is called Steiner bundle, if there exist finite dimensional vector spaces V_1, V_2 and a short exact sequence

$$0 \to \mathcal{O}_{\mathbb{P}^n}(-1) \otimes_k V_1 \to \mathcal{O}_{\mathbb{P}^n} \otimes_k V_2 \to \mathcal{F} \to 0,$$

where $\mathcal{O}_{\mathbb{P}^n}(-1)$ denotes the Serre twisting sheaf on $\mathbb{P}^n$. Steiner bundles were introduced in [1] and it is known, at least since [2], that the category of Steiner bundles is equivalent to a full subcategory of the category of representations $rep(K_n)$ for the generalized Kronecker quiver K_n with n arrows $\gamma_i \colon 1 \to 2$. We interpret a Kronecker representation M as a k-linear map $\psi_M \colon A_n \otimes_k M_1 \to M_2$, where $A_n := \bigoplus_{i=1}^n k\gamma_i$ denotes the so-called arrow space of K_n.

The representations $M \in rep(K_n)$ corresponding to Steiner bundles may be described by the property that for every k-linear injective map $\alpha \colon A_1 \to A_r$ the restriction $\psi_M \circ (\alpha \otimes_k id_{M_1})$ is a projective representation in the representation finite category $rep(K_1)$. Moreover, they can be characterized as being right Hom-orthogonal to a certain algebraic family of "test representations" in $rep(K_n)$. These test representations can be built from the projective cover of the simple representation $S(1) \in rep(K_1)$, when considered as a representation in $rep(K_n)$.

We discuss a generalization of this characterization, which can be obtained using adjunctions between the categories $rep\, K_2$ and $rep\, K_n$. The adjoint pairs involved are constructed using restriction, inflation, and reflection functors, and lead to a family of test representations for every indecomposable preprojective K_2 representation.

As an application we explain how this approach can be used in conjunction with an adapted version of Reineke's result [3] on general Kronecker representations and AR theory to study the splitting types of uniform Steiner bundles.

[1] I. Dolgachev and M. Kapranov, *Arrangements of hyperplanes and vector bundles on* $\mathbb{P}^n$. Duke Math. J. **71** (1993), 633–664.

[2] M. Jardim and D. Prata: *Vector bundles on projective varieties and representations of quivers.* Algebra Disc. Math. **20** (2015), 217-249.

[3] M. Reineke: *Dimension expanders via quiver representations.* J. Comb. Algebra **8** (2024), 111 - 119.

7. **Pierre Bodin (Université de Sherbrooke): Recollements for partially wrapped Fukaya categories from spherical band objects**

By a theorem of Haiden, Katzarkov and Kontsevich, partially wrapped Fukaya categories of graded marked surfaces are known to be equivalent to perfect derived categories of graded gentle algebras. Using this equivalence, Chang, Jin and Schroll studied the localization of a partially wrapped Fukaya category at a subcategory generated by an admissible collection of graded arcs. In particular, they showed that "cutting" the surface along these arcs gives a recollement of the corresponding categories.

Motivated by a similar question, we will study the localization of a partially wrapped Fukaya category at a subcategory generated by certain graded simple closed curves. For this, we introduce the class of pinched graded gentle algebras and show that they are in bijection with graded marked surfaces with conical singularities. Then we will see that the localized category is equivalent to the perfect derived category of a pinched graded gentle algebra, and that the associated pinched surface is obtained by contracting the simple closed curve.

8. **Giovanni Cerulli Irelli (Sapienza-Università di Roma): Specialization map for quiver Grassmannians**

We define a specialization map between cohomology algebras of quiver Grassmannians of Dynkin type and we prove that it is surjective in type A, generalizing a beautiful result of Lanini and Strickland. This is a joint work with Francesco Esposito, Xin Fang and Ghislain Fourier. If time permits, I will shortly report on a second project in collaboration with Martina Lanini, Francesco Esposito and Rui Xiong in which we describe the kernel of the specialization map and thus the cohomology of quiver Grassmannians of type A in terms of Schubert calculus.

9. **Wen Chang (Shaanxi Normal University): Tilting-completion, τ_n-finiteness and n-completeness for gentle algebras**

The purpose of this talk is two-fold. Firstly, we study the self-orthogonal modules over a gentle algebra. In particular, it is proved that any almost tilting module over a gentle algebra is partial tilting. At the same time, for any $n > 2$ and $0 < m < n - 2$, there always exists a gentle with rank n and a pre-tilting module over it with rank m which is not partial tilting. Secondly, we give a complete classification of gentle algebras that are τ_n-finite, and n-complete with respect to a tilting module in the sense of Iyama. The tool we use is the geometric model of the module category over a gentle algebra.

10. **Hongxing Chen (Capital Normal University): Self-orthogonal modules and Tachikawa's second conjecture**

This talk is based on a joint work with Changchang Xi. In the talk, we will report some advances on Tachikawa's second conjecture which says that a self-orthogonal, finitely generated module over a finite-dimensional algebra is projective. This conjecture is an important part of the Nakayama conjecture that is one of the most prominent conjectures in representation theory and homological algebra of finite-dimensional algebras. Our strategy is to address finitely generated, self-orthogonal generators over a self-injective Artin algebra from the view point of stable categories and recollements. We give equivalent characterizations of Tachikawa's second conjecture in terms of relative Gorenstein categories and special approximations, introduce Gorenstein-Morita algebras by linking Gorenstein-projective modules and modules of finite projective dimensions, and show that the Nakayama conjecture holds true for Gorenstein-Morita algebras. It turns out that any gendo-symmetric, virtually Gorenstein algebra with infinite dominant dimension is symmetric.

11. **Jianmin Chen (Xiamen University): Geometric model for vector bundles via infinite marked strips**

In this talk, we present a geometric model for the category of vector bundles over the weighted projective line of type $(2, 2, n)$. This geometric model is based on the orbit space of a marked infinite strip under a specific group action. By establishing a bijection between indecomposable bundles over the weighted projective line and orbits of line segments on the strip, we interpret the slope of indecomposable bundles, the Picard group action, vector bundle duality, the dimension of extensions space between two vector bundles, projective covers and injective hulls of extension bundles, etc. in geometric term. This is a joint work with Shiquan Ruan and Jinfeng Zhang.

12. **Jun Chen (Nanjing University): (De)Coloring in operad theory with applications to homotopy theory of relative Rota-Baxter algerbas**

In this talk, I will introduce a (de)coloring method in operad theory which is compatible with Koszul duality theory and present some applications to minimal models of operated algebras such as (relative) diffential associative algebras with weight and (relative) Rota-Baxter associative/Lie algebras with weight.

13. **Xiao-Wu Chen (University of Science and Technology of China): An introduction to module factorizations**

Matrix factorizations play a central role in the study of modules over hypersurface singularities. Module factorizations are natural extensions of matrix factorizations, and arise implicitly in the study of Eisenbud-Peeva (2021) on modules over complete intersections.

We study the category of module factorizations over a general noncommutative ring, and obtain two vast generalizations of Eisenbud's matrix factorization theorem. We illustrate the results via integral representations of finite groups.

14. **Xueqing Chen (University of Wisconsin-Whitewater): On the acyclic quantum cluster algebras with principle coefficients**

We study a new lower bound quantum cluster algebra which is generated by the initial quantum cluster variables and the quantum projective cluster variables of an acyclic quantum cluster algebra with principle coefficients. We show that the lower bound quantum cluster algebra coincides with the corresponding acyclic quantum cluster algebra. Moreover, the dual PBW basis of this algebra is obtained. This is a joint work with M. Ding, J. Huang and F. Xu.

15. **Merlin Christ (IMJ - Paris Rive Gauche): Cluster categories for higher Teichmüller theory**

Given a marked surface and integer $n > 1$, there is an associated cluster algebra which arises as the ring of regular functions on the SL_n higher Teichmüller space of the surface in the sense of Fock-Goncharov. This talk concerns ongoing work on the additive categorification of these cluster algebras (which coefficients) in terms of 2-Calabi-Yau extriangulated categories. This generalizes my previous work on the rank 2 case, which was treated in arxiv:2209.06595. Along the way, we will encounter generalized cluster categories, Fukaya categories of surfaces, relative Calabi-Yau structures, as well as gluing constructions for categories with cluster-tilting objects.

16. **Claude Cibils (IMAG Université de Montpellier): τ-tilting Happel's question**

This follows Andrea Solotar's presentation.

We will define for all degrees $n \geq 1$ the vector space ${}^{\tau}H^n(\Lambda, X)$, that is the τ-tilting Hochschild cohomology of a finite dimensional algebra Λ with coefficients in a Λ-bimodule X. This will be done according to one of the main ideas of the τ-tilting theory, by means of the Auslander-Reiten formula. This graded vector space contains the classical Hochschild cohomology of Λ with coefficients in X and is Morita invariant.

We compute the dimension n of the τ-tilting Hochschild cohomology. The result is expressed as an alternating sum of the dimensions of classical Hochschild cohomology in lower degrees, plus an alternating sum of the dimensions of vector spaces taking into account the Ext algebra of Λ as well as the Peirce decomposition of the bimodule X.

If Λ has finite global dimension, then ${}^{\tau}H^n(\Lambda, \Lambda) = 0$ for $n >> 0$. We use the minimal projective resolution of Λ as a bimodule which dimensions were given by Happel. Using this resolution, ${}^{\tau}H^*(\Lambda, X)$ is the cokernel of the morphisms which compute the Hochschild cohomology of X.

Each algebra Λ that satisfies the converse of the previous statement, that is if the τ-tilting Hochschild cohomology of Λ stops then Λ has finite global dimension, is a positive answer to the *τ-tilting analog of Happel's question.* The answer is positive for local algebras.

In contrast, recall that R.O. Buchweitz , E. L. Green, D. Madsen and Ø. Solberg described a local algebra which answers negatively the (classical) Happel's question.

Moreover, if the Ext algebra is finitely generated, then the answer to the τ-tilting Happel's question is also positive.

If time allows, I will discuss a truncated long exact sequence of τ-tilting Hochschild cohomology associated to each short exact sequence of Λ-bimodules.

This is joint work with M. Lanzilotta, E.N. Marcos and A. Solotar.

17. **Tomasz Ciborski (Nicolaus Copernicus University in Toruń): Derived equivalences for derived discrete algebras of infinite global dimension**

Following [3] we say that a finite-dimensional algebra A over an algebraically closed field k is *derived discrete* if for every vector $\mathbf{n}$ of non negative integers there are only finitely many isomorphism classes of indecomposable objects in $\mathbf{D}^b(\mod A)$ with cohomology dimension vector $\mathbf{n}$.

By a *derived equivalence* between finite dimensional k-algebras A and B we mean a triangle equivalence between triangulated categories $\mathbf{D}^b(\mod A)$ and $\mathbf{D}^b(\mod B)$. It is an open question whether any derived equivalence is *standard*, that is, isomorphic, as a triangle functor, to an equivalence given by the derived tensor product $X \otimes_A^{\mathbb{L}} -$ for some two-sided tilting complex X of B-A-bimodules [2].

An affirmative answer to the question has been given when A and B are derived discrete algebras of finite global dimension [1]. In this talk I aim to explain that this is also the case for the derived discrete algebras of infinite global dimension.

The talk is a report on my PhD work under supervision of Grzegorz Bobiński.

[1] Xiao-Wu Chen, Chao Zhang, *The derived-discrete algebras and standard equivalences*, J. Algebra vol.525(2019),259-283.

[2] Jeremy Rickard, *Derived equivalences as derived functors*, J. London math. Soc. (2) vol.43(1991), no. 1, 37-48.

[3] Dieter Vossieck, *The algebras with discrete derived category*, J. Algebra vol.243(2001), no. 1, 168-176.

18. **Alessandro Contu (Université Paris Cité): A quantum cluster algebra structure on the semiderived Hall algebra**

In 2011, Hernandez–Leclerc discovered a surprising isomorphism between the quantum Grothendieck ring of a quantum loop algebra of ADE type and the derived Hall algebra of any Dynkin quiver of the same type. Thanks to this isomorphism, we can endow the derived Hall algebra with a quantum cluster algebra structure, by transporting the quantum cluster algebra structure on the quantum Grothendieck ring described by Fujita–Hernandez–Oh–Oya in 2023. On the other hand, generalizing Bridgeland's work, in 2014, Gorsky (and later, in a broader setting, Lin–Peng) defined the semiderived Hall algebra and showed that the derived Hall algebra can be obtained as a specialization. Building on the combination of these results, we provide the semiderived Hall algebra with a quantum cluster algebra structure. In particular, we propose a lift of the (q,t)-characters to the semi-derived Hall algebra, showing that they satisfy a lifted version of the quantum T-system.

19. **Jian Cui (Shanghai Jiao Tong University): Cotorsion pairs and model structures on Morita rings**

We study cotorsion pairs and abelian model structures on Morita rings $\Lambda = \left(\begin{smallmatrix} A & {}_AN_B \\ {}_BM_A & B \end{smallmatrix}\right)$ which are Artin algebras. Given cotorsion pairs $(\mathcal{U}, \mathcal{X})$ and $(\mathcal{V}, \mathcal{Y})$ in A-Mod and B-Mod, respectively, one can construct four cotorsion pairs in Λ-Mod:

$$({}^{\perp}\left(\begin{smallmatrix} \mathcal{X} \\ \mathcal{Y} \end{smallmatrix}\right), \left(\begin{smallmatrix} \mathcal{X} \\ \mathcal{Y} \end{smallmatrix}\right)), \quad (\Delta(\mathcal{U},\ \mathcal{V}),\ \Delta(\mathcal{U},\ \mathcal{V})^{\perp}), \quad (\left(\begin{smallmatrix} \mathcal{U} \\ \mathcal{V} \end{smallmatrix}\right), \left(\begin{smallmatrix} \mathcal{U} \\ \mathcal{V} \end{smallmatrix}\right)^{\perp}), \quad ({}^{\perp}\nabla(\mathcal{X},\ \mathcal{Y}),\ \nabla(\mathcal{X},\ \mathcal{Y})).$$

These cotorsion pairs have relations:

$$\Delta(\mathcal{U},\ \mathcal{V})^{\perp} \subseteq \left(\begin{smallmatrix} \mathcal{X} \\ \mathcal{Y} \end{smallmatrix}\right), \qquad {}^{\perp}\nabla(\mathcal{X},\ \mathcal{Y}) \subseteq \left(\begin{smallmatrix} \mathcal{U} \\ \mathcal{V} \end{smallmatrix}\right).$$

An important feature is that they are not equal, in general. In fact, there even exists a Morita algebra Λ, such that the four cotorsion pairs are pairwise different. The problem of identifications, i.e., when these inclusions are the same, are studied; the heredity and completeness of these cotorsion pairs are investigated; and finally, various model structures on Λ-Mod are obtained, by explicitly giving the corresponding Hovey triples and Quillen's homotopy categories. In particular, cofibrantly generated Hovey triples, and the Gillespie-Hovey triples induced by compatible generalized projective (respectively, injective) cotorsion pairs, are explicitly constructed. All these Hovey triples obtained are pairwise different and "new" in some sense. Some results are even new when $M = 0$ or $N = 0$.

This is a joint work with Shi Rong and Pu Zhang.

20. **Difan Deng (Southwest Jiaotong University): On τ-rigid modules over string algebras**

In this talk, we investigate the properties of τ-rigid modules over finite-dimensional string algebras. As an application, we establish τ-reachability in gentle algebras. This is based on joint work with Changjian Fu, Shengfei Geng and Pin Liu.

21. **Souvik Dey (Charles University): Finitistic dimension and singularity categories**

Let A be a Noetherian ring (not necessarily commutative). When is there a uniform upper bound on the projective dimensions of all (left) A-modules of finite projective dimension? When A is commutative, it follows from the works of Bass and Gruson-Raynaud, that this is the case if and only if A has finite Krull dimension. The question of whether such a uniform upper bound exists for Artin algebras, even when restricted to finitely generated modules only, was first publicized by Bass in the 1960s. This question, since known as the finitistic dimension conjecture, remains open even after half a century. In this talk, based on ongoing joint work with Jan Stovicek, we will present some criteria for the existence of such uniform upper bounds in terms of certain form of generation in singularity categories. One ingredient of our approach is based on certain generalizations of the "delooping level" of Gélinas.

22. **Eduardo do Nascimento Marcos (University of Sao Paulo): Strongly stratifying ideals, Morita contexts and Hochschild homology**

This talk is based on a work of Claude Cibils, Marcelo Lanzilotta, Eduardo N. Marcos,* and Andrea Solotar.

We consider stratifying ideals of finite dimensional algebras in relation with Morita contexts. A Morita context is an algebra built on a data consisting of two algebras, two bimodules and two morphisms. For a strongly stratifying Morita context - or equivalently for a strongly stratifying ideal - we show that Han's conjecture holds if and only if it holds for the diagonal subalgebra. The main tool is the Jacobi-Zariski long exact sequence. One of the main consequences is that Han's conjecture holds for an algebra admitting a strongly (co-)stratifying chain whose steps verify Han's conjecture.

If Han's conjecture is true for local algebras and an algebra Λ admits a primitive strongly (co-)stratifying chain, then Han's conjecture holds for Λ.

