



北京大学“表示论年-2023 五月会议”

暨有限群表示及相关专题研讨会

2023 年 5 月 27-28 日

会议手册

北京大学数学科学学院

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会议日程

北京大学数学科学学院

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日 程 安 排

5 月 27 日上午 地点：理科一号楼1560 (1556) 室			
08:30-08:40 开幕式 张继平院士讲话 会议合影			
时 间	报告人	报告题目	主持人
08:40-09:25	单 芄	Modularity for W-algebras and affine Springer fibers	张继平
09:30-10:15	余 君	Elementary abelian p -subgroups of linear algebraic groups	
10:15-10:35 茶 歇			
10:35-11:20	徐 斐	斜范畴代数与赋环有限座上的模	刘合国
11:25-12:10	王宝山	语义悖论的量子力学解释	
5 月 27 日下午 地点：理科一号楼1560 (1556) 室			
时 间	报告人	报告题目	主持人
14:00-14:45	张金币	Extension dimensions: derived equivalences and stable equivalences	胡维
14:50-15:35	廖鹏程	Frobenius' arithmetic theory and its application to supercharacter theory.	
15:35-15:55 茶 歇			
15:55-16:40	杜予聪	On the permutation structure of moonshine module	王宝山
16:45-17:30	李鹏程	Categorical actions for finite classical groups	

日程安排 (续)

5月28日上午地点: 理科一号楼1560 (1556) 室			
时 间	报告人	报告题目	主持人
08:40-09:25	胡维	Induction and restriction of derived equivalences	刘玉明
09:30-10:15	陈红星	Homological theory of orthogonal modules over algebras	
10:15-10:35		茶 歇	
10:35-11:20	刘洋	Huppert's ρ - σ conjecture	杨勇
11:25-12:10	麻常利	A class of quasi-classical groups over finite fields	
5月28日下午地点: 理科一号楼1560 (1556) 室			
时 间	报告人	报告题目	主持人
14:00-14:45	徐行忠	On Oliver's p -group conjecture for Sylow subgroups of symplectic groups and orthogonal groups	刘燕俊
14:50-15:35	廖军	Local rank of fusion systems and Alperin's weight conjecture	
15:35-15:55		茶 歇	
15:55-16:40	杨勇	TBA	王立中
16:45-17:30	靳平	Tensor factorizations of characters (revisited)	

报告题目与摘要

报告题目：Homological theory of orthogonal modules over algebras

报告人：陈红星 首都师范大学

摘要：Tachikawa's second conjecture predicts that a finitely generated, orthogonal module over a finite-dimensional self-injective algebra is projective. This conjecture is an important part of the Nakayama conjecture. In the talk, we try to understand Tachikawa's second conjecture by addressing finitely generated, orthogonal generators over a self-injective Artin algebra from the view point of (relative) stable categories. This reports a joint work with Changchang Xi.

报告题目：On the permutation structure of moonshine module

报告人：杜予聪 南方科技大学

摘要：In this talk, we give a description for subgroups of the sporadic simple group Monster that permute the moonshine module. More specifically, we classify the maximal p -subgroups that permute the moonshine module, we prove that the second maximal subgroup $2_{+}^{1+24} \cdot (2^{11} : M_{24})$ permutes the moonshine module up to a minus sign, and moreover we prove that there exists a simple subgroup of the Monster isomorphic to M_{11} that permutes the moonshine module. This is a joint work with Lizhong Wang and Jinwei Yang.

报告题目：Induction and restriction of derived equivalences

报告人：胡维 北京师范大学

摘要：In this talk, we discuss how to transfer derived equivalences from two algebras A and B to derived equivalences between eAe and fBf for certain idempotents e and f (restriction), and the other way around (induction). The induction process results in an

inductive method to lift stable equivalences to derived equivalences, and the restriction process leads to the derived invariance of some homological dimensions of algebras related to Lie theory. This is based on joint works with Ming Fang, Steffen Koenig, and Changchang Xi.

报告题目：Tensor factorizations of characters (revisited)

报告人：靳平 山西大学

摘要：In this talk we will investigate further the question of tensor factorizations of irreducible characters of an arbitrary finite group, and establish the existence and uniqueness of a certain type of tensor factorizations for a family of irreducible characters by introducing prime characters and primary characters as multiplicative building blocks. Our results generalize the corresponding factorization theorems of Brauer for projective representations and of Ferguson and Turull for quasi-primitive characters.

报告题目：Categorical actions for finite classical groups

报告人：李鹏程 清华大学

摘要：In this talk, we will give a brief introduction to quantum Heisenberg and Kac-Moody categorification. We construct categorical actions of Heisenberg algebras and Kac-Moody algebras on categories of representations of finite classical groups in non-defining characteristic. Using it, we can classify the blocks of $Sp_{2n}(q)$ and $O^{\pm}_{2n}(q)$, prove that Broue's abelian defect group conjecture is true for the finite classical groups at linear primes, and prove that Donovan's conjecture is true for finite classical groups and a given q .

This is a work in progress, joint with Peng Shan and Jiping Zhang.

报告题目：Local rank of fusion systems and Alperin's weight conjecture

报告人：廖军 湖北大学

摘要：In this talk we will explain the proper notion of local rank for fusion systems which is motivated by reformulating the Alperin's weight conjecture in the framework of block fusion systems following R. Knörr and G.R. Robinson's work.

This is a joint work with Heguo Liu, Baoshan Wang and Jiping Zhang.

