

数学物理与分次几何研讨会

报告时间安排

(2023 年 4 月 30 日)

	报告人	题目
09:00-09:50	陈酌	有限域上的特殊数形对应---幂零矩阵, 旗, 与树
10:00-10:50	毕艳会	Nonabelian omni-Lie algebroids
11:00-11:50	李晓斌	Random partition meets mirror symmetry: the power of thermodynamic limit
午饭		
14:00-14:50	乔雨	Fredholm groupoids and analysis on singular manifolds
15:00-15:50	程家豪	From Lie pairs to homotopy braces algebras
16:00-16:50	倪大地	Lie triads and their Atiyah extensions

会议地点: 四川大学西南中心 516 报告厅

报告题目及摘要

Nonabelian omni-Lie algebroids

毕艳会 (南昌航空大学)

摘要: In this talk, we study the structure of nonabelian omni-Lie algebroids. Firstly, taking Lie algebroid $(E, [\cdot, \cdot]_E, \rho_E)$ as the starting point, a nonabelian omni-Lie algebroid is defined on direct sum bundle $\mathcal{D}E \oplus \mathcal{J}E$, where $\mathcal{D}E$ and $\mathcal{J}E$ are, respectively, the gauge Lie algebroid and the jet bundle of vector bundle E , and study its properties. Furthermore, it is concluded that the nonabelian omni-Lie algebroid is a trivial deformation of the omni-Lie algebroid, and the nonabelian omni-Lie algebroid is a matched pair of Leibniz algebroids. This is a joint work with Hongtao Fan, Danlu Chen.

有限域上的特殊数形对应---幂零矩阵, 旗, 与树

陈酌 (清华大学)

摘要: 有限域是只有有限个元素构成的数域。它的性质与通常的实数域或复数域既相似又有很大的不同。本次讲座科普有限域的一些基础知识, 重点介绍一种只在有限域空间上成立的特殊的数形转化关系。我们揭示幂零矩阵的分类问题, 旗空间及其等价类, 树图等看似无关的数学对象之间是如何内在联系的。

From Lie pairs to homotopy braces algebras

程家豪 (南昌航空大学)

摘要: The braces algebra structures are important in the solutions of Deligne's conjecture on the existence of E_2 -algebra structure on the Hochschild cochain complex of an associative algebra. The theory of Lie pairs provides a common framework to study many sources of geometric objects which include complex manifolds, foliations, and manifolds with group actions. In this talk, I report progress on constructing homotopy braces algebra structures on the Hochschild cochain complex of a Lie pair. This is an ongoing joint work with Z. Chen, Y. Qiao, MS. Xiang.

Random partition meets mirror symmetry: the power of thermodynamic limit

李晓斌 (西南交通大学)

摘要: What is mirror symmetry? Mirror symmetry is a relation between generating function of Gromov-Witten invariants (A-model) and period integrals (B-model). From viewpoint of gauge theory and instanton counting, it is a duality between Nekrasov partition function and Seiberg-Witten prepotential. In this talk, I will discuss new dualities appearing in 5d $N = 1$ $Sp(N)$ gauge theory with $N_f (\leq 2N + 3)$ flavors and explain the computations about Nekrasov partition function based on topological vertex algorithm of 5-brane web with $O5$ -plane which corresponds to $Sp(N)$ geometry. With the help of random partition technique, Nekrasov

partition function can be rewritten in terms of profile function, after taking thermodynamic limit and functional derivatives, the saddle point equation can be derived for the profile function. By introducing the resolvent, the corresponding Seiberg-Witten geometry and boundary conditions are derived and the relations with the prepotential in terms of the cycle integrals are discussed. They coincide with those directly obtained from the dual graph of the 5-brane web with O5-plane. This agreement gives further evidence for mirror symmetry which relates Nekrasov partition function with Seiberg-Witten curve in the case with orientifold plane. This is joint work with Futoshi Yagi.

Fredholm Groupoids and Analysis on Singular Manifolds

乔雨 (陕西师范大学)

摘要: A classical theorem states that if M is a compact manifold, P is a pseudo-differential operator on M , then P is Fredholm if and only if P is elliptic. This theorem is no longer true for singular or non-compact manifolds.

In this talk, we would like to extend this theorem to singular setting via Lie groupoid techniques. First of all, we recall the notion of manifolds with corners (following the work of Melrose). Then we present the concept of a Fredholm Lie groupoid, which is a class of Lie groupoids for which certain characterization of Fredholm operators is valid, and then adopt b -calculus, scattering calculus, and edge calculus in the frame work of Fredholm Lie groupoids. Finally, we discuss briefly the relation between Fredholm Lie groupoids and index theory. This is joint work with Catarina Carvalho and Victor Nistor.

Lie triads and their Atiyah extensions

倪大地 (清华大学)

摘要: A Lie pair is a pair of Lie algebroids A and L where A is a Lie subalgebroid of L . A Lie triad is a Lie pair (L, A) together with an A -module E , all over the same base manifold. From a Lie triad $(L, A; E)$, one can naturally derive the associated Atiyah class and Atiyah extension. Then one will obtain more interesting objects and structure maps. This talk reports partial progress of joint work with Z Chen, C He, and JH Cheng.