23. **Jingcheng Dong (Nanjing University of Information Science and Technology): Near-integral fusion**

We abstract the study of irreducible characters of finite groups vanishing on all but two conjugacy classes, initiated by S. Gagola, to irreducible characters of fusion rings whose kernel is maximal rank. These near-integral fusion rings include the near-groups which are currently one of the most abundant sources of novel examples of fusion categories to date. We generalize many of the known results on near-group fusion categories from the literature to near-integral fusion categories and characterize when such categories are braided. In particular, braided near-integral fusion categories describe all braided fusion categories which are almost symmetrically braided. This allows a complete description of the braided equivalence classes of premodular fusion categories of rank 6 or less. This is a joint work with Andrew Schopieray.

24. **Qiang Dong (Shanghai Jiao Tong University): Equivariant approach to simple singularities**

This is a report on a joint work with Xiao-Wu Chen and Shiquan Ruan. In this talk we investigate the equivariant relations between simple singularities. H. Knörrer has established the equivalence between the category of matrix factorizations with respect to singularity and the category of the maximal Cohen-Macaulay modules over the corresponding skew group algebra. We investigate it in the view of equivariant categories.

25. **Ivon Dorado (Universidad Nacional de Colombia): Preprojective component in a suitable Krull-Schmidt category**

Consider a Krull-Schmidt category $\mathcal{B}$, not necessarely abelian, with enough projectives and injectives, almost split sequences, and satisfying the following properties:

$A.1$ There is an indecomposable projective object $\hat{S} \in \mathcal{B}$ such that $\mathrm{Hom}(\hat{S}, X) \neq 0$ for all $X \in \mathcal{B}$ and if $f : X \to \hat{S}$ is a non zero morphism, then f is a retraction.

A.2 If $X \to Q$ and $Y \to Q$ are irreducible morphisms with Q indecomposable projective and X, Y indecomposable, then $X \cong Y$.

We introduce pseudo hereditary projective objects to construct a suitable set of sections within the Auslander-Reiten component of the object $\hat{S}$.

This construction allows us to describe many categories of representations including some modulations of species and to establish some bijections between them. For example between some oriented modulations of the Dynkin diagrams B_n and C_n.

26. **Darius Dramburg (Uppsala University): Classifying n-representation infinite algebras of type $\tilde{A}$**

n-representation infinite (= n-RI) algebras are an analog of hereditary representation infinite algebras in Iyamas higher Auslander-Reiten theory. An n-RI algebra is of type $\tilde{A}$ if its higher preprojective algebra is a skew-group algebra $R * G$, where G is a finite abelian group acting on $R = \mathbb{C}[x_0, ..., x_n]$ with determinant 1. In this talk, I want describe a classification scheme for n-representation infinite algebras via the skew-group algebra $R * G$, and the invariant ring R^G. First, we group the n-RI algebras by their "type" and classify which values the types can take. Using the toric geometry of R^G, I will explain why the types naturally are lattice points in some polytope. This leads to the statement that "almost all" skew-group algebras of this kind are higher preprojective, and explains why deciding whether $R * G$ is higher preprojective is a hard problem. Then we fix a type. We will see that a process of mutation allows us to relate all n-RI algebras of the same type, and I will conclude by showing how such a mutation class can be turned into a distributive lattice.

This talk is based on joint work with Oleksandra Gasanova.

27. **Jie Du (University of New South Wales): Constructing the quantum queer supergroup using Hecke-Clifford superalgebras**

Using a geometric setting of q-Schur algebras, Beilinson-Lusztig-MacPherson discovered a new basis for quantum $\mathfrak{gl}_n$ (i.e., the quantum enveloping algebra $U_q(\mathfrak{gl}_n)$ of the Lie algebra $\mathfrak{gl}_n$) and its associated matrix representation of the regular module of $U_q(\mathfrak{gl}_n)$. This beautiful work shows that the structure of the quantum linear group is hidden in the structure of Hecke algebras. The work has been generalized (either geometrically or algebraically) to quantum affine $\mathfrak{gl}_n$, quantum super $\mathfrak{gl}_{m|n}$, and recently, to some i-quantum groups of type AIII.

In this talk, I will report on a completion of the work for a new construction of the quantum queer supergroup using Hecke-Clifford superalgebras and their associated q-Schur superalgberas. This project was initiated 10 years ago, and almost failed immediately after a few months' efforts, due to the complication in computing the multiplication formulas by odd generators. Then, we moved on testing special cases or other methods for some years and regained confidence to continue. Thus, it resulted in a preliminary version which was posted on arXiv in August 2022.

The main unsatisfaction in the preliminary version was the order relation used in a triangular relation and the absence of a normalized (or standardised) basis. It took two more years for us to tune the preliminary version up to a satisfactory version, where the so-called SDP condition, involving further combinatorics related to symmetric groups and

Clifford generators, and an extra exponent, involving the odd part of a labelling matrix, play decisive roles in fixing the problems.

If time permits, I will discuss some applications of the work.

This is joint work with Haixia Gu, Zhenhua Li, and Jinkui Wan.

28. **Bing Duan (Lanzhou University): Cluster algebras, quantum affine algebras, and categorifications**

In this talk, I will present a recent joint work with Ralf Schiffler on the study of real or real prime modules over simply-laced quantum affine algebras by establishing a link between additive categorifications and monoidal categorifications of cluster algebras.

29. **Li Fan (Tsinghua University): On relative Koszul duality and dg enhanced orbit categories**

This is joint work with Bernhard Keller and Yu Qiu. We first show that, for any dg algebra A, its perfect derived category can be realized respectively as an (enlarged) cluster category and a (shrunk) singularity category of certain differential bigraded algebras, generalizing results of Ikeda-Qiu and Happel/Hanihara-Iyama respectively. Secondly, we show that pretriangulated dg categories enjoy a universal property and deduce that the passage to an orbit quotient commutes with the dg quotient. In particular, for a triangulated category with dg enhancement and an endofunctor, there exists a unique triangulated orbit category. As an application, we show that the orbit quotient commutes with dg/Verdier quotients. In particular, the orbit m-cluster category is equivalent to AKG's m-cluster category for any connective, smooth and proper dg algebra.

30. **Jiepeng Fang (Peking University): Sheaf realization of Bridgeland's Hall algebra of Dynkin type**

Bridgeland realized the quantum group $\mathrm{U}_v(\mathfrak{g})$ via the localization of Ringel-Hall algebra for two-periodic projective complexes of quiver representations over a finite field. We generalize Lusztig's categorical construction and (dual) canonical basis for the nilpotent part $\mathrm{U}_v(\mathfrak{n}^+)$ to Bridgeland's Hall algebra of Dynkin type, and obtain a perverse sheaf realization of global basis for Bridgeland's localizing algebra. In particular, we prove that the dual of canonical basis elements are part of our basis up to powers of v. This is a joint work with Yixin Lan and Jie Xiao.

31. **Ming Fang (Chinese Academy of Sciences): Projective-injective modules of Temperley-Lieb algebras**

We classify indecomposable projective-injective modules of Temperley-Lieb algebras over an arbitrary field via a diagrammatic approach. As an application, we determine when the quantised Schur algebra $S(2, r)$ has dominant dimension at least two. This talk is based on a joint work with Dr. Xiaojuan Yin.

32. **Jiarui Fei (Shanghai Jiao Tong University): Crystal Structure of Upper Cluster Algebras**

We describe the upper seminormal crystal structure for the μ-supported δ-vectors for any Jacobi-finite quiver with potential with reachable frozen vertices, or equivalently for the tropical points of the corresponding cluster $\mathcal{X}$-variety. We show that the crystal structure can be algebraically lifted to the generic basis of the upper cluster algebra. This can be viewed as an additive categorification of the crystal structure arising from cluster algebras. We introduce the biperfect bases and the strong biperfect bases in the cluster algebra setting and give a description of all strong biperfect bases.

33. **Xianhui Fu (Northeast Normal University): Ghosts, phantoms and Cartan-Eilenberg DG-modules for a DG-ring**

We firstly investigate the ghost ideal and the phantom ideal in the (derived) category of DG-modules of a DG-ring. This allows us to introduce and investigate the notions of a Cartan-Eilenberg projective module, a Cartan-Eilenberg injective module, and a Cartan-Eilenberg flat module for a DG-ring. An immediate application is that we can give an affirmative answer to a conjecture of Minamoto [7, Conjecture 4.15]. Also we may investigate Notherian DG-ring from our approach, and parallel to classical theory of rings and modules, introduce and investigate the notions of a coherent DG-ring, and a perfect DG-ring. We also investigate the global dimension and weakly global dimension of a DG-ring in the sense of Hovey and Lockridge [4, 5]. This talk is based on an ongoing project with Xiaoyan Yang.

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[2] E.E. Enochs, Cartan - Eilenberg complexes and resolutions, *J. Algebra* **342**(1) (2011), 16-39.

[3] S. Estrada, X.H. Fu, I. Herzog and S. Odabaşı, Powers of ghost ideals, preprint.

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[6] H. Krause, Smashing subcategories and the telescope conjecture - an algebraic approach, *Invent. Math.* **139** (2000) 99-133.

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34. **Nan Gao (Shanghai University): Chains of model structures arising from modules of finite Gorenstein dimension**

For any integer $n \geq 0$ and any ring R, $(\mathcal{PGF}_n, \mathcal{P}_n^{\perp} \cap \mathcal{PGF}^{\perp})$ proves to be a complete hereditary cotorsion pair in R-Mod, where $\mathcal{PGF}$ is the class of PGF modules, introduced by J. Šaroch and J. Šťovíček, and $\mathcal{PGF}_n$ is the class of R-modules of PGF dimension $\leq n$. For any Artin algebra R, $(\mathcal{GP}_n, \mathcal{P}_n^{\perp} \cap \mathcal{GP}^{\perp})$ proves to be a complete and hereditary cotorsion pair in R-Mod, where $\mathcal{GP}_n$ is the class of modules of Gorenstein projective dimension $\leq n$. These cotorsion pairs induce two chains of hereditary Hovey triples $(\mathcal{PGF}_n, \mathcal{P}_n^{\perp}, \mathcal{PGF}^{\perp})$ and $(\mathcal{GP}_n, \mathcal{P}_n^{\perp}, \mathcal{GP}^{\perp})$, and the corresponding homotopy categories in the same chain are the same. It is observed that some complete cotorsion pairs in R-Mod can induce complete cotorsion pairs in some special extension closed subcategories of R-Mod. Then corresponding results in exact categories $\mathcal{PGF}_n, \mathcal{GP}_n, \mathcal{GF}_n, \mathcal{PGF}^{<\infty}, \mathcal{GP}^{<\infty}$ and $\mathcal{GF}^{<\infty}$, are also obtained. As a byproduct, $\mathcal{PGF} = \mathcal{GP}$ for a ring R if and only if $\mathcal{PGF}^{\perp} \cap \mathcal{GP}_n = \mathcal{P}_n$ for some n.

This is based on the joint work with Pu Zhang and Xuesong Lu.

35. **Monica del Rocio Garcia Gallegos (Université de Versailles Saint-Quentin-en-Yvelines): Cotorsion pairs, thick subcategories and g-finiteness in the category of projective presentations**

An algebra is said to be g-finite if it admits finitely many isomorphism classes of basic τ-tilting pairs. This notion was introduced and thoroughly studied by L. Demonet O. Iyama and G. Jasso, who showed that this property is equivalent to the module category admitting finitely many isomorphism classes of bricks (which is equivalent to having finitely many wide subcategories), finitely many functorially finite torsion classes, and equivalent to all torsion classes being functorially finite. Many of these concepts and their relationships have been shown to have counterparts in the extriangulated category of 2-term complexes of projective modules. In this talk, we introduce new equivalent conditions to an algebra being g-finite in the context of the category of 2-term complexes. Namely, we establish that being g-finite is equivalent to the category of 2-term complexes admitting finitely many thick subcategories, finitely many complete cotorsion pairs and equivalent to all cotorsion pairs being complete. This talk is based on the preprint: https://arxiv.org/abs/2406.04134.

36. **Christof Geiss (National Autonomous University of Mexico): Bangle functions are the generic basis for cluster algebras from punctured surfaces with boundary**

This is joint work with J. Wilson (UCLan) and D. Labardini-Fragoso (UNAM). Let $\varSigma = (\Sigma, M, P)$ be a surface with marked points and non-empty boundary. We prove that for any tagged triangulation T of $\varSigma$ in the sense of Fomin – Shapiro – Thurston, the coefficient-free bangle functions of Musiker – Schiffler – Williams coincide with the coefficient-free generic Caldero-Chapoton functions arising from the Jacobian algebra of the quiver with potential $(Q(T), W(T))$ associated to T by Cerulli Irelli and the second named author. When the set of boundary marked points M has at least two elements, Schröer and the first two authors have shown, relying heavily on results of Mills, Muller and Qin, that the generic coefficient-free Caldero-Chapoton functions form a basis of the coefficient-free (upper) cluster algebra $A(\varSigma) = U(\varSigma)$. So, the set of bangle functions proposed by Musiker – Schiffler – Williams over ten years ago is indeed a basis. Previously, this was only known in the unpunctured case. Our proof relies heavily on recent progress on the understanding of generically $\tau\hat{}$-reduced irreducible components of skewed-gentle algebras, and of the combinatorics of curves on punctured surfaces.

37. **Shengfei Geng (Sichuan University): Denominator conjecture for some surface**

cluster algebras

The denominator conjecture, proposed by Fomin and Zelevinsky, says that for a cluster algebra, the cluster monomials are uniquely determined by their denominator vectors with respect to an initial cluster. In this talk, for a cluster algebra from a marked surface with at least three boundary marked points, we establish this denominator conjecture for a given strong admissible tagged triangulation.

38. **Hernán Giraldo (Universidad de Antioquia): Auslander-Reiten triangles in Frobenius categories and applications**

Let $(\mathcal{C}, \mathcal{E})$ be a Krull-Schmidt Frobenius category, that is, $\mathcal{C}$ is an additive category, $\mathcal{E}$ is a class of exact pairs, and $(\mathcal{C}, \mathcal{E})$ is an exact category. For $\underline{\mathcal{C}}$, the stable category of $\mathcal{C}$, we prove that every Auslander-Reiten triangle in $\underline{\mathcal{C}}$, is induced from a special Auslander-Reiten sequence in $\mathcal{C}$ when these exist. This result generalizes the same result given by Y. Calderón-Henao, H. Giraldo, and J.A. Vélez-Marulanda in [1], that is, they obtained this result for $\widehat{\Lambda}$-$\underline{\text{mod}}$ the stable category of $\widehat{\Lambda}$-mod the abelian category of finitely generated left $\widehat{\Lambda}$-modules, where $\widehat{\Lambda}$ is the repetitive algebra of Λ the finite dimensional $\daleth$-algebra with $\daleth$ an algebraically closed field. As an application of our result we obtain an easy proof, than the one given by E.R. Alvares, S.M. Fernandes, and H. Giraldo in [2], of how to get the shape of the Auslander-Reiten triangles in the bounded derived category $\mathrm{D}^b(\mathrm{mod}\Lambda)$, with $\mathrm{mod}\Lambda$ being the category of finitely generated right Λ-modules. Finally, we noted how our result is applied to give a relation between the strong global dimension, complexes of fixed size, and the bounded derived category $\mathrm{D}^b(\mathrm{mod}\Lambda)$, this relations was given by Y. Calderón-Henao, F. Gallego-Olaya, and H.Giraldo (preprint).

This is a joint-work with Yohny Calderón-Henao and Felipe Gallego-Olaya.

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39. **Mikhail Gorsky (University of Vienna): Deep points in cluster varieties**

Coordinate rings of many important affine algebraic varieties, such as open positroid strata in Grassmannians, Richardson varieties, or augmentation varieties of certain Legendrian links, are known to carry cluster algebra structures. In particular, each such variety is covered, up to codimension 2, by a collection of overlapping open tori. In this talk, I will discuss the "deep locus" of a cluster variety, that is, the complement to the union of all cluster toric charts. I will explain a conjectural relation between the deep locus and a natural torus action compatible with the cluster structure. For many positroid strata in $Gr(2, n)$ and $Gr(3, n)$, and for all cluster varieties of types ADE, this relation is made precise: we show that the deep locus consists precisely of the points with non-trivial stabilizer for this action. This uses the construction of cluster structures on braid varieties via Demazure weaves established in my earlier work with R. Casals, E. Gorsky, I. Le, L. Shen, and J. Simental. If time permits, I will explain how these results can be applied in the context of homological mirror symmetry and say a few words on the geometry of deep loci. The talk is based on joint work with Marco Castronovo, JoséSimental, and David Speyer (arXiv:2402.16970).