报告题目：Frobenius' arithmetic theory and its application to supercharacter theory

报告人：廖鹏程 北京大学

摘要：In order to study prime decomposition of group-determinant on the field of complex numbers, Frobenius used arithmetic method to develop the theory of characters, which is considered the origin of representation theory for finite groups. In 2008, P. Diaconis and I. Isaacs first gave the definition of supercharacter theory. We applied the arithmetic method of Frobenius to supercharacter theory and obtained some results. In addition, we will introduce the computer algorithm and the classification of supercharacter theory for some finite groups.

报告题目：Huppert's ρ - σ conjecture

报告人：刘洋 天津师范大学

摘要：Let G be a finite group and $Irr(G)$ be the set of all irreducible complex characters of G . Define $\rho(G) = \{\text{prime } q : \chi(1) \equiv 1 \pmod{q}, \chi \in Irr(G)\}$ and $\sigma(G) = \max\{|\pi(\chi)| : \chi \in Irr(G)\}$. In the 1990s, Huppert asked the following question which is now called ρ - σ conjecture:

(1) If G is solvable, then $|\rho(G)| \leq 2\sigma(G)$;

(2) In general, $|\rho(G)| \leq 3\sigma(G)$.

In this talk, we will introduce some works on this problem.

报告题目： A class of quasi-classical groups over finite fields

报告人：麻常利 河北师范大学

摘要：Classical groups over finite fields, which include symplectic groups, unitary groups, orthogonal groups and so on, is a very important class of finite simple groups. The structure and order of classical groups are the basic problems in group theory. Geometry of classical groups has been found to be very useful in many fields, such as combinatorial mathematics, coding and cryptographic theory. In this paper, a class of quasi-classical groups are introduced, which partially generalize the concepts of symplectic group and orthogonal group. We determine structure and order of quasi-classical groups. As an application, we discuss the relationship between quasi-classical groups and self-dual normal bases over finite fields.

报告题目： Modularity for W -algebras and affine Springer fibers

报告人：单芑 清华大学

摘要：We will explain a bijection between admissible representations of affine Kac-Moody algebras and fixed points in affine Springer fibers. We will also explain how to match the modular group action on the characters with the one defined by Cherednik in terms of double affine Hecke algebras, and extensions of these relations to representations of W -algebras. This is based on joint work with Dan Xie and Wenbin Yan.

报告题目： 语义悖论的量子力学解释

报告人：王宝山 北航大学

摘要：自指代命题是指一个命题的内容涉及到对该命题自身的描述或判断。悖论的经典解释认为悖论的出现是由于自指代命题中出现了自指代否定导致真假不相容的情况。

本报告中我们将尝试从量子理论的角度给出容纳悖论的模型，以及从范畴论和表示论视角的展望。

报告题目：斜范畴代数与赋环有限座上的模

报告人：徐斐 汕头大学

摘要：设 \mathcal{C} 为有限范畴。在赋予 Grothendieck 拓扑 \mathcal{J} 后，我们考虑座 $\mathbf{C} = (\mathcal{C}, \mathcal{J})$ 上“模与模范畴的黏合”。受 P. Balmer 和 H. Asashiba 近期工作的启发，我们尝试通过层与叠形来分别实现黏合。设 \mathfrak{A} 是 \mathbf{C} 上的结构层。基于 Grothendieck 和 Verdier 关于有限拓扑斯的刻画，我们能够描述 \mathfrak{A} -模范畴 $\mathfrak{Mod}\text{-}\mathfrak{A}$ 。我们证明，存在 \mathcal{C} 的唯一满子范畴 \mathcal{D} ，使得 $\mathfrak{Mod}\text{-}\mathfrak{A}$ 等价于斜范畴代数 $\mathfrak{A}|_{\mathcal{D}}[D]$ 的模范畴。

作为一个应用，我们指出 Asashiba 关于黏合导出等价的定理给出斜范畴代数导出等价的一个充分条件。

报告题目：On Oliver's p-group conjecture for Sylow subgroups of symplectic groups and orthogonal groups

报告人：徐行忠 湖北大学

摘要：In this talk, we focus on Oliver's p-group conjecture. We prove that Oliver's pgroup conjecture holds for Sylow p-subgroups of symplectic groups and orthogonal groups. This is a joint work with Heguo Liu and Jiping Zhang.

报告题目：Elementary abelian p-subgroups of linear algebraic groups.

报告人：余君 北京大学

摘要：From a recent preprint of An-Dietrich-Litterick, I learned that my classification in 2013 of elementary abelian 2-subgroups in complex simple Lie groups might be used in studying the Alperin weight conjecture in finite group theory. In this talk I will recall methods and main results of the classification.

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为全面了解群与代数表示论的最新前沿研究动态，促进与加强交流与合作，拟于 2023 年 5 月 26-28 日在北京召开北京大学“表示论年-2023 五月会议”暨有限群表示及相关专题研讨会，诚挚邀请您参加。

本次会议由北京大学数学科学学院主办。

学术指导：张继平 院士

会议组织：王立中、刘燕俊、冯致程

具体事项如下：

1. 会议报到时间

2023 年 5 月 26 日下午（京内老师不用报到）

2. 会议报到地点

北京大学 中关村新园 1 号楼

3. 会议联系人

崔文慧 cuiwenhui@math.pku.edu.cn

刘燕俊 liuyanjun@pku.edu.cn

冯致程 zfeng@pku.edu.cn

本次会议不收取会务费，统一安排食宿。交通、食宿等费用自理。

北京大学数学科学学院

2023 年 5 月 16 日