40. **Esha Gupta (Université de Versailles Saint-Quentin-en-Yvelines): d-term silting objects, torsion classes, and cotorsion classes**

For a finite-dimensional algebra Λ over an algebraically closed field K, it is known that the poset of 2-term silting objects in $\mathrm{K}^b(\mathrm{proj}\,\Lambda)$ is isomorphic to the poset of functorially finite torsion classes in $\mathrm{mod}\,\Lambda$, and to that of complete cotorsion classes in $\mathrm{K}^{[-1,0]}(\mathrm{proj}\,\Lambda)$. It is also known that the functor H^0 gives an isomorphism between the poset of cotorsion classes in $\mathrm{K}^{[-1,0]}(\mathrm{proj}\,\Lambda)$ and that of torsion classes in $\mathrm{mod}\,\Lambda$, and that the latter is a lattice. In this talk, I will start by defining the notion of positive torsion classes in extriangulated categories. I will then generalise the above result as follows. For $d \geq 2$, let $\mathrm{K}^{[-d+1,0]}(\mathrm{proj}\,\Lambda)$ and $\mathcal{D}^{[-d+2,0]}(\mathrm{mod}\,\Lambda)$ be truncated versions of $\mathrm{K}^{b,-}(\mathrm{proj}\,\Lambda)$ and $\mathcal{D}^b(\mathrm{mod}\,\Lambda)$ respectively. I will show that the poset of d-term silting objects in $\mathrm{K}^b(\mathrm{proj}\,\Lambda)$ is isomorphic to the poset of complete and hereditary cotorsion classes in $\mathrm{K}^{[-d+1,0]}(\mathrm{proj}\,\Lambda)$, and to that of positive and functorially finite torsion classes in $\mathcal{D}^{[-d+2,0]}(\mathrm{mod}\,\Lambda)$. I will further show that the posets $\mathrm{cotors}\,\mathrm{K}^{[-d+1,0]}(\mathrm{proj}\,\Lambda)$ and $\mathrm{tors}\,\mathcal{D}^{[-d+2,0]}(\mathrm{mod}\,\Lambda)$ are lattices, and that the truncation functor $\tau_{\geq -d+2}$ gives an isomorphism between the two, which restricts to an isomorphism between the sublattices of hereditary cotorsion classes and positive torsion classes. I will also discuss some examples, including type A_n where these lattices are counted by the Fuss-Catalan numbers.

41. **Zhe Han (Henan University): Groupoids from moduli space of quadratic differentials on Riemann surfaces**

By Bridgeland-Smith's seminal work, the meromorphic quadratic differentials on compact Riemann surface could be realized as stability conditions on some Calabi-Yau 3 triangulated categories. In this talk, I will introduce a groupoid given by wall-chamber structure of the moduli space of meromorphic quadratic differentials. This is a joint work with A. King and Y. Qiu.

42. **Norihiro Hanihara (Kyushu University): Cluster categories from roots of Auslander-Reiten translations**

Roots of Auslander-Reiten translations (or shifted Serre functors) appear naturally in tilting theory for singularity categories or for projective varieties. Algebraically, they are formulated as roots of shifted inverse dualizing bimodules over dg categories. As an analogue of Keller's Calabi-Yau completion, we give a construction of Calabi-Yau dg algebras from such roots of shifted inverse dualizing bimodules. We further discuss the cluster category associated to such a Calabi-Yau dg algebra and show that it is an orbit category of the usual cluster category by a finite cyclic group which we call the folded cluster category.

43. **Magnus Hellstrøm-Finnsen (Østfold University College): Hochschild cohomolo-**

gy of monads

Hochschild cohomology was initially studied by Hochschild in 1945-46. With inspiration from the classical definition for associative rings and algebras, we define the similar notion of Hochschild cohomology for monads. Monads are here defined from (weak) bicategories, initially studied by Benabou 1967.

In this talk, we will discuss some basic combinatoric of the Hochschild cochain complex and how a monad fits more or less naturally into that. Then we define the complex and the cohomology of a monad. We interpret the lower dimensional cohomology groups. Finally, we define the cohomology ring and the cup-product on the cohomology ring, which is graded-commutative, as in classical case. This talk is based on work in progress research.

44. **Lutz Hille (Universität Münster): Polynomial invariants for full exceptional sequences**

Given a full exceptional sequence in a triangulated or abelian category of modules over a finite dimensional algebra, we are interested in invariants of the corresponding Euler form in the Grothendieck group. There is one famous example known for sequences of length three, the classical Markov equation. This has been applied to cluster mutations in a joint work with Brüstle and Beineke.

The aim of this talk is to determine such invariant for any length of the full exceptional sequence and relate it to the classification of possible discrete invariants for derived equivalence classes of finite dimensional algebras. Moreover, there is a connection to the braid group action and the eigen values of the Coxeter transformation. The main theorem classifies all polynomial invariants for any given length of the full exceptional sequence.

The talk can also seen as a first step towards a classification of derived equivalence classes of finite dimensional algebras and a first step to a classification of algebras derived equivalent to a variety or even a stack (like a weighted projective space in the sense of Geigle and Lenzing).

45. **Haigang Hu (University of Science and Technology of China): Point varieties of noncommutative conics**

The classification of quantum projective spaces and noncommutative quadric hypersurfaces are major problems in noncommutative algebraic geometry. The concept of point varieties is introduced by Artin, Tate and Van den Bergh. It is a very important invariant in the classification of quantum projective planes. However, not every quantum projective space or noncommutative quadric hypersurface has a point variety. In this talk, we show that every noncommutative conic has the point variety. We also give a classification result of point varieties of noncommutative conics in the quantum projective planes of Type EC. This talk is based on a joint work with Wenchao Wu (USTC).

46. **Jiangsheng Hu (Hangzhou Normal University): Resolving dualities and applications to semi-derived Ringel-Hall algebras**

In this talk, dualities of resolving subcategories of module categories over rings are introduced and characterized as dualities with respect to Wakamatsu tilting bimodules. By restriction of the dualities to smaller resolving subcategories, sufficient and necessary conditions for these bimodules to be tilting are provided. This leads to the Gorenstein version of both the Miyashita's duality and Huisgen-Zimmermann's correspondence. An application of resolving dualities is to show that semi-derived Ringel-Hall algebras of finitely generated Gorenstein-projective modules over Artin algebras are preserved under tilting. This improves some results on the invariance of semi-derived Ringel-Hall algebras of Gorenstein algebras under tilting obtained by Lu and Wang. This talk is based on a joint work with Hongxing Chen.

47. **Wei Hu (Beijing Normal University): Rigidity dimensions and the Euclidean algorithm**

Rigidity dimension, introduced recently by H. X. Chen, M. Fang, O. Kerner, S. Koenig and K. Yamagata, measures the quality of the best resolutions of finite dimensional algebras. In this talk, we determine the rigidity degrees of all indecomposable modules over representation-finite self-injective algebras, and the rigidity dimensions of self-injective Nakayama algebras with n simple modules and Loewy length m at least n. This main tool is a combinatorial method related to the Euclidean algorithm. This is a joint work with Xiaojuan Yin.

48. **Yanping Hu (Hunan Normal University): n-slice algebras of finite type**

A quadratic algebra is called an n-slice algebra if its $(n+1)$-preprojective algebra is $(q+1, n+1)$-Koszul for $q \geq 1$ or $q = \infty$ and its quadratic dual is an n-properly-graded algebra. An n-slice algebra is of finite type if q is finite. We show that an acyclic n-slice algebra is an n-hereditary algebra and an acyclic n-hereditary algebra with $(q+1, n+1)$-Koszul $(n+1)$-preprojective algebra is an n-slice algebra. We also show that higher slice algebras of finite type appear in pairs and call the other its companion. As 1-slice algebra, a path algebra of Dynkin quiver Q has a companion, which is a $(h-3)$-representation-finite algebra for the Coxeter number h of Q, and we describe this algebra and its representations.

49. **Zheng Hua (The University of Hong Kong): A modular construction of positroid varieties**

We construct a family of Poisson structures on Grassmannian $G(k, n)$ parametrised by a Calabi-Yau curve, a simple vector bundle of degree n on it. When the curve is a Kodaira cycle of n irreducible components and for a particular choice of the vector bundle, we recover the standard Poisson structure of Drinfeld and Jimbo. In this case, the positroid varieties are isomorphic to certain moduli spaces of coherent systems on the Kodaira cycle. This leads to several new results and new proof of known results about the symplectic geometry of the positroid varieties. When we pick different vector bundles and curves, we speculate that one might get new cluster algebra structures on Grassmannian.

50. **Min Huang (Sun Yat-sen University): Positivity for quantum cluster algebras from orbifolds**

Let Σ be a marked orbifold with or without punctures and let $\mathcal{A}_v$ be a quantum cluster algebra from Σ with arbitrary coefficients and quantization. We provide a unified combinatorial formula for quantum Laurent expansion of quantum cluster variables of $\mathcal{A}_v$ concerning an arbitrary quantum seed. Consequently, the positivity for the quantum cluster algebra $\mathcal{A}_v$ is proved. This talk is based on the preprint arXiv:2406.03362 .

51. **Zhaoyong Huang (Nanjing University): Auslander-type conditions and Gorenstein algebras**

For a left and right Noetherian ring R, we give some equivalent characterizations for ${}_RR$ satisfying the Auslander condition. As applications, we prove that for an artin algebra R satisfying the Auslander condition, R is Gorenstein if and only if the subcategory consisting of finitely generated modules satisfying the Auslander condition is contravariantly finite. We also provide some support for several homological conjectures. In particular, we prove that if an artin algebra R is left quasi Auslander, then R is Gorenstein if and only if it is (left and) right weakly Gorenstein; and that if R satisfies the Auslander condition, then R is Gorenstein if and only if it is left or right weakly Gorenstein. This is a reduction of an Auslander–Reiten’ s conjecture, which states that R is Gorenstein if R satisfies the Auslander condition.

52. **Ryota Iitsuka (Nagoya University): Triangulated structures induced by mutations**

In representation theory of algebras, there exist two types of mutation pairs: rigid type (cluster-tilting mutations by Iyama-Yoshino) and simple-minded type (mutations of simple-minded systems by Simões-Pauksztello). It is known that such mutation pairs induce triangulated categories, however, these facts have been proved in different ways. In this paper, we introduce the concept of “mutation triples”, which is a simultaneous generalization of two different types of mutation pairs as well as concentric twin cotorsion pairs. We present two main theorems concerning mutation triples. The first theorem is that mutation triples induce pretriangulated categories. The second one is that pretriangulated categories induced by mutation triples become triangulated categories if they satisfy an additional condition (MT4).

53. **Miodrag Cristian Iovanov (Yeshiva University/University of Iowa): Quantum groups of discrete representation type**

The study of algebras of finite representation type (FRT) is of central interest in representation theory. Following the classical results on groups of FRT, more recently special attention has been given to quantum groups of FRT. Results exist for finite group schemes (finite dimensional cocommutative Hopf algebras) and for the ”pointed” case (pointed Hopf algebras). We turn attention to the infinite dimensional case, where the analogue of FRT is that of discrete representation type. A category of representations of an (abstract) quantum group is said to be of discrete type if given any dimension vector d, there are only finitely many indecomposable representations of this dimension vector. In recent work with Emre Sen, Alex Sistko and Shijie Zhu, we such pointed quantum groups of discrete representation type, equivalently, pointed Hopf algebras whose category of comodules is of discrete type. The classification includes generalizations and deformations of the well known Taft algebras, along with deformations/generalizations of certain Hopf algebras which are homological in nature and whose categories of comodules are equivalent to chain or double chain complexes. Time permitting, we will explain how various covering techniques along with separable extensions of algebras are used in the reduction to our main classes.

54. **Alicja Jaworska-Pastuszak (Nicolaus Copernicus University in Toruń): Galois coverings and Krull-Gabriel dimension of algebras**

This is a report on an ongoing work with Grzegorz Pastuszak.

One of the motivations to study Krull-Gabriel dimension $KG(A)$ of a finite dimensional algebra A is its relation with representation type. In particular, Prest conjectured that algebra A is of domestic representation type if and only if Krull-Gabriel dimension of A is finite. So far, all the known results support the conjecture.

The aim of this talk is to show how the technique of Galois coverings can be used to determine Krull-Gabriel dimension of algebras. Recently Pastuszak showed that under some assumptions on a category R and a group G of automorphisms of R, the induced Galois covering $R \to R/G = A$ preserves Krull-Gabriel dimension, that is $KG(A) = KG(R)$. A new, more general result shows that for any Galois covering $R \to A$ we have $KG(A) \geq KG(R)$. We shall use these facts to get the Krull-Gabriel dimension of cluster-tilted algebras and weighted surface algebras, among others.

55. **Hai Jin (Shanghai Jiao Tong University): Bi-Frobenius algebras structures on quantum complete intersections**

Let k be a field, a quantum complete intersection is a k algebra $A = A(\mathbf{q}, \mathbf{a}) = k\langle x_1, \cdots x_n\rangle / \langle x_i^{a_i}, x_i x_j - q_{ji} x_j x_i\rangle$. By introducing compatible permutation and permutation antipode, a necessary and sufficient condition is found, such that A admits a bi-Frobenius algebra structure with permutation antipode; and when these conditions are met, a concrete construction is explicitly given. Additionally, intrinsic conditions only involving the structure coefficients $(\mathbf{q}, \mathbf{a})$ of A are obtained, for A admitting a bi-Frobenius algebra structure with permutation antipode.

Moreover, we prove that A admits a bialgebra structure if and only if it admits a Hopf algebra structure, if and only if it is commutative, the characteristic of k is a prime p, and each a_i is a power of p. This also provides a large class of examples of bi-Frobenius algebras which are not bialgebras (and hence not Hopf algebras).

This is a joint work with Pu Zhang.

56. **Maximilian Kaipel (University of Cologne): Torsion lattices and the τ-cluster morphism category**

The picture group $G(A)$ of a finite-dimensional algebra A encodes the structure of maximal green sequences of mod$A$. In order to study this group, the τ-cluster morphism category $\mathfrak{T}(A)$, whose classifying space has fundamental group isomorphic to $G(A)$, was introduced. So far, this category has been defined either algebraically or geometrically. In this talk, we take a novel lattice-theoretic viewpoint and define $\mathfrak{T}(A)$ from the lattice of torsion classes.

This approach has many advantages. Firstly, it provides a purely combinatorial definition, which leads to a bijection between the signed τ-exceptional sequences of two algebras having isomorphic posets of torsion classes. Secondly, we obtain two functors $F : \mathfrak{T}(A) \to \mathfrak{T}(A/I)$ and $G : \mathfrak{T}(A/I) \to \mathfrak{T}(A)$ for any ideal I of A and we describe their properties. In particular, this leads to a new class of algebras for which there exists a faithful functor from $\mathfrak{T}(A)$ to a group.

57. **Ryo Kanda (Osaka Metropolitan University): Dualizable Grothendieck categories and idempotent rings**

In 1965, Jan-Erik Roos proved that a Grothendieck category satisfies Grothendieck's conditions Ab6 and Ab4* if and only if it is the quotient category of the category of modules over a ring by a bilocalizing subcategory. We call a Grothendieck category satisfying Ab6 and Ab4* a *Roos category*. Consequently, it follows that every Roos category is represented by a pair consisting of a ring and its idempotent ideal, and is equivalent to the category of firm modules over an idempotent non-unital ring.

In 2015, Brandenburg, Chirvasitu, and Johnson-Freyd conjectured that every dualizable locally presentable linear category is strongly generated by compact projective objects. However, it turned out that there is a counterexample. It follows that every Roos category is dualizable, and there is a nonzero Roos category that has no nonzero projective objects, constructed by Roos. Therefore the conjecture should be modified as follows: every dualizable locally presentable linear category is a Roos category. Stefanich, in a preprint in 2023, proved that every dualizable locally presentable linear category is a Grothendieck category satisfying Ab4*. We observe that it also satisfies Ab6, which gives an affirmative answer to the modified conjecture.

58. **Shunsuke Kano (Tohoku University): Entropy of cluster DT transformations and the finite-tame-wild trichotomy of acyclic quivers**

The cluster algebra associated with an acyclic quiver has a special mutation loop τ, called the cluster Donaldson–Thomas (DT) transformation, related to the Auslander–Reiten translation. In this talk, we characterize the finite-tame-wild trichotomy for acyclic quivers by the sign stability of τ and its cluster stretch factor, which are introduced by the speaker and T. Ishibashi . As an application, I will present the calculation of several kinds of entropies of τ and other mutation loops, which are commonly given by the logarithm of the spectral radius of the Coxeter matrix associated with the quiver. In particular, I will explain that any mutation loop of finite or tame acyclic quivers has zero algebraic entropy. This talk is based on the joint work with Tsukasa Ishibashi.

59. **Mohammad Hossein Keshavarz (Nantong University): Tilting and cotilting subcategories in categories of quiver representations**

In this talk we study tilting and cotilting subcatecories of the category of representations of a quiver. Let $\mathcal{M}$ be an abelian category, $\mathcal{Q}$ a rooted quiver, and $\mathrm{Rep}(\mathcal{Q}, \mathcal{M})$ the category of $\mathcal{M}$-valued representations of $\mathcal{Q}$. By using some recent results about cotorsion torsion triples (resp. torsion cotorssion triples), under certain assumptions, we show that if $\mathcal{T}$ is a 1-tilting (resp. 1-cotilting) subcategory of $\mathcal{M}$, then the monomorphism category $\Phi(\mathcal{T})$ (resp. the epimorphism category $\Psi(\mathcal{T})$) is a 1-tilting (resp. 1-cotilting) subcategory of $\mathrm{Rep}(\mathcal{Q}, \mathcal{M})$. After that we study another types of induced subcategories in $\mathrm{Rep}(\mathcal{Q}, \mathcal{M})$ and, by using nice descriptions of monomorphisms and epimorphism categories, show that if $\mathcal{T}$ is a tilting (resp. cotilting) subcategory of $\mathcal{M}$, then the epimorphism category $\Psi(\mathcal{T})$ (resp. the monomorphism category $\Phi(\mathcal{T})$) is a tilting (resp. cotilting) subcategory of $\mathrm{Rep}(\mathcal{Q}, \mathcal{M})$ for every finite acyclic quiver $\mathcal{Q}$. This result is a generalization of a lemma due to Zhang about induced cotilting modules in 2011. We finally extend Zhang's reciprocity of the monomorphism operator and the left perpendicular operator for cotilting modules to cotilting subcategories. The results give us a systematical method to create new tilting and cotilting subcategories.

60. **Gleb Koshevoy (Russian Academy of Sciences): Maximal green sequences and q-characters of Kirillov-Reshetikhin modules**

Hernandez and Leclerc (2013) proposed a cluster algebra algorithm for computing q-characters of KR-modules. We defines a maximal green sequence for infinite quivers. For ADE types the quiver considered by Hernandez and Leclerc take the form of the triangular product of a Dynkin quiver of ADE type with alternating orientation of edges and semi-ninfinte quiver A_∞ with single sink vertex. For such quivers, we are interested in source-sink (Genz and Koshevoy (2021)) maximal green sequences. We can compute q-characters of KR-modules by applying such sequences. For a KR-modules with defining monomials whose support form a nested collection, we can find a finite subsequence, such that a seed, obtained by applying such a sequence to the initial seed, contains q-characters such modules among cluster variables of such a seed. For quantum affine $A_n^{(1)}$, $D_n^{(1)}$ types, q-characters of KR-modules can be computed as a specification of generalized minors $\Delta_{w_0\Lambda_i, c^j\Lambda_i}(\theta^-_{\mathbf{i}}(\mathbf{t}))$ for A_N and D_N types with an appropriate N, respectively. For ADE types the cluster Donaldson-Thomas transformation on cluster algebras of a big Bruhat cell can be computed by using the Frenkel-Mukhin algorithm. This is a joint work with Yuki Kanakubo and Toshiki Nakashima.

61. **Sondre Kvamme (Norwegian University of Science and Technology): d-exact categories and d-cluster tilting**

The notion of d-abelian and d-exact categories were introduced by Jasso in 2016 to axiomatize d-cluster tilting subcategories of abelian and exact categories, respectively. In particular, it was shown that any d-cluster tilting subcategory of an abelian or exact category is d-abelian or d-exact, respectively. More recently, in 2022 the converse for d-abelian categories was shown, i.e., that any d-abelian category is equivalent to a d-cluster tilting subcategory of an abelian category. In this talk we explain that the converse also holds for any idempotent complete d-exact categories, i.e. that any such category is equivalent to a d-cluster tilting subcategory of an idempotent complete exact category.

62. **Yixin Lan (Chinese Academy of Sciences): Lusztig sheaves and tensor products of integrable highest weight modules**

In this talk, we will define the localization of Lusztig's sheaves for N-framed quivers and functors $E_i^{(n)}, F_i^{(n)}, K_i^{\pm}$ for localizations. This gives a categorical realization of tensor products of integrable highest weight modules of the quantized enveloping algebra. The simple perverse sheaves in the localization provide the canonical basis of tensor products. Moreover, we give a categorical interpretation of the $\mathcal{R}$-matrix and Yang-Baxter equations. This is a joint work with Jiepeng Fang.

63. **Giovanna Le Gros (Charles University): Tor-pairs and tensor-orthogonal pairs over commutative noetherian rings**

Over a commutative noetherian ring, collections of subsets of the spectrum classify families of objects in its derived category and module category. In the derived category, this includes the compactly generated t-structures by sp-filtrations due to Alonso-Jeremías-Saorín, and localising subcategories by subsets of the spectrum due to Neeman. Similarly, in the module category, finite sequences of specialisation closed subsets of the spectrum which do not contain the associated primes of the ring, classify cotilting cotorsion pairs, as shown by Angeleri Hügel-Pospíšil-Šťovíček-Trlifaj.

We consider an extension of the above results: On the derived category side, we introduce tensor-structures, and we show that the ones generated by bounded complexes of flat modules are in bijective correspondence with certain sequences of subsets of the spectrum of the ring. On the module category side, we consider hereditary Tor-pairs generated by modules of bounded flat dimension over commutative noetherian rings, and show that these are classified by sequences of subsets of the spectrum with a certain condition depending on the depth of the localisations at primes of the spectrum.

This talk is based on joint work with Dolors Herbera and Michal Hrbek.

64. **Gangyong Lee (Chungnam National University): On Utumi rings**

For a commutative ring R, a ring of quotients of R always exists, e.g., a total ring of quotients of a commutative integral domain is a field. While a noncommutative ring does not have a classical right ring of quotients, in general. A classical right ring of quotients and a total ring of quotients are the same on a commutative ring.

However, a ring always possesses the maximal right (resp., left) ring of quotients. In general, the maximal right ring of quotients and the maximal left ring of quotients of a ring are different. Utumi determined under what condition either of the maximal one-sided ring of quotients of a ring is, in fact, two-sided. That is, he showed if a ring R is nonsingular and cononsingular then its maximal right and left rings of quotients coincide in 1963.

In this talk, we consider that every right Utumi ring is left nonsingular. Recall that R is a (right) Utumi ring if it is both (right) nonsingular and (right) cononsingular. Using the above result, we prove that, for any one-sided nonsingular ring R, its maximal right and left rings of quotients coincide if and only if R is a cononsingular ring. Thus, we provide that for a right nonsingular R, which is not left nonsingular, the maximal right and left rings of quotients of R are different. We also obtain that every left cononsingular, right extending ring is directly finite.

This is a joint work with Cosmin Roman, Nguyen Khanh Tung, and Xiaoxiang Zhang.

65. **Liping Li (Hunan Normal University): A torsion theoretic interpretation of sheaf theory over ringed sites**

In this talk we propose a torsion theoretic interpretation for sheaves over ringed sites, including a homological characterization of sheaves as well as an equivalence between the sheaf category and the Serre quotient of the presheaf category by the category of torsion presheaves. We also consider Grothendieck topologies on directed categories, and show that every Grothendieck topology on it is a subcategory topology if and only if this directed category is an artinian EI category. Consequently, in this case every sheaf category is equivalent to the presheaf category over a full subcategory. These results are applied to study sheaves of modules over orbit categories and continuous representations of topological groups.

66. **Nengqun Li (Beijing Normal University): Fractional Brauer configuration algebras**

In 2017, Green and Schroll introduced a generalization of Brauer graph algebras which they call Brauer configuration algebras. We further generalize Brauer configuration algebras to fractional Brauer configuration algebras by generalizing Brauer configurations to fractional Brauer configurations. We define various types of fractional Brauer configurations, and show that if the fractional Brauer configuration is of type S (resp. of type MS), then the corresponding fractional Brauer configuration algebra is a locally bounded Frobenius algebra (resp. a locally bounded special multiserial Frobenius algebra). We also show that over an algebraically closed field, the class of finite-dimensional indecomposable representation-finite fractional Brauer configuration algebras in type S coincides with the class of basic indecomposable finite-dimensional standard representation-finite self-injective algebras. This is a joint with Liu Yuming.

67. **Li Liang (Lanzhou Jiaotong University): A method to construct model structures**

In this talk, we introduce the concept of compatible weak factorization systems in general categories as a counterpart of compatible complete cotorsion pairs in abelian categories. We then describe a method to construct model structures on general categories via two compatible weak factorization systems satisfying certain conditions, and hence generalize a very useful result by Gillespie for abelian model structures.

68. **Kay Jin Lim (Nanyang Technological University): Projective modules and co-**

homology for the integral basic algebras

This is a joint work with David John Benson. Algebras defined over fields of characteristic zero and positive characteristic usually do not behave the same way. In this joint work, we initiate the study of this topic by imposing increasingly strong hypotheses on integral basic algebras. When the algebras satisfy the right hypotheses, we have equalities of the dimensions of their cohomology groups between simples modules and equalities of graded Cartan numbers.

69. **Xiaoyue Lin (Shanghai Jiao Tong University): H-based quiver potentials and their representations**

Derkesn-Weyman-Zelevinsky defined mutations of quivers of potentials and their decorated representations in the case of quivers without loops and oriented 2-cycles. A quiver with at most one nilpotent loop at each vertex is called a H-based quiver. In this talk, we will extend DWZ's mutations to H-based quivers with potentials and their representations in general positions. Our main motivation and application is to categorify the generalized cluster algebras introduced by Chekhov and Shapiro. Analogous to the structure of cluster algebras, a generalized cluster algebra is controlled by its $\mathbf{g}$-vectors and F-polynomials. We find an interpretation of the $\mathbf{g}$-vectors in terms of general (decorated) representations of H-based quiver with potentials. This is a joint work with Jiarui Fei.

70. **Zengqiang Lin (Huaqiao University): Inhomogeneous tubes and a conjecture by Geiss-Leclerc-Schröer on root systems**

This talk is based on joint work with Hua-Lin Huang and Xiuping Su. Let C be a symmetrizable generalized Cartan matrix with symmetrizer D and orientation Ω. Geiss-Lerclerc-Schröer constructed a finite dimensional algebra $H = H(C, D, \Omega)$ and conjectured that there is a bijection between the set of positive roots of the Kac-Moody Lie algebra $g(C)$ associated with C and the set of rank vectors of τ-locally free H-modules. If C is symmetric and D is the identity matrix, the conjecture is true by Kac's Theorem. When C is of Dynkin type and D is arbitrary, Geiss-Lerclerc-Schröer proved that the conjecture is true. In this talk I will explain cases when the conjecture holds and provide some counter examples. In some more detail, if C is of type $\widetilde{C}_n$ and D is minimal, then the algebra H is a string algebra. In this case, using minimal string modules we give a classification of all τ-locally free H-modules and show that the conjecture is true. For general affine type, we construct explicitly stable tubes, some of which are inhomogeneous tubes with non rigid mouth modules. We deduce that any positive root of type C is the rank vector of some τ-locally free H-module. However, the converse is not true in general. Our construction shows that there are τ-locally free H-modules whose rank vectors are not roots, when C is of type $\widetilde{B}_n, \widetilde{CD}_n, \widetilde{F}_{41}$ and $\widetilde{G}_{21}$, and so the conjecture fails in these four types.

71. **Jonathan Lindell (Uppsala University): Relative Hochschild cohomology and contracted fundamental group**

This is joint work with Lleonard Rubio y Degrassi.

Let (Q, I) be a bound quiver and let $A = kQ/I$ be the path algebra modulo the relation. The fundamental group of a bound quiver was first introduced by Martínez-Villa and de la Peña. By work of Assem and de la Peña, first for triangular algebras, and by de la Peña and Saorín for the general setup, the dual of the fundamental group embedds into the first Hochschild cohomology.

Relative Hochschild cohomology was first defined by Hochschild, generalising Hochschild cohomology to the setup where one has an algebra and a subalgebra of interest. Relative Hochschild cohomology has been used, for example, by Gerstenhaber-Schack in the context of deformation theory and by Cibils-Lanzilotta-Marcos-Solotar recently to study Han's conjecture. We generalise the construction of the fundamental group to the setup where one has a bound quiver and a bound subquiver (under certain condition) and define a contracted fundamental group with respect to the bound subquiver. Analogously, we show that the dual of the contracted fundamental group embedds into the first relative Hochschild cohomology.

72. **Junyang Liu (Tsinghua University): On Amiot's conjecture**

In 2010, Claire Amiot conjectured that algebraic 2-Calabi-Yau categories with cluster-tilting object must come from quivers with potential. This would extend a structure theorem obtained by Keller-Reiten in the case where the endomorphism algebra of the cluster-tilting object is hereditary. Many other classes of examples are also known. We will report on the proof of the conjecture in the general case for categories with algebraic 2-Calabi-Yau structure. This result has been obtained in joint work with Bernhard Keller and is based on Van den Bergh's structure theorem for complete Calabi-Yau algebras.

73. **Miantao Liu (Université Paris Cité): Categorification of Goncharov-Shen's basic triangle**

The cluster variety of triples of flags (associated with a split simple Lie group) plays a key role in higher Teichmuller theory as developed by Fock-Goncharov, Ian Le, ... and Goncharov-Shen. For a given group, we refer to it as Goncharov-Shen's basic triangle. We will show how to categorify such a triangle in the simply laced case by constructing a suitable ice quiver with potential.

74. **Shiping Liu (University of Sherbrooke): A new approach to Auslander-Reiten formulas and almost aplit sequences in abelian categories**

This is a joint work with Zetao Lin. The classical approach to the AR-formula over arbitrary algebras involves tensor product and adjunction isomorphism, which is not applicable for algebras defined by infinite quivers with relations. Moreover, it seems that an AR-formula for finitely copresented modules is missing, and consequently, there is no existence theorem of almost split sequences starting with finitely copresented modules.

In this talk, we deal with an abelian category $\mathfrak{A}$ with enough projective objects and enough injective objects, admitting a Nakayama functor $\nu : \mathcal{P} \to \mathfrak{A}$, where $\mathcal{P}$ is subcategory of $\mathfrak{A}$ of projective objects. We shall use the Nakayama functor to establish an AR-formula for finitely presented objects over $\mathcal{P}$, and a generalized AR-formula for finitely copresented objects over $\nu\mathcal{P}$, which is a subcategory of $\mathfrak{A}$ of injective objects. In case $\mathcal{P}$ is Krull-Schmidt and Hom-finite over a commutative artinian ring, we shall derive from the AR-formula almost split sequences ending with finitely presented objects over $\mathcal{P}$, and from the generalized AR-formula almost split sequences starting with finitely copresented objects over $\nu\mathcal{P}$.

This technique has already been applied in the category of all graded modules over a graded algebra defined by a locally finite quiver with homogeneous relations. It will be also applicable in the category of all modules over an algebra defined by a locally finite quiver with relations and the category of all representations of a species of a locally finite valued quiver. It might be applicable as well in the Bernstein-Gelfand-Gelfand category of a semisimple complex Lie algebra.

75. **Yu Liu (Shaanxi Normal University): Relative cluster tilting theory and τ-tilting theory**

Let $\mathcal{C}$ be a Krull-Schmidt triangulated category with shift functor [1] and $\mathcal{R}$ be a rigid subcategory of $\mathcal{C}$. We are concerned with the mutation of two-term weak $\mathcal{R}[1]$-cluster tilting subcategories. We show that any almost complete two-term weak $\mathcal{R}[1]$-cluster tilting subcategory has exactly two completions. Then we apply the results on relative cluster tilting subcategories to the domain of τ-tilting theory in functor categories and abelian categories.

76. **Yuming Liu (Beijing Normal University): A generalization of Dugas' construction on stable auto-equivalences for symmetric algebras**

In 2015, Dugas gave two methods to construct nontrivial auto-equivalences of stable module categories for elementary, local symmetric algebras over a field k. These auto-equivalences are modeled after the spherical twists of Seidel and Thomas and the P_n-twists of Huybrechts and Thomas, which yield auto-equivalences of the derived category of coherent sheaves on a variety. We give a unified generalization of Dugas' construction for arbitrary symmetric algebras. This is a joint work with Nengqun Li.

77. **Suiqi Lu (Tsinghua University): Categorification of collapsing subsurfaces**

A work of A. Barbieri, M. Möller, Y. Qiu and J. So studied the Verdier quotients of 3-Calabi-Yau categories from decorated marked surfaces, which can categorify the collapsed surfaces. We generalize their work. For weighted decorated marked surfaces allowing normal points, zeros and simple poles, as long as there is a class of associated categories satisfying some conditions, the Verdier quotients will categorify the collapsed surfaces. This is based on a joint work with L. Fan and Y. Qiu.

78. **Xue-Song Lu (Shanghai Jiao Tong University): Model structure from one cotorsion pair**

In contrast with the Hovey correspondence of abelian model structures, from two complete cotorsion pairs, Beligiannis and Reiten give a construction of model structures on abelian categories, from only one complete cotorsion pair. The aim of this talk is to extend this result to weakly idempotent complete exact categories, by adding the condition of heredity of the complete cotorsion pair. In fact, even for abelian categories, this condition of heredity should be added. This construction really gives model structures which are not necessarily exact in the sense of Gillespie. The correspondence of Beligiannis and Reiten of weakly projective model structures also holds for weakly idempotent complete exact categories. This a joint work with Jian Cui and Pu Zhang.

79. **Yongzhi Luan (Shandong University): Dirac cohomology, branching laws and Wallach modules**

The idea of using Dirac cohomology to study branching laws was initiated by Jing-Song Huang, Pavle Pandžić and Fuhai Zhu in 2013 (cf. Dirac cohomology, K-characters and branching laws, *Amer. J. Math.* 135(2013), no.5, 1253 - 1269). One of their results says that the Dirac cohomology of π completely determines $\pi|_K$, where π is any irreducible unitarizable highest weight $(\mathfrak{g}, K)$ module. This paper aims to develop this idea for the exceptional Lie groups $E_{6(-14)}$ and $E_{7(-25)}$: we recover the K-spectrum of the Wallach modules from their Dirac cohomology. This is a joint work with Chao-Ping DONG and Haojun XU (cf. arXiv:2404.03918).

80. **Xiu-Hua Luo (Nantong University): Auslander-Reiten translations in the monomorphism categories of exact categories**

In Ringel and Schmidmeier' s work on submodule categories, for an artin algebra Λ, they showed a formula for the AR-translation in the submodule module category $S(\Lambda)$: $\tau_{\mathcal{S}}(f) = Mimo \circ \tau_\Lambda \circ Coker(f)$ for each $f \in \mathcal{S}(\Lambda)$. With the help of recent works by Eshraghi and Hafezi, we are able to provide a new proof of this formula, which not only provides more insights into the connections between morphism categories and functor categories, but also enjoys broader generaltities. That is, the formula also works for monomorphism categories of certain exact categories. This talk is based on the joint work with Shijie Zhu.

81. **Yajun Ma (Lanzhou Jiaotong University): Model structures and Q-shaped derived category**

In this talk, we first give an informal introduction to model structures. We then construct a flat model structure on the category of additive functors from a preadditive category satisfying certain conditions to the module category, whose homotopy category is the Q-shaped derived category introduced by Holm and Jorgensen. This is the joint work with Zhenxing Di, Liping Li and Li Liang.

82. **Piotr Malicki (Nicolaus Copernicus University in Toruń): Characterizations of tame algebras with separating families of almost cyclic coherent components**

Let A be a basic, finite dimensional K-algebra over a fixed algebraically closed field K, mod$A$ the category of finite dimensional right A-modules, and Γ_A the Auslander-Reiten quiver of A. Let $\mathcal{C}$ be a connected component of Γ_A. Recall that $\mathcal{C}$ is called *almost cyclic* if all but finitely many modules of $\mathcal{C}$ lie on oriented cycles (in $\mathcal{C}$). Further, $\mathcal{C}$ is called *coherent* if every projective module in $\mathcal{C}$ is the starting module of an infinite sectional path and every injective module in $\mathcal{C}$ is the ending module of an infinite sectional path. Moreover, a family $\mathcal{C}_A = (\mathcal{C}_i)_{i\in I}$ of sincere and generalized standard components of Γ_A is called *separating* in mod$A$ if the indecomposable finite dimensional A-modules not in $\mathcal{C}_A$ split into two disjoint classes $\mathcal{P}_A$ and $\mathcal{Q}_A$ such that there is no non-zero morphism from $\mathcal{Q}_A$ to $\mathcal{P}_A$, from $\mathcal{Q}_A$ to $\mathcal{C}_A$, or from $\mathcal{C}_A$ to $\mathcal{P}_A$, while any non-zero morphism from $\mathcal{P}_A$ to $\mathcal{Q}_A$ factors through add$(\mathcal{C}_A)$.

The aim of the talk is to present the characterizations of tame algebras with separating families of almost cyclic coherent Auslander - Reiten components in terms of the support of the indecomposable modules, the minimum coordinates of dimension vectors of the indecomposable modules and the values of the Tits quadratic form.

83. **Francesca Mantese (University of Verona): Irreducible representations of free algebras through Leavitt path algebras**

Let K be a field and E be the graph with a vertex v and n. The associated Leavitt path algebra $L_K(E)$ is a perfect left localization of the free algebra in n variables Λ, and the category of finitely presented simple $L_K(E)$-modules is a quotient category of the finitely presented simple modules over Λ. Applying methods and techniques for the study of simple modules over Leavitt path algebras, we obtain a better understanding of the finitely presented irreducible representation of Λ. As an interesting application, we give a new classification of irreducible polynomials in n non-commutative variables. This talk is based on joint work with P. N. Anh.

84. **Xuefeng Mao (Shanghai University): Calabi-Yau connected cochain DG algebras**

In this talk, I will present some discoveries on Calabi-Yau connected cochain DG algebras. These concern some criteria, new examples and homological invariants.

85. **František Marko (The Pennsylvania State University): Blocks of rational supermodules over some quasi-reductive supergroups in positive characteristic**

We work over algebraically closed fields of positive characteristic $p > 2$. The main focus of the talk is to describe blocks for general linear supergroups and periplectic supergroups. We also describe blocks for the queer supergroup $Q(2)$. If time permits, we present a description of blocks for orthosymplectic supergroups.

86. **Lang Mou (University of Cologne): Generic bases of skew-symmetrizable cluster algebras in affine types**

We investigate affine type cluster algebras by examining locally free modules over the Geiss-Leclerc-Schröer algebras associated to acyclic skew-symmetrizable matrices. Our approach involves constructing rigid locally free modules whose rank vector is a real Schur root and constructing bases using generic Caldero - Chapoton type functions on varieties of locally free modules. In particular, this basis contains all cluster monomials. This work is joint with Xiuping Su.

87. **Kaveh Mousavand (Okinawa Institute of Science and Technology): Brick Brauer-Thrall conjectures and some Applications**

Let A be a finite dimensional algebra over an algebraically closed field k. A left A-module X is called a *brick* (a.k.a Schur representation) if $\mathrm{End_A(X)} \simeq \mathrm{k}$, and A is said to be *brick-finite* if there are only finitely many (isoclasses of) bricks. To conduct a dictionary between the notion of τ-tilting finiteness and some geometric phenomena in representation varieties, in 2019, as part of my PhD thesis, I posed a conjecture, so-called the *Second Brick Brauer-Thrall* (2*nd* bBT): A is brick-infinite if and only if, for some $d \in \mathbb{Z}_{>0}$, there are infinitely many bricks of dimension d.

Although 2*nd* bBT conjecture has been verified in some cases, it is still open in full generality. Meanwhile, it is shown that 2*nd* bBT plays a decisive role in various aspects of representation theory of algebras and has deep connections with several other open conjectures (on semibricks, on τ-tilting fans, on stability conditions, and on generic bricks). In this talk, I first outline such connections and then verify the 2*nd* bBT conjecture for some new cases, for which the aforementioned conjectures will follow. This is based on some ongoing joint work with Charles Paquette.

88. **Ruslan Muslumov (ADA University): Simple Functors over the Green Biset Functor of Section Burnside rings**

Biset functors over a commutative and unitary ring k provide a powerful framework for studying finite groups and their actions. The biset category, whose objects are finite groups and morphism sets are given by Grothendieck groups $B(G, H)$ of finite (G, H)-bisets, serves as the foundation for this theory. The study of biset functors has yielded remarkable results, such as the evaluation of the Dade group of endopermutation modules of a p-group and the determination of the unit group of the Burnside ring of a p-group.

To delve deeper into the intricate structure of biset functors, one can explore ring objects within this category. This pursuit leads to a more sophisticated algebraic structure known as a Green biset functor. This extension enables a richer understanding of the interplay between algebraic structures and group actions, offering a broader perspective on the relationships between finite groups and their associated algebraic objects.

Serge Bouc made significant contributions to this field by introducing the slice Burnside ring and the section Burnside ring for a finite group G. These rings encapsulate essential information about the group and its actions, providing a nuanced algebraic viewpoint. Bouc's work demonstrated that both the slice Burnside ring and the section Burnside ring naturally possess the structure of a Green biset functor, showcasing the versatility of biset functor theory in capturing and characterizing algebraic structures arising from group actions.

The classification of simple modules over the section Burnside ring of G represents a further advancement in this line of research. This classification is achieved through the application of the fibered biset functor approach, as detailed in the article by Robert Boltje and Olcay Coşkun. This approach provides a systematic and powerful method for understanding the intricate module structure associated with the section Burnside ring. By leveraging the tools and concepts from biset functor theory, the classification sheds light on the representation theory of finite groups and offers valuable insights into the algebraic structure underlying group actions.

In summary, the study of biset functors and their algebraic counterparts, such as Green biset functors, slice Burnside rings, and section Burnside rings, provides a rich and fruitful framework for understanding the algebraic structures arising from group actions. The classification of simple modules over the section Burnside ring, achieved through the fibered biset functor approach, represents a significant contribution to this area of research, advancing our knowledge of the intricate relationships between algebra and group theory.

89. **Haru Negami (Chiba University): Construction of representation of braid groups and integral transformation**

The Long-Moody construction is a method for obtaining a representation of the braid group from a given representation of the semidirect product of the free group F_n and the braid group B_n defined by Artin representation. The braid group is defined as the mapping class group of a closed disk with n holes, $D\backslash\{n\text{-points}\}$, and the fundamental group of $D\backslash\{n\text{-points}\}$ is isomorphic to F_n. Thus, Artin representation has a geometric realization such as the transformation of the loops on $D\backslash\{n\text{-points}\}$. Wada generalized the Artin representation and obtained the group invariants of links.

In this talk, we first introduce the extension of the method to obtain an infinite series of representations of the braid group [2] by using the convolution of Dettweiler-Reiter[1], defined by an integral transform. In particular, this construction has a correspondence with the multiplicative middle convolution of KZ-type equations in the case of pure braid groups, giving an irreducible representation. Second, we further extend the method to one of the Wada types of semidirect product. We then discuss the connection between this construction and the unitarity of the representation.

[1] Michael Dettweiler and Stefan Reiter, *An Algorithm of Katz and its Application to the Inverse Galois Problem*, Journal of Symbolic Computation 30 (2000), no. 6, 761-798, DOI https://doi.org/10.1006/jsco.2000.0382.

[2] K. Hiroe and H. Negami, *Long-Moody construction of braid representations and Katz middle convolution*, https://arxiv.org/pdf/2303.05770.pdf.

90. **Sebastian Opper (Charles University): Derived Picard groups and integration of Hochschild cohomology**

I will talk about a general tool which allows one to study derived Picard groups, a "derived" notion of symmetry groups for triangulated categories. These groups are rather elusive to computations because they require a very good understanding of the triangulated category at hand. Some cases where they have been successfully computed by ad-hoc methods include the derived categories of hereditary and canonical algebras, local and commutative rings as well as Brauer tree and derived discrete algebras. A result of Keller shows that the Lie algebra of the derived Picard group of an algebra can be identified with its Hochschild cohomology equipped with the Gerstenhaber Lie bracket. In analogy with the classical relationship between Lie groups and their Lie algebras, I will explain how to "integrate" elements in the Hochschild cohomology of an A_∞-category over fields of characteristic zero to elements in the derived Picard group via a generalized exponential map. Afterwards we discuss properties of this exponential and a few applications. The first concerns necessary conditions for the uniqueness of lifts of functors between homotopy categories to enhancements and uniqueness of Fourier-Mukai kernels. Other applications concern derived Picard groups of categories arising in algebra and geometry which we illustrate by Fukaya categories of cotangent bundles and their plumbings as well as derived categories of graded gentle algebras and the corresponding partially wrapped Fukaya categories of surfaces.

91. **Yuya Otake (Nagoya University): On the existence of counterexamples for vanishing problems of Ext**

This talk is based on [3]. Let R be a commutative noetherian local ring. In commutative algebra, it is a classical subject to study the behavior of tensor products of modules. We say that R satisfies *Auslander's depth condition* if all finitely generated R-modules M and N with $\mathrm{Tor}^R_{>0}(M,N)$ satisfy the *depth formula*, i.e.,

$$\operatorname{depth}(M \otimes_R N) = \operatorname{depth} M + \operatorname{depth} N - \operatorname{depth} R.$$

Christensen and Jorgensen[2] proved that every AB ring satisfies Auslander's depth condition. It has been an open question for several decades now whether every local ring, or even every Gorenstein local ring, satisfies Auslander's depth condition, and much work has been put towards providing sufficient conditions for the depth condition to hold. In this talk, we consider the relationship between Auslander's depth condition and weak Gorensteinness in the sense of Ringel and Zhang[4], and the converse of the result of Christensen and Jorgensen. As an application, we prove that there exist a Gorenstein equicharacteristic local unique factorization domain R having an isolated singularity which does not satisfy Auslander's depth condition, and a Cohen-Macaulay equicharacteristic local unique factorization domain S having an isolated singularity which is not weakly Gorenstein.

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[2] L. W. Christensen; D. A. Jorgensen, Vanishing of Tate homology and depth formulas over local rings, *J. Pure Appl. Algebra* **219** (2015), no. 3, 464–481.

[3] K. Kimura; J. Lyle; Y. Otake; R. Takahashi, On the vanishing of Ext modules over a local unique factorization domain with an isolated singularity, preprint (2023), arXiv:2310.16599.

[4] C. M. Ringel; P. Zhang, Gorenstein-projective and semi-Gorenstein-projective modules, *Algebra Number Theory* **14** (2020), no. 1, 1–36.

92. **Takumi Otani (Tsinghua University): The numbers of full exceptional collections for extended Dynkin quivers**

For Dynkin quivers, Obaid–Nauman–Shammakh–Fakieh–Ringel and Seidel gave a counting formula for the number of full exceptional collections in derived categories as a categoriacal interpretation of Deline's work. It is known that the number of full exceptional collections is equal to the degree of the Lyashko–Looijenga map for the corresponding ADE singularity.

In this talk, I will give a formula for the number of full exceptional collections for extended Dynkin quivers, which can be regarded as a generalization of the Dynkin cases.

If time permits, I will explain the relationship between this number and the degree of the Lyashko–Looijenga map for an orbifold projective line. This talk is based on joint work with Yuuki Shiraishi and Atsushi Takahashi.

93. **Oyeyemi Oyebola (Brandon University): Extra Polyloop-II and its representations**

In this study, we introduce an especial class of non-associative hyperalgebraic structure christened extra polyloop-II, and examine its algebraic properties. Extra polyloop-II is a special class of newly introduced non-associative hyperalgebraic structure, designated "Polyloop." This work is focused on studying and investigating the hyperalgebraic properties and autotopic representation of extra polyloop-II. We also explore the notion of pseudoautomorphism in this hyperalgebraic structure.

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[8] S. Spartalis, *The Hyperoperation Relation and the Corsini's partial or not partial Hypegroupoids (A classification)*, Ital. J. Pure Appl. Math. 24(2008) 97-112.

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94. **Shengyong Pan (Beijing Jiaotong University): Cohen–Montgomery duality for bimodules and singular equivalences of Morita type**

We fix a commutative ring k and a group G. To include infinite coverings of k-algebras into consideration we usually regard k-algebras as locally bounded k-categories with finite objects, and thus we will work with small k-categories. For small k-categories R and S with G-actions, we introduce *G-invariant S-R*-bimodules and their category denoted by $G\text{-inv}({}_S\text{Mod}_R)$, and denote by R/G the orbit category of R by G, which is a small G-graded k-category. For small G-graded k-categories A and B, we introduce *G-graded B-A*-bimodules and their category denoted by $G\text{-gr}({}_B\text{Mod}_A)$, and denote by $A\#G$ the smash product of

A and G, which is a small k-category with G-action. Then the Cohen–Montgomery duality theorem [1,2] says that we have equivalences $(R/G)\#G \simeq R$ and $(A\#G)/G \simeq A$, by which we identify these pairs. In the talk, we introduce functors $?/G : G\text{-inv}({}_S\mathrm{Mod}_R) \to G\text{-gr}({}_{S/G}\mathrm{Mod}_{R/G})$ and $?\#G : G\text{-gr}({}_B\mathrm{Mod}_A) \to G\text{-inv}({}_{B\#G}\mathrm{Mod}_{A\#G})$, and show that they are equivalences and quasi-inverses to each other (by applying $A := R/G$, $R := A\#G$, etc.), have good properties with tensor products and exchange "canonically G-invariant projectivity" and "canonically G-graded projectivity" of finitely generated bimodules. We apply this to singular equivalences of Morita type to obtain the following.

Theorem Assume that all of R, S, A and B be k-projective.

(1) There exists a "G-invariant singular equivalence of Morita type" between R and S if and only if there exists a "G-graded singular equivalence of Morita type" between R/G and S/G.

(2) There exists a "G-graded singular equivalence of Morita type" between A and B if and only if there exists a "G-invariant singular equivalence of Morita type" between $A\#G$ and $B\#G$.

The corresponding result for stable equivalences of Morita type was announced at ICRA 2016 held in Syracuse by the first author.

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95. **Romeo Parackal Govindan (Cochin University of Science and Technology): Normality of Lie categories and category of bundles**

In [1] K.S.S. Nambooripad introduced normal categories to discuss the structure of semigroups. He obtained celebrated structure theorem for regular semigroups using the cross-connections of these categories. Recently in [2] introduced Lie categories. Bundles and groupoids are interesting mathematical structures which have vital applications in mathematical physics. In this paper we discuss the categories of bundles, groupoids and Lie categories with an aim to extend the theory of normal categories and cross-connections to these categories.

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[2] Zan Gard, *Fundamentals of Lie categories*, arXiv:2302.05233v3 [math.DG] 2 Jul 2023.

96. **Grzegorz Pastuszak (Nicolaus Copernicus University in Toruń): On covering theory of functor categories and its applications**

This is a report on an ongoing work with Alicja Jaworska-Pastuszak. Assume that K is an algebraically closed field and R, A are locally bounded K-categories. Moreover, assume that G is a group of K-linear automorphisms of R, acting freely on the objects of

R, and let $F : R \to A \cong R/G$ be the associated Galois G-covering. Recall that in case G is torsion-free, the push-down functor $F_\lambda :\ \bmod (R) \to\ \bmod (A)$ is a Galois G-precovering of module categories. We show that this situation lifts to the level of categories of finitely presented functors. More precisely, the group G acts freely on the categories $\mathcal{F}(R)$ and $\mathcal{F}(A)$ of finitely presented functors (which are Krull-Schmidt K-categories) and there exists a functor $\Phi : \mathcal{F}(R) \to \mathcal{F}(A)$ which is a Galois G-precovering (of functor categories). Hence it makes sense to adapt the well-known terminology of Dowbor and Skowroński from [1] and define the *functors of the first kind*, lying in the image of Φ, and that of the *second kind* - the remaining ones. We show that even in the nicest situations, when R and A are simply connected and representation-finite, the functor Φ may not be dense and thus the functors of the second kind exist. Last but not least, we show applications of the above facts to the theory of *Krull-Gabriel dimension*, significantly extending the results from [2].

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97. **Calvin Pfeifer (Universität zu Köln): On generic τ-reduced wildness of algebras associated to symmetrisable Cartan matrices of indefinite type**

It is well known that the path algebra KQ of an acyclic quiver Q is of wild representation type if and only if the quiver Q is of indefinite type. In 2014, Geiss — Leclerc — Schröer associated a finite-dimensional algebra $H = H(C, D, \Omega)$ to every generalised Cartan matrix C with symmetriser D and orientation Ω. In general, H is representation wild even if C has finite type. We consider such algebras H with C of indefinite type, and show that they are wild from a τ-tilting theoretic perspective: The generic number of parameters of generically τ-reduced irreducible components of their module varieties is unbounded. This suggests a new notion of generic τ-reduced wildness of finite-dimensional algebras.

98. **Tuan Anh Pham (University of Edinburgh): The orbit method for the Witt algebra**

The orbit method is a fundamental tool to study a finite dimensional solvable Lie algebra $\mathfrak{g}$. It relates the annihilators of simple $U(\mathfrak{g})$-module to the coadjoint orbits of the adjoint group on $\mathfrak{g}^*$. In my talk, I will extend this story to the Witt algebra - a simple (non-solvable) infinite dimensional Lie algebra which is important in physics and representation theory. I will construct an induced module from an element of W^* and show that its annihilator is a primitive ideal. I will also construct an algebra homomorphism that allows one to relate the orbit method for W to that of a finite dimensional solvable Lie algebra $\mathfrak{g}$.

99. **Mara Pompili (University of Graz): Factorization theory of cluster algebras**

In 1847 Gabriel Laméannounced a solution of Fermat's Last Theorem, but it turned out that his solution hinged on the assumption that the cyclotomic ring $\mathbb{Z}[\zeta_n]$ is a unique factorization domain (UFD), which Ernst Kummer had already disproven three years earlier. This mistake sparked interest in the study of non-unique factorization domains among mathematicians. This interest led to the development of various theories, including that of Krull domains, named after the German mathematician Wolfgang Krull, who introduced them in the 1930s. Krull domains are a class of commutative rings with a well-understood factorization theory, completely determined by an invariant called the class group.

In this talk, we will compute the class group for all cluster and upper cluster algebras that are Krull domains. In these cases, the class group is always a free finitely generated abelian group. Additionally, under certain assumptions, we will show how to compute the rank of this class group in term of the exchange polynomials.

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[2] S. Fomin and A. Zelevinsky, *Cluster algebras. I. Foundations,* J. Amer. Math. Soc. **15** (2002), No. 2, 497–529 (https://doi.org/10.1090/S0894-0347-01-00385-X).

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[4] M. Pompili, *On class groups of upper cluster algebras*, preprint (https://arxiv.org/abs/2312.03457).

100. **Matthew Pressland (University of Glasgow): Representation theory and positroid varieties**

Positroid varieties, introduced by Knutson, Lam and Speyer based on ideas of Postnikov, are subvarieties of the Grassmannian which induce a cell decomposition of its totally non-negative part. In 2016, Muller and Speyer conjectured that the coordinate ring of each positroid variety should carry two natural cluster algebra structures, and that these should quasi-coincide (in particular, have the same cluster monomials). The first part of the conjecture was proved by Galashin and Lam in 2023, and in this talk I will explain how to prove the second part. This is based on a series of papers, including joint work with Çanakçı and King, in which the relevant cluster algebras are categorified, and various combinatorial and geometric phenomena for positroid varieties re-interpreted in representation-theoretic terms. In particular, I will explain how the quasi-coincidence of the two cluster structures is a consequence of a certain equivalence of derived categories.

101. **Marina Purri Brant Godinho (University of Glasgow): Twist autoequivalences arising from periodic suspension**

Given an object in a Frobenius exact category satisfying mild conditions, we construct a derived autoequivalence of the object's endomorphism algebra as a composition of equivalences induced by tilting modules. In fact, we show that this autoequivalence can be characterised as a twist around a functor. The key idea is that this autoequivalence exists when suspension functor in the stable category acts periodically on the object, and this is automatically satisfied when the stable endomorphism algebra of the object satisfies certain "relatively spherical" properties. The properties of this stable endomorphism algebra actually afford some control over the autoequivalence. For example, when this algebra is finite dimensional over a field, then the cotwist is a shift of the Nakayama functor of the stable endomorphism algebra and, moreover, the autoequivalence is a spherical twist. As an application, we obtain new non-trivial derived autoequivalences for very singular varieties.

102. **Fan Qin (Beijing Normal University): A proof of $A = U$ for cluster algebras from class P quivers**

Determining whether the ordinary cluster algebra A coincides with the upper cluster algebra U is a fundamental yet largely open problem in cluster theory. In this talk, we focus on quivers in class P, i.e., those that can be constructed from a single vertex through iterated mutations and triangular extensions. Using cluster categories, we prove $A = U$ for the classical cluster algebras with full rank coefficients arising from class P quivers. This is a joint work with Bernhard Keller and Pierre-Guy Plamondon.

103. **Yongyun Qin (Yunnan Normal University): Categorical properties and homological conjectures for bounded extensions of algebras**

An extension $B \subset A$ of finite dimensional algebras is bounded if the B-B-bimodule A/B is B-tensor nilpotent, its projective dimension is finite and $\mathrm{Tor}_i^B(A/B, (A/B)^{\otimes_B j}) = 0$ for all $i, j \geq 1$. We show that for a bounded extension $B \subset A$, the algebras A and B are singularly equivalent of Morita type with level. Additively, under some conditions, their stable categories of Gorenstein projective modules and Gorenstein defect categories are equivalent, respectively. Applications to trivial extensions, triangular matrix algebras and Morita context algebras are given. Some homological conjectures are also investigated for bounded extensions, including Auslander-Reiten conjecture, finististic dimension conjecture, Han's conjecture, and Keller's conjecture. This is a joint-work with Xiaoxiao Xu, Jinbi Zhang and Guodong Zhou.

104. **Yu Qiu (Tsinghua University): Deformed 3-Calabi-Yau categories and partial compactifications with orbifolding**

We introduce a new family of quivers with potential for triangulated marked surfaces with punctures. We show that the deformation of the associated 3-Calabi-Yau categories corresponds to the partial compactification (with orbifolding) of the associated moduli s-paces. As an application, we calculate the fundamental groups of these moduli spaces (of framed quadratic differentials), which in particular produces Euclidean Artin braid groups of type $\widetilde{A}, \widetilde{B}, \widetilde{C}$ and $\widetilde{D}$.

105. **Edson Ribeiro Alvares (Universidade Federal do Paraná): Stratifying systems via nested family of torsion pairs**

Due to the importance of the homological properties of standard modules, K. Erdmann and C. Sáenz introduced the notion of stratifying systems in the category of modules. Subsequently, H. Treffinger and O. Mendoza obtained stratifying systems using τ-tilting theory. They demonstrated that from a τ-rigid module, one can obtain at least one stratifying system, whose size is bounded by the rank of the Grothendieck group. In this presentation, we will show that every stratifying system is induced by a certain family (nested family) of torsion pairs, thus generalizing the work of Mendoza-Treffinger. If time permits, we will also demonstrate that not every stratifying system can be obtained from a τ-rigid module, including stratifying systems of infinite size.

This is a joint work with Matheus Vinicius dos Santos.

106. **Ricardo Felipe Rosada Canesin (Université Paris Cité): Categorifying twisted Auslander-Reiten quivers**

An important combinatorial ingredient in the representation theory of quantum affine algebras is the inverse of the quantum Cartan matrix associated to a complex finite-dimensional simple Lie algebra. It was first proven by Hernandez-Leclerc that, in the simply-laced case, the formal Laurent expansion of its entries can be read off from the Auslander-Reiten quiver of the derived category of a Dynkin quiver with the corresponding type. This result was extended to all types by Fujita-Oh, who introduced the combinatorics of Q-data and used them to read off the expansion from the so-called twisted Auslander-Reiten quivers, previously defined by Oh-Suh. Such quivers are defined only combinatorially and one may wonder how to interpret them categorically. We provide an interesting candidate for such a categorification by means of preprojective representations and explain how to recover most of the entries of the inverse of the quantum Cartan matrix.

107. **Shiquan Ruan (Xiamen University): Hall algebra approach to iquantum groups**

The iquantum group is a generalization of quantum groups, which arises from the construction of quantum symmetric pairs by Letzter. A striking breakthrough of the iquantum groups is the discovery of canonical basis by Bao-Wang. It has been found that most of the fundamental constructions of quantum groups admit generalizations in the setting of iquantum groups. In this talk, we will review several recent progress on Hall algebra realization of iquantum groups. We use the iHall algebra of the category of coherent sheaves over weighted projective lines to realize the Drinfeld new presentation of universal iquantum groups, and use derived Hall algebras of 1-periodic derived category to realize split iquantum groups. Finally, we introduce a new kind of algebra associated to a hereditary abelian category, and establish the relationship with iHall algebras and derived Hall algebras. This is a series work joint with Jiayi Chen, Yanan Lin, Ming Lu and Weiqiang Wang.

108. **Lleonard Rubio y Degrassi (Uppsala University): On the first Hochschild cohomology and the fundamental groups**

The first Hochschild cohomology group $\mathrm{HH}^1(A)$ of an algebra A is a Lie algebra, which is a derived invariant and, among self-injective algebras, an invariant under stable equivalences of Morita type. This establishes a bridge between finite dimensional algebras and Lie algebras. However, aside from few exceptions, fine Lie theoretic properties of $\mathrm{HH}^1(A)$ are not often used.

In this talk, I will show some results in this direction. I will first introduce the notion of fundamental groups associated to presentations of A introduced by Martínez-Villa and de la Peña. Then I will explain how maximal tori in $\mathrm{HH}^1(A)$ together with the dual of some fundamental groups can be used to deduce information about the shape of the Gabriel quiver of A. More precisely, I will show that every maximal torus in $\mathrm{HH}^1(A)$ arises as the dual of some fundamental group of A. As a consequence, I will deduce that the largest rank of a fundamental group of A is a derived invariant. I will also include various applications to monomial algebras, semi-monomial algebras, group algebras and to the first group cohomology.

This is all joint with Benjamin Briggs.

109. **Álvaro Sánchez Campillo (Universidad de Murcia): Abstract representation theory via coherent Auslander-Reiten diagrams**

In this talk we explain a method to study representations of quivers over arbitrary stable ∞-categories in terms of Auslander-Reiten diagrams.

Our techniques allow us to internally visualize (a significant piece of) the Auslander-Reiten quiver of the derived category of a hereditary finite-dimensional algebra inside much more general (∞-)categories of representations, such as representations over arbitrary rings, schemes, dg algebras, or ring spectra. This is provided by an equivalence with a certain *mesh subcategory* of representations of the repetitive quiver, which we build inductively using abstract reflection functors.

As an application we obtain that the automorphism group of the non-regular components of the Auslander-Reiten quiver acts on the ∞-category of representations over any stable ∞-category. When specialized to representations of trees over a field, this action gives an isomorphism with the derived Picard group as shown by Miyachi and Yekutieli.

110. **Markus Schmidmeier (Florida Atlantic University): Invariant Subspaces of Nilpotent Operators. Level, Mean, and Colevel: The Triangle $\mathbb{T}(n)$**

We consider the category $\mathcal{S}(n)$ of all pairs $X = (U, V)$, where V is a finite-dimensional vector space with a nilpotent operator T with $T^n = 0$, and U is a subspace of V such that $T(U) \subseteq U$. Our main interest in an object $X = (U, V)$ are the three numbers $uX = \dim U$ (for the subspace), $wX = \dim V/U$ (for the factor) and $bX = \dim \mathrm{Ker} T$ (for the operator). Actually, instead of looking at the reference space $\mathbb{R}^3$ with the triples (uX, wX, bX), we will focus the attention to the corresponding projective space $\mathbb{T}(n)$ which contains for a non-zero object X the level-colevel pair $\mathbf{pr}X = (uX/bX, wX/bX)$ supporting the object X.

We use $\mathbb{T}(n)$ to visualize part of the categorical structure of $\mathcal{S}(n)$: The action of the duality D and the square τ_n^2 of the Auslander-Reiten translation are represented on $\mathbb{T}(n)$ by a reflection and a rotation by $120°$ degrees, respectively. Moreover for $n \geq 6$, each component of the Auslander-Reiten quiver of $\mathcal{S}(n)$ has support either contained in the center of $\mathbb{T}(n)$ or with the center as its only accumulation point.

We show that the only indecomposable objects X in $\mathcal{S}(n)$ with support having boundary distance smaller than 1 are objects with $bX = 1$ which lie on the boundary, whereas any rational vector in $\mathbb{T}(n)$ with boundary distance at least 2 supports infinitely many indecomposable objects. At present, it is not clear at all what happens for vectors with boundary distance between 1 and 2. The use of $\mathbb{T}(n)$ provides even in the (quite well-understood) case

$n = 6$ some surprises: In particular, we will show that any indecomposable object in $\mathcal{S}(6)$ lies on one of 12 central lines in $\mathbb{T}(6)$.

The talk is about a joint project with Claus Michael Ringel (Bielefeld).

111. **Sibylle Schroll (University of Cologne): The Tamarkin-Tsygan calculus for gentle algebras**

The Tamarkin-Tsygan calculus of an associative algebra is the comprehensive data of its Hochschild homology and cohomology and their algebraic structures. In general, it is next to impossible to obtain the comprehensive information of this calculus since already the explicit calculation of the Hochschild homology and cohomology are of exceeding computational complexity. However, in certain cases, when there is much structural information about the algebras available, one might attempt such a calculation. The class of gentle algebras constitutes such a case and in this talk, I will report on joint work with Christian Chaparro, Andrea Solotar and Mariano Suarez-Alvarez where we explicitly calculate the complete Tamarkin-Tsygan calculus for gentle algebras. For the purposes of the talk, we will put a particular focus on the surface interpretation of the generators of the Hochschild cohomology. More precisely, gentle algebras are a class of monomial algebras which appear in many different settings such as cluster theory, $N = 2$ gauge theories and homological mirror symmetry of surfaces. In particular, in the context of the latter, there is a correspondence of the symplectic homology of the surface and the Hochschild cohomology of the gentle algebra. We will make this explicit by showing how the generators of the graded commutative algebra of the Hochschild cohomology of a gentle algebra can be seen in terms of the associated surface.

112. **Adam Skowyrski (Nicolaus Copernicus University in Toruń): Periodicity shadows: a new combinatorial insight in studying periodic algebras**

Let $\Lambda = kQ/I$ be a symmetric periodic finite-dimensional k-algebra. We are especially interested in algebras of period 4 of infinite representation type. In this case, every simple Λ-module S has period 4, that is $\Omega_\Lambda^4(S) \cong S$, where Ω_Λ is the syzygy operator. When passing to dimension vectors, periodicity of simples give rise to a matrix equation of the form: $A_Q \cdot C = 0$, where C is the Cartan matrix of Λ and A_Q is the (signed) adjacency matrix of Q. Motivated by this property, every skew-symmetric matrix $A \in \mathbb{M}_n(\mathbb{Z})$, for which there is a symmetric matrix $C \in \mathbb{M}_n(\mathbb{N})$ with $AC = 0$, is called a *periodicity shadow*. Clearly, every Cartan matrix of a representation-infinite symmetric periodic algebra of period 4 is a peridicity shadow, but the reverse question seem to be a very exciting and important problem. Its solution is strictly connected to the classification of Gabriel quivers of all tame symmetric periodic algebras of period 4. In this talk we will desribe various issues of the problem, in particular, presenting what is already known for small $n = 3, 4, 5, 6$.

113. **Andrea Solotar (Universidad de Buenos Aires and GTIIT): On the first τ-tilting Hochschild cohomology of an algebra**

In this talk I will introduce the τ-tilting Hochschild cohomology in degree one of a finite dimensional k-algebra A, where k is a field. The excess of A is the difference between the dimensions of the τ-tilting Hochschild cohomology in degree one and the dimension of the usual Hochschild cohomology in degree one. One of the main results is that for bound quiver algebra A such that its excess is zero, the Hochschild cohomology in degree two $HH^2(A)$ is isomorphic to the space $Hom_{kQ-kQ}(I/I^2, A)$. This may be useful to determine when $HH^2(A) = 0$ for these algebras. We compute the excess for hereditary, radical square zero and monomial triangular algebras. For a bound quiver algebra A, a formula for the excess is obtained. We also give a criterion for A to be τ-rigid.

This is a joint work with Claude Cibils, Marcelo Lanzilotta and Eduardo Marcos.

114. **Greg Stevenson (Aarhus University): Some thoughts on Han's conjecture**

I will share some thoughts on non-vanishing of invariants for finite dimensional algebras of infinite global dimension. A natural setting for this is the category of motives, where one can formulate a weaker version of Han's conjecture which we hope is more accessible. I'll also discuss a new positive result concerning the non-vanishing of Hochschild homology for certain algebras, with the novelty that no explicit cycles are constructed.

No conjecture will be settled, affirmatively or otherwise, during the talk. Rather there will be challenges. My thoughts are joint with Gratz, Raedschelders, and Špenko.

115. **Arjun Sujatha Narayanan (Cochin University of Science and Technology): On irreducible representation of cover of Lie algebras**

A pair of Lie algebras (K, M) is called a defining pair of for a finite dimensional Lie algebra L if $L \cong K/M$ and $M \subseteq Z(M) \cap [K, K]$. If K is of maximal dimension, then K is called the cover of L (cf. [2]). In the talk, I will introduce projective representation of Lie algebras and describe the irreducible representation of cover of Lie algebras by establishing a bijective correspondence between the set of irreducible linear representations of cover of Lie algebras and the set of projective representations of Lie algebras.

[1] S. N. Arjun and P. G. Romeo, *On central extensions and projective representations of Plesken Lie algebra*, Palestine Journal of Mathematics.

[2] P. G. Batten, *Multilpliers and covers of Lie algebras*, Ph.D Thesis, 1993.

116. **Peter Symonds (University of Manchester): The Module structure of a group action on a ring**

Consider a finite group G acting on a graded Noetherian k-algebra S, where k is a field of characteristic p; for example S might be a polynomial ring, in which case S is the symmetric algebra on a kG-module. Regard S as a graded kG-module and express it as a sum of indecomposable modules.

There are various questions we can now ask concerning a given isomorphism type of indecomposable kG-modules. Does it occur? If so, by which degree? How frequently does it occur? How many different isomorphism types occur? We show how this can be described in terms of homological algebra and how it is linked to the geometry of the group action on the spectrum of S.

117. **Kai Meng Tan (National University of Singapore): e-Cores and e-Weights of Multipartitions and Blocks of Ariki-Koike Algebras**

The Uglov map sends a multipartition (with an associated multicharge) to a partition. Using this Uglov map, I will show how one can use the e-abacus to define the e-core (which is a partition) and the e-weight (which is a non-negative integer) of a multipartition associated to a multi-e-residue. This combinatorial definition of e-weight coincides with the definition first introduced by Fayers. Furthermore, two Specht modules of an Ariki-Koike algebra lie in the same block if and only if they are labelled by multipartitions with the same e-core and the same e-weight. This thus provides a characterisation of the blocks of Ariki-Koike algebras that is analogous to that for Iwahori-Hecke algebras.

If time allows, I will discuss the implications of these results for Scopes's equivalences for the blocks of Ariki-Koike algebras, as well as suggest a definition of Rouquier blocks of Ariki-Koike algebras that is different from Lyle's, but is perhaps more natural.

118. **Hugh Thomas (Université du Québec á Montréal): u-equations and quotients of algebras**

A finite-dimensional algebra of finite representation type determines a system of u-equations, and thus an algebraic variety. I will explain how a quotient map of algebras induces a morphism between the corresponding algebraic varieties. It turns out that this can be understood in terms of a blowdown map between the toric varieties associated to their respective g-vector fans.

This talk reports on ongoing work with Nima Arkani-Hamed, Hadleigh Frost, Pierre-Guy Plamondon, and Giulio Salvatori. It is motivated by problems in the theory of scattering amplitudes, but I won't say much about that on this occasion.

119. **Jan Henrik Thomm (Lund University): Auslander–Reiten sequences in minimal A_∞-structures of the module category of a directed algebra**

The Auslander–Reiten sequences of a representation finite algebra may be seen as the building blocks of the module category. On the other hand, any Yoneda product of any radical morphism with an Auslander–Reiten sequence will always be split by definition. Hence, the Auslander–Reiten sequences seem to be unable to 'generate' any other short exact sequences.

Enhancing the Yoneda product to an A_∞-structure helps us to overcome this discrepancy at least in the case of representation directed algebras. We will show that in this case the Ext algebra of any basic additive generator is in fact always generated by the irreducible morphisms and Auslander–Reiten sequences as an A_∞-algebra.

120. **Ryu Tomonaga (The University of Tokyo): Cohen-Macaulay representations of invariant subrings**

In the branch of Cohen-Macaulay representations, it is an important problem to classify CohenMacaulay rings of finite Cohen-Macaulay type and determine their Auslander-Reiten quivers. In two dimensional case, it is classical that a complete Cohen-Macaulay local ring whose residue field is algebraically closed of characteristic zero is of finite Cohen-Macaulay type if and only if it is a quotient singularity [1,2]. Moreover, its Auslander-Reiten quiver coincides with the McKay quiver of the finite group defining the quotient singularity. In this talk, we generalize these classical results to the non-algebraically closed case based on [3].

[1] M. Auslander: *Rational singularities and almost split sequences*, Trans. Amer. Math. Soc. 293 (1986), no. 2, 511 - 531.

[2] H. Esnault: *Reflexive modules on quotient surface singularities*, 1985.

[3] R. Tomonaga: *Cohen-Macaulay representations of invariant subrings*, arXiv preprint arXiv:2403.19282 (2024).

121. **Satoshi Usui (Tokyo Metropolitan College of Industrial Technology): Stable categories of Gorenstein-projective modules over monomial algebras**

In 2018, Chen, Shen and Zhou provided an explicit description of representatives of the isomorphism classes of indecomposable Gorenstein-projective modules over an arbitrary monomial algebra. Further, they determined the triangulated structure of the stable category of its Gorenstein-projective modules when no non-zero non-trivial homomorphism exists in the stable category. Later, Lu and Zhu (2021) described such stable categories for 1-Iwanaga-Gorenstein monomial algebras. We also note that Ringel (2013) computed them for Nakayama algebras.

In this talk, we extend the above results to arbitrary monomial algebras. More precisely, we show that the stable category of Gorenstein-projective modules over any monomial algebra is triangle equivalent to the stable module category of a self-injective Nakayama algebra, which we will specify explicitly. This talk is based on joint work with Takahiro Honma.

122. **Adam-Christiaan van Roosmalen (Xi'an Jiaotong-Liverpool University): Holomorphic vector bundles for quantum Grassmannians**

This talk is based on joint work with Reamonn Ó Buachalla and Jan Stovicek.

One possible approach to noncommutative complex differential geometry is to start with a differential *-calculus, a possibly non-commutative version of a de Rham dga. We can then define holomorphic vector bundles to be certain dg modules. In this talk, we look at a Kähler structure for such a holomorphic vector bundles. Our definition of a Kähler structure allows us to generalise many results from commutative Kähler geometry to non-commutative Kähler geometry, such as the celebrated Kodaira vanishing theorem.

Examples of such non-commutative differential *-calculi come from quantum Grassmannians and from finite (commutative) groups.

123. **Laertis Vaso (Norwegian University of Science and Technology): Higher τ-tilting theory for Nakayama algebras**

τ-tilting theory and torsion theory are established areas of interest in representation theory. Recently, there have been attempts to generalize these theories in the setting of higher homological algebra. d-torsion classes were introduced by Jørgensen, and several versions of higher analogues of τ-tilting modules have been introduced by different authors (Jacobsen - Jørgensen, Martínez - Mendoza, Zhou - Zu and others). The aim of this talk is to give an explicit classification of some of these higher τ-tilting modules and higher torsion classes for truncated linear Nakayama algebras. This classification will also be used to illustrate the different properties of the proposed notions of higher τ-tilting modules. This is joint work with Endre S. Rundsveen.

124. **Jialin Wang (City University of London): Some endotrivial module for the symmetric group**

Let G be a finite group and $\mathbb{F}$ a field of characteristic $p > 0$. An $\mathbb{F}G$-module M is endotrivial if $\mathrm{Hom}_{\mathbb{F}}(M, M) \cong \mathbb{F} \oplus P$, for some projective $\mathbb{F}G$-module P. One main class of indecomposable endotrivial modules is given by

$$\Omega_G := \{\Omega^n(\mathbb{F}), n \in \mathbb{Z}\},$$

where Ω denotes the Heller translate. In some cases, this is the only class of indecomposable endotrivial modules, for example when G is an elementary abelian p-group. Assume the characteristic of $\mathbb{F}$ is 2 and consider the symmetric group $\mathfrak{S}_n$. The set of indecomposable endotrivial $\mathbb{F}\mathfrak{S}_n$-modules is just $\Omega_{\mathfrak{S}_n}$ except for some small n. In the case when n is 4, the Specht module $S^{(3,1)}$ is indecomposable endotrivial and $S^{(3,1)} \notin \Omega_{\mathfrak{S}_4}$. We examine the symmetric power $\mathrm{Sym}^n S^{(3,1)}$ and describe all the indecomposable nonprojective summands in $\mathrm{Sym}^n S^{(3,1)}$. In particular, the set of indecomposable nonprojective summands of $\mathrm{Sym}^n S^{(3,1)}$ for all n, up to isomorphism, is finite.

125. **Junpeng Wang (Northwest Normal University): Homotopy equivalence over rings with finite Gorenstein weak global dimension**

Let R be a ring with $\mathrm{Ggldim}(R) < \infty$. Chen in 2010 obtained a triangle-equivalence $\mathrm{K}(R\text{-GProj}) \simeq \mathrm{K}(R\text{-GInj})$ which restricts to a triangle-equivalence $\mathrm{K}(R\text{-Proj}) \simeq \mathrm{K}(R\text{-Inj})$. In this talk, we consider the same result for the setting of $\mathrm{Gwgldim}(R) < \infty$. As application, we establish some triangle-equivalences of Grothendieck duality over Ding-Chen rings and Gorenstein n-coherent rings.

This is a joint work with Sergio Estrada. Thanks to Zhongkui Liu, Li Liang, Lars Winther Christensen and Peder Thompson.

126. **Qi Wang (Tsinghua University): Representation type of cyclotomic quiver Hecke algebras**

One of the fundamental problems in representation theory is determining the representation type of algebras. In this talk, we will introduce the representation type of cyclotomic quiver Hecke algebras, also known as cyclotomic Khovanov-Lauda-Rouquier algebras, especially in affine type A. Our main result relies on novel constructions of the maximal dominant weights of integrable highest weight modules over quantum groups. This talk is based on collaborations with Susumu Ariki, Berta Hudak, and Linliang Song.

127. **Ren Wang (Hefei University of Technology): Preprojective algebras, skew group algebras and Morita equivalences**

Let $\mathbb{K}$ be a field of characteristic p and G be a cyclic p-group which acts on a finite acyclic quiver Q. The folding process associates a Cartan triple to the action. We establish a Morita equivalence between the skew group algebra of the preprojective algebra of Q and the generalized preprojective algebra associated to the Cartan triple in the sense of Geiss, Leclerc and Schröer. The Morita equivalence induces an isomorphism between certain ideal monoids of these preprojective algebras, which is compatible with the embedding of Weyl groups appearing in the folding process. This is a joint work with Xiao-Wu Chen.

128. **Xi Wang (Beijing University of Technology): The λ-pure singularity categories on a Grothendieck category**

Motivated by Neeman's research about the derived category of exact categories, we became interested in λ-pure version of derived category of a Grothendieck category, and obtained some meaningful results in our previous work. In this talk, we continue to study the λ-pure version of singularity category, and we verify that it is triangle equivalent to another quotient category under a special condition. Moreover, we also explore the reason why the general construction of classic Buchweitz-Happel Theorem is not feasible for λ-pure one, which is very different from general study of relative singularity categories. This is based on a joint work with Professor Hailou Yao.

129. **Xukun Wang (Chinese Academy of Sciences): The lax functoriality of Hochschild cochain complex**

It is clear that the Hochschild chain complex $C_\bullet(A)$ of an algebra A over a field k is functorial on A, i.e., the Hochschild chain complex $C_\bullet$ is a functor from the category $\mathbf{alg}_k$ of k-algebras to the category $\mathcal{C}k$ of complexes of k-vector spaces. Furthermore, Hochschild homology $HH_\bullet$ is also functorial. However, the Hochschild cochain complex $C^\bullet$ and Hochschild cohomology $HH^\bullet$ are not the case. In fact, even the center $Z(A)$ of a k-algebra A, which is isomorphic to the zeroth Hochschild cohomology $HH^0(A)$ of A, is not functorial on A. Nonetheless, in 2011, Davydov, Kong, and Runkel proved that the center of a k-algebra is lax functorial ([1, Theorem 4.12]), i.e., the center Z is a lax functor from the category $\mathbf{alg}_k$ of k-algebras, viewed as a bicategory with discrete Hom category, to the bicategory $\mathbf{alg_k}$**-cospan** of k-algebras, cospans of k-algebras, and morphisms of cospans of k-algebras. Moreover, in 2021, Grady and Oren showed that the center Z is a lax functor from the category **ring** of rings, viewed as a bicategory with discrete Hom category, to the bicategory **RING** of rings, bimodules, and bimodule morphisms ([2, Theorem 4.4]). Note that the Hochschild cochain complex is "homotopy center", it is natural to ask if the Hochschild cochain complex of a k-algebra is a lax functor between appropriate bicategories.

In the more general context of dg categories, the Hochschild cochain complex $C^\bullet(\mathcal{A})$ of a small dg k-category $\mathcal{A}$ is not functorial. However, in 2003, Keller showed that the Hochschild cochain complex $C^\bullet$ is a contravariant functor from the category $\mathbf{dgcat}_{\mathrm{ff}}$ of small dg k-categories and fully faithful dg k-functors to the category B_∞ of B_∞-algebras and B_∞-algebra morphisms. Furthermore, Keller proved that Hochschild cochain complex

$C^\bullet$ is a functor from the category $\mathbf{Hmo}_{\mathrm{ff}}$ to the homotopy category $\mathrm{Ho}(B_\infty)$ of B_∞-algebras ([4, 5.4]). Here, the category **Hmo** is the localization of $\mathbf{dgcat}_k$ with respect to the Morita morphisms, and $\mathbf{Hmo}_{\mathrm{ff}}$ is the subcategory of **Hmo** whose morphisms are the quasi-functors $X \in \mathrm{rep}(\mathcal{A}, \mathcal{B})$ such that the derived tensor product functor $? \otimes^L_{\mathcal{A}} X_{\mathcal{B}} : \mathrm{per}(\mathcal{A}) \to \mathrm{per}(\mathcal{B})$ is fully faithful. Keller's results imply that derived equivalence preserves the B_∞-algebra structure of Hochschild cochain complexes of small dg categories. Inspired by Keller's results, it is natural to ask if the Hochschild cochain complex of a small dg category exhibits any form of functoriality, especially when considering all dg functors, or more generally, all dg bimodules.

We will answer the above questions and complete, improve and generalize these results by constructing a bicategory of spans of spans in a model category, and showing that the Hochschild cochain complex of a small dg category can be constructed as a lax functor from a bicategory of small dg categories cofibrant over k to the bicategory of spans of spans in the category B_∞ of B_∞-algebras. The upper triangular matrix dg category introduced by Keller in [3] will play a crucial role. Furthermore, we prove that the Hochschild cohomology of a small dg category cofibrant over k is of lax functoriality, i.e., it is a lax functor from some bicategory of small dg categories cofibrant over k to the bicategory of spans of spans in the category of Gerstenhaber algebras. Our results provide a panoramic view of the functoriality of the Hochschild cochain complex and Hochschild cohomology.

This talk is based on an ongoing joint work with Yang Han.

[1] A. Davydov, L. Kong and I. Runkel, Field theories with defects and the centre functor, in: Mathematical foundations of quantum field theory and perturbative string theory, Proc. Sympos. Pure Math. 83 (2011), 71–128.

[2] R. Grady and G. Oren, Lax functors, cospans and the center construction, Grad. J. Math. 6 (2021), no. 2, 1–8.

[3] B. Keller, Derived invariance of higher structures on the Hochschild complex, 2003. Available from http://www.math.jussieu.fr/ keller/publ/dih.dvi.

[4] B. Keller, On differential graded categories, International Congress of Mathematicians II, European Mathematical Society, Zürich, 2006, 151–190.

130. **Peter Webb (University of Minnesota): Biset functors defined on categories**

The classical biset category (with a modification) first arose in a description of the morphisms between classifying spaces of finite groups, as a consequence of the Segal Conjecture. Biset functors are linear functors from this category to abelian groups. They are closely related to Mackey functors, being sometimes called globally defined Mackey functors. The classical theory has since been extended in several directions: one is that the biset category can now be taken to have as its objects all finite categories, rather than just all finite groups, so that biset functors are now defined on arbitrary finite categories. A key role is played by the Burnside ring of the finite category, for which the definition is new when the category is not a group. The homology and cohomology of simplicial complexes can both be regarded as biset functors, and this provides a uniform setting for the construction of transfer maps. Another direction of development is that both the biset category and the category of biset functors are monoidal, and the biset category is, in fact, rigid. I give an overview of key aspects of this theory.

131. **Can Wen (Beijing Normal University): The first Hochschild cohomology groups under gluings**

Stable equivalences occur frequently in the representation theory of finite dimensional algebras; however, these equivalences are poorly understood. An interesting class of stable equivalences is obtained by "gluing" two vertices. More precisely, let A be a finite dimensional algebra of the form kQ/I and B is obtained from A by gluing a source vertex and a sink vertex, then A and B are stably equivalent. In this talk, based on the Bardzell's projective resolution, we will compare the first Hochschild cohomology groups of arbitrary finite dimensional quiver algebras under gluing two arbitrary vertices. In particular, we will show that, as Lie algebras, $HH^1(A)$ is isomorphic to a quotient of $HH^1(B)$ under the stable equivalence induced by gluing vertices. As a generalization, we also get some very similar results under gluing arrows in monomial case. This is a joint work with Yuming Liu and Lleonard Rubio y Degrassi.

132. **Nicholas Williams (Lancaster University): Donaldson–Thomas invariants for the Bridgeland–Smith correspondence**

It is well-known that from a triangulated surface one can define a quiver with potential, and from this obtain a 3-Calabi–Yau triangulated category as the derived category of the associated Ginzburg DG algebra. Remarkably, up to equivalence, this category only depends upon the surface, rather than on the triangulation. Bridgeland and Smith have a more refined version of this construction, where the starting point is a quadratic differential on a Riemann surface, from which one then obtains a triangulation. Starting with the extra data of a quadratic differential, one also obtains a stability condition on the associated 3-Calabi–Yau triangulated category. Finite-length trajectories of the quadratic differential correspond to stable objects of the stability condition, which then have associated Donaldson–Thomas invariants which count them. In this talk I will explain recent joint work with Kidwai in which we compute the Donaldson–Thomas invariants corresponding to the different types of finite-length trajectories, showing that these values match predictions from physics. Indeed, in order for the invariants to match the predictions, it is necessary to use the refinement of the work of Bridgeland and Smith due to Christ, Haiden, and Qiu.

133. **Yilin Wu (University of Science and Technology of China): Group actions on relative cluster categories and Higgs categories**

Let G be a finite group acting on an ice quiver with potential (Q, F, W). In this talk, we will discuss the associated G-action on the relative cluster category and on the Higgs category, and provide the construction of G-equivariant relative cluster category and G-equivariant Higgs category, generalizing the work of Demonet, Paquette-Schiffler, and Le Meur. In the non-simply laced case, the G-equivariant Higgs category can provide an additive categorification for cluster algebras with principal coefficients.

134. **Yumeng Wu (Tsinghua University): The parity of Lusztig's restriction functor and Green's formula for a quiver with automorphism**

This report will show a formula about Lusztig's induction and restriction functors which can induce Green's formula via trace map. In this way, we could realize Green's formula for any finite dimensional hereditary algebra over the finite field $\mathbb{F}_q$. We will describe the representations of any finite dimensional hereditary algebra over the finite field $\mathbb{F}_q$ over a quiver with automorphism (Q, a), and then give the construction of induction and restriction functors as well as giving a sketch of the proof of the formula about them in mixed semisimple perverse sheaves complexes categories over a quiver with automorphism (Q, a).

135. **Changchang Xi (Capital Normal University): Derived equivalences of algebras VS equivalence relations of matrices**

In representation theory, derived categories and equivalences are of great interest. For instance, one of the central conjectures in modular representations of groups is Broue's abelian defect group conjecture which predicts a derived equivalence of block algebras of groups. In this talk, we investigate derived equivalences of the centralizers of matrices. To describe such equivalences, new equivalence relations on all square matrices are introduced, and characterizatios of derived equivalences for centralizers of matrices are presented in terms of elementary divisors. Thus homological equivalences of categories are reduced to problems in linear algebas. The talk reports parts of a joint work with X.G. Li, see arXiv:2312.08794.

136. **Jie Xiao (Beijing Normal University): Lie algebras arising from two-periodic projective complex and derived categories**

Let A be a finite-dimensional $\mathbb{C}$-algebra of finite global dimension and $\mathcal{A}$ be the category of finitely generated right A-modules. By using of the category of two-periodic projective complexes $\mathcal{C}_2(\mathcal{P})$, we construct the motivic Bridgeland's Hall algebra for $\mathcal{A}$, where structure constants are given by Poincaré polynomials in t, then construct a $\mathbb{C}$-Lie subalgebra $\mathfrak{g} = \mathfrak{n} \oplus \mathfrak{h}$ at $t = -1$, where $\mathfrak{n}$ is constructed by stack functions about indecomposable radical complexes, and $\mathfrak{h}$ is by contractible complexes. For the stable category $\mathcal{K}_2(\mathcal{P})$ of $\mathcal{C}_2(\mathcal{P})$, we construct its moduli spaces and a $\mathbb{C}$-Lie algebra $\tilde{\mathfrak{g}} = \tilde{\mathfrak{n}} \oplus \tilde{\mathfrak{h}}$, where $\tilde{\mathfrak{n}}$ is constructed by support-indecomposable constructible functions, and $\tilde{\mathfrak{h}}$ is by the Grothendieck group of $\mathcal{K}_2(\mathcal{P})$. We prove that the natural functor $\mathcal{C}_2(\mathcal{P}) \to \mathcal{K}_2(\mathcal{P})$ together with the natural isomorphism between Grothendieck groups of $\mathcal{A}$ and $\mathcal{K}_2(\mathcal{P})$ induces a Lie algebra isomorphism $\mathfrak{g} \cong \tilde{\mathfrak{g}}$. This makes clear that the structure constants at $t = -1$ provided by Bridgeland in [1] in terms of exact structure of $\mathcal{C}_2(\mathcal{P})$ precisely equal to that given in [2] in terms of triangulated category structure of $\mathcal{K}_2(\mathcal{P})$. This is bases on the joint work with J. Fang and Y. Lan.

[1] T. Bridgeland. Quantum groups via Hall algebras of complexes. *Ann. of Math. (2)*, 177(2):739–759, 2013.

[2] L. Peng and J. Xiao. Triangulated categories and Kac-Moody algebras. Invent. Math., 140(3):563–603, 2000.

137. **Bohan Xing (Beijing Normal University): Generalized parallel paths method with applications to Brauer graph algebras**

In 2006, in the study of the Lie algebra structure on the first Hochschild cohomology group, Claudia Strametz established the parallel paths method for the computation in the case of monomial algebras. We will report on joint work with Yuming Liu in which we generalize this method to arbitrary quiver algebras. As an application, we analyze and contrast the Lie structures of the first Hochschild cohomology groups of Brauer graph algebras and their associated graded algebras.

138. **Jiajun Xu (Shanghai Jiao Tong University): Quiver locus, Kazhdan-Lusztig variety and Zelevinsky map**

In the affine space of quiver representations with a fixed dimension vector, the quiver locus (also known as the quiver representation variety) is the orbit closure of a quiver representation under the action of the product of general linear groups. It exhibits profound connections with Schubert varieties and Kazhdan-Lusztig varieties in many aspects. In 1985, A. V. Zelevinsky presented a bijective map between a type A quiver locus and an open subset of a Schubert variety. This bijection has been proven to be a scheme-theoretical isomorphism, enriching many studies on type A quiver loci. This isomorphism was generalized to bipartite type A and almost bipartite type D quivers by R. Kinser and J. Rajchgot in 2015 and 2021, respectively. In this talk, we will introduce a generalization of this Zelevinsky isomorphism to type A and type D quivers with arbitrary orientation. In the index of Kazhdan-Lusztig variety as isomorphic image, much information regarding the representation of type A quiver is efficiently recorded. As applications, it helps in determining the singular loci of type A quiver loci and in answering more questions about the defining ideal of quiver loci. This is an ongoing joint work with Guanglian Zhang.

139. **Xiaoxiao Xu (East China Normal University): A recollement approach to Han's conjecture**

A conjecture due to Yang Han says that the Hochschild homology groups of a finite dimensional algebra vanish for sufficiently large degrees if this algebra is of finite global dimensional. We investigate this conjecture from a viewpoint of recollements of derived categories and reduce this conjecture to derived 2-simple algebras. This is a joint work in progress with Goudong Zhou and Jinbi Zhang.

140. **Gang Yang (Lanzhou Jiaotong University): Homological theory of representations having pure acyclic injective resolutions**

Let Q be a quiver and R an associative ring. A representation by R-modules of Q is called strongly fp-injective if it admits a pure acyclic injective resolution in the category of representations. It is shown that such representations possess many nice properties. We obtain the sufficient and necessary conditions for strongly fp-injective representations under some mild assumptions, which are closely related to strongly fp-injective R-modules. Subsequently, we use such representations to define relative Gorenstein injective representations, called Gorenstein strongly fp-injective representations, and give an explicit characterization of the Gorenstein strongly fp-injective representations of right rooted quivers. As an application, a model structure in the category of representations is given. This talk is based on a joint work with Qihui Li and Junpeng Wang.

141. **Guiyu Yang (Shandong University of Technology): Quasi-hereditary slim cyclotomic q-Schur algebras**

Slim cyclotomic q-Schur algebras are centraliser algebras of cyclotomic q-Schur algebras introduced by Dipper, James and Mathas, including q-Schur algebras of type A and C as examples. In this talk we will construct a basis of the slim cyclotomic q-Schur algebra $\mathcal{S}_{\mathbf{m}}(n, r)$ labelled by matrices. Moreover, we will prove that $\mathcal{S}_{\mathbf{m}}(n, r)$ is quasi-hereditary if and only if the cyclotomic Hecke algebra has a semisimple bottom. This talk is based on the joint work with Bangming Deng and Jie Du.

142. **Xiaoyan Yang (Zhejiang University of Science and Technology): G-dimensions for DG-modules over commutative DG-rings**

We define and study a notion of G-dimension for DG-modules over a non-positively graded commutative noetherian DG-ring A. Some criteria for the finiteness of the G-dimension of a DG-module are given by applying a DG-version of projective resolution introduced by Minamoto [Israel J. Math. 245 (2021) 409-454]. Moreover, it is proved that the finiteness of G-dimension characterizes the local Gorenstein property of A. Applications go in three directions. The first is to establish the connection between G-dimensions and the little finitistic dimensions of A. The second is to characterize Cohen - Macaulay and Gorenstein DG-rings by the relations between the class of maximal local-Cohen-Macaulay DG-modules and a special G-class of DG-modules. The third is to extend the classical Buchweitz-Happel Theorem and its inverse from commutative noetherian local rings to the setting of commutative noetherian local DG-rings. Our method is somewhat different from classical commutative ring.

143. **Huihui Ye (Sichuan University): On F-polynomials for generalized quantum cluster algebras and Gupta's formula**

We show the existence of F-polynomials for generalized quantum cluster algebras and obtain the associated separation formulas under a mild condition. Along the way, we obtain Gupta's formulas of F-polynomials for generalized quantum cluster algebras. These formulas specialize to Gupta's formulas for quantum cluster algebras and cluster algebras respectively. Finally, a generalization of Gupta's formula has also been discussed in the setting of generalized cluster algebras.

144. **Yu Ye (University of Science and Technology of China): On quasi-diagrams and gentle algebras**

It is known that any gentle algebra corresponds to a unique quasi-diagram. In this talk, we will introduce the notion of regularity for quasi-diagrams, and show that the regularity of the associated quasi-diagram is equivalent to the finiteness on the global dimension of the gentle algebra. We will also discuss the behaviour of quasi-diagrams under the dihedral group action and under taking Koszul duality.

145. **Haicheng Zhang (Nanjing Normal University): Periodic derived Hall algebras**

of hereditary abelian categories

Let m be a positive integer and $D_m(A)$ be the m-periodic derived category of a finitary hereditary abelian category A. Applying the derived Hall numbers of the bounded derived category $D^b(A)$, we define an m-periodic extended derived Hall algebra for $D_m(A)$, and use it to give a global, unified and explicit characterization for the algebra structure of Bridgeland' s Hall algebra of periodic complexes. Moreover, we also provide an explicit characterization for the odd periodic derived Hall algebra of A defined by Xu-Chen.

146. **Lujun Zhang (Zhejiang University): The maximality of weakly separated collections under boundary map**

In this talk, we show that the maximality of any weakly separated collection in $\binom{[n]}{k}$ is preserved under boundary map. As an application, this shows that the construction of Nick Early from a maximal weakly separated collection induces a finest positroid subdivision of hypersimplex $\Delta_{k,n}$, thus corresponds to a maximal cone of tropical positive Grassmannian $\mathrm{Trop}^{+}\mathrm{Gr}_{\mathrm{k,n}}$. In 2019, Nick Early introduced a polyhedral subdivision of hypersimplex by moving blades to its vertices. He proved that this subdivision is positroidial if and only if the vertices correspond to a weakly separated collection. In the following work, we will characterize the flip of this positroid subdivision as we do a cluster mutation of this maximal weakly separated collection in some direction.

This is a joint work with Fang Li and Gleb A. Koshevoy.

147. **Xiaojin Zhang (Jiangsu Normal University): Self-orthogonal τ-tilting modules and tilting modules**

Let Λ be an artin algebra and T a τ-tilting Λ-module. We prove that T is a tilting module if and only if $\mathrm{Ext}^i_\Lambda(T, \mathsf{Fac}T) = 0$ for all $i \geq 1$, where $\mathsf{Fac}T$ is the full subcategory consisting of modules generated by T. Consequently, a τ-tilting module T of finite projective dimension is a tilting module if and only if $\mathrm{Ext}^i_\Lambda(T, T) = 0$ for all $i \geq 1$. Moreover, we also give an example to show that a support τ-tilting but not τ-tilting module M of finite projective dimension satisfying $\mathrm{Ext}^i_\Lambda(M, M) = 0$ for all $i \geq 1$ need not be a partial tilting module.

148. **Yingying Zhang (Huzhou University): Mutation of Brauer configuration algebras**

In this talk, we study tilting mutation of Brauer configuration algebras, which are mostly wild algebras. For Brauer graph algebras, tilting mutation is compatible with flip of Brauer graphs. We generalize this result to the class of Brauer configuration algebras introduced by Green and Schroll recently. More precisely, under a certain condition, we introduce flip of Brauer configurations and prove that it is compatible with tilting mutation of the corresponding Brauer configuration algebras. This is based on a joint work with Toshitaka Aoki.

149. **Zhen Zhang (Beijing Normal University at Zhuhai): Simple modules and quasi-**

tubes on self-injective algebra of polynomial growth

Let A be a finite dimensional algebra over algebraically closed field k. Auslander-Reiten theory initialed by Auslander and Reiten [1] is an important combinatorial and homological invariant of module category A-mod. Quasi-tubes as a class of connected components of Auslander-Reiten quiver (AR-quiver for short) appeal in many self-injective algebras, for example, representation-infinite blocks of group algebras, representation-infinite tame algebras, and self-injective algebras of wild canonical type and so on. We mainly consider the self-injective algebras of polynomial growth, which are of tame type. In this talk, we shall describe the location of the set of simple modules in a quasi-tube for a non-local self-injective algebra of polynomial growth.

150. **Zhibing Zhao (Anhui University): n-torsionfree objects and Frobenius functors**

The notion of the n-torsionfree object in an Abelian category with enough projective objects is introduced in this note. Using the notion, we give some criterion of an Abelian category with enough projective objects is weakly Gorenstein, which is generalization of weakly Gorenstein algebras. We prove that the property of n-torsionfreeness is preserved under a faithful Frobenius functor between two abelian categories with enough projective objects. As an application, we obtain that if ARC holds for a base ring then ARC holds for the extension ring under Frobenius extension of rings. This is a joint work with Xiaowu Chen, Zhiwei Li and Xiaojin Zhang.

151. **Xiaoqiu Zhong (Shanghai Jiao Tong University): Quasi-hereditary orderings of Nakayama algebras**

To determine an algebra is quasi-hereditary is a difficult problem. A new method, Green-Schroll set, is introduced in this talk. It is well known that an algebra is quasi-hereditary if and only if it admits a quasi-hereditary ordering of simple modules. Let A be a Nakayama algebra. We prove a necessary and sufficient criterion to determine whether an ordering of simple modules is quasi-hereditary on A, and A is quasi-hereditary if and only if its Green-Schroll set is nonempty. This seems to be the simplest characterization currently known, since it does not involve any algebraic concepts. A general iteration formula for the number $q(A)$ of all quasi-hereditary orderings of A is given via Green-Schroll set. The q-ordering conjecture is proved to be true for A.

152. **Guodong Zhou (East China Normal University): Minimal models in algebra and operad Theory**

Minimal models of algebras originated from rational homotopy theory and play an important role in algebra. For algebraic structures governed by operads, it is also important to seek minimal models, say, minimal homotopy version of them. For instance, A-infinity algebras are the homotopy version of associative algebras, which can be obtained by Koszul duality. However, for operated algebras such Rota-Baxter algebras or differential algebras with nonzero weights, the minimal models remained open. Recently we found a method to produce minimal models for the oeprad of such operated algebras. This talk is a survey about our recent work on this subject.

153. **Panyue Zhou (Changsha University of Science and Technology): Right triangulated quotient categories**

A right triangulated category is a natural generalization of a triangulated category, inheriting its basic properties while incorporating some new structures. In this talk, we recall some definitions and properties of right triangulated categories. We give two equivalent characterizations of the octahedron axiom in the context of right triangulated categories. As an application, we prove that the Gabriel-Zisman localization of a right triangulated category remains a right triangulated category.

154. **Haiyan Zhu (Zhejiang University of Technology): Frobenius extensions about centralizer matrix algebras**

For an algebra R over an integral domain, let $S_n(c, R)$ be the centralizer algebra of an $n \times n$ matrix c. In this talk, we characterize the matrix such that extension $S_n(c, R)/R$ to be (separable) Frobenius. Furthermore, if R is an algebraically closed field, then $S_n(c, R)$ is (separable) Frobenius if and only if c is a diagonalizable matrix. As an application, we have homological invariant properties of some centralizer algebras.

155. **Shijie Zhu (Nantong University): Defect invariant Nakayama algebras and homological dimensions**

For a Nakayama algebra Λ, its syzygy filtered algebra $\varepsilon(\Lambda)$ was introduced by E.Sen in order to study the homological properties of syzygies of indecomposable Λ-modules. We prove that for a given Nakayama algebra Θ, there exists a unique Nakayama algebra Λ such that (1) $\varepsilon(\Lambda) \cong \Theta$; (2) both Λ and Θ have the same defect. Furthermore, we will show a close relation between the homological dimensions of a Nakayama algebra Λ and its syzygy filtered algebra $\varepsilon(\Lambda)$ which can be applied to classify the minimal Auslander-Gorenstein and dominant Auslander-regular Nakayama algebras. This is a joint work with Emre Sen and Gordana Todorov, arXiv:2406.00254v1.

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