



陈省身数学研究所
CHERN INSTITUTE OF MATHEMATICS

京津几何工作营&微分几何青年论坛

程序册

南开大学陈省身数学研究所

2026年10月27日-31日

京津几何工作营

10月28日上午

时间	报告人	题目	主持人
9:00-10:00	田刚	On Yau-Tian-Donaldson Problem	张伟平
10:00-10:30	茶歇、合影		
10:30-11:30	吴云辉	Group Actions on CAT(0) Spaces	葛建全
12:00	午餐（嘉园）		

10月28日下午

时间	报告人	题目	主持人
15:00-16:00	李琼玲	From cyclic Higgs bundles to Anosov representations	彦文娇
16:00-16:30	茶歇		
16:30-17:30	周向宇	General L^2 theory	麻小南
18:00	晚餐（嘉园）		

微分几何青年论坛

10月29日上午

时间	报告人	题目	主持人
08:45-09:00	开幕式		
09:00-09:45	杨晓奎	The prescribed Hermitian-Yang-Mills tensor equation and applications	张会春
09:55-10:40	刘冰萧	Asymptotic expansion of induced Grassmannian Chern forms and distribution of random degeneracy sets	刘钢
10:40-11:00	茶歇		
11:00-11:45	陈恒宇	Sharp leafwise width estimate for a class of foliated bands	刘博
12:00	午餐（嘉园）		

10月29日下午

时间	报告人	题目	主持人
14:00-14:45	朱锦天	The Riemannian Penrose Inequality in All Dimensions	葛化彬
14:55-15:40	欧阳泽轩	Positive Sectional Curvature on the exotic Gromoll-Meyer Sphere	夏超
15:40-16:00	茶歇		
16:00-16:45	李彦鹏	Cluster Structures on the Heisenberg Double	宋翀
18:00	晚餐（嘉园）		

10 月 30 日上午

时间	报告人	题目	主持人
09:00-09:45	丁琪	Hamiltonian stationary Lagrangian submanifolds	黄勇
09:55-10:40	杜承勇	Orbifold Morse Theory, CJS Realizations, and Morse Complexes	周斌
10:40-11:00	茶歇		
11:00-11:45	李发贵	A proof of the Simon conjecture and curvature rigidities	张川静
12:00	午餐（嘉园）		

10 月 30 日下午

时间	报告人	题目	主持人
14:00-14:45	沈伟明	The Monge-Ampere equation in convex polytope	杨文元
14:55-15:40	梁睿明	Complete Calabi–Yau metrics on noncompact K3-fibered threefolds	魏国新
15:40-16:00	茶歇		
16:00-16:45	戴嵩	Applications of Higgs bundle theory to problems in geometric analysis	张振雷
18:00	晚餐（嘉园）		

报告题目与摘要

田刚 北京大学

题目: On Yau-Tian-Donaldson Problem

摘要: The Yau-Tian-Donaldson problem concerns existence of constant scalar curvature metrics. In general, such metrics may not exist on a given Kähler manifold with a fixed Kähler class unless certain stability condition is satisfied. It turns out that such a condition is given by the K-stability I introduced and its extensions. In this expository talk, I will discuss the YTD problem, past works and current situations.

吴云辉 清华大学

题目: Group Actions on CAT(0) Spaces

摘要: We present our recent work on the algebraic structures of groups acting properly discontinuously by isometries on proper and non-positively curved spaces. In particular, we first review our solution to the Eberlein–Gromov–Margulis conjecture, and then discuss how its ideas can be extended to solve the Swenson conjecture. The former is joint work with Ran Ji; the latter is joint work with Jiankun Hou, Hiroyasu Izeki, Ran Ji, and Anders Karlsson.

李琼玲 南开大学

题目: From cyclic Higgs bundles to Anosov representations

摘要: Fuchsian representations are characterized as faithful and discrete representations of closed surface groups into $\mathrm{PSL}(2, \mathbb{R})$. More generally, replacing $\mathrm{PSL}(2, \mathbb{R})$ by an arbitrary semisimple Lie group, Anosov representations provide a natural generalization and retain the properties of being discrete and faithful. Apart from certain small deformations or specific components of the character variety, constructing new families of Anosov representations—particularly those that form closed subsets—remains a challenging problem. Meanwhile, the nonabelian Hodge correspondence gives a parametrization of the character variety of a surface group into a semisimple Lie group G in terms of holomorphic objects known as Higgs bundles over a Riemann surface. In general, however, it is difficult to determine whether the representation associated with a given Higgs bundle possesses desirable geometric properties. In this talk, I will present several families of cyclic Higgs bundles for which we are able to prove that the corresponding representations are Anosov and thus find new closed families of Anosov representations. This is based on work joint with Samuel Bronstein and Colin Davalo.

周向宇 中国科学院

题目: General L^2 theory

摘要: We'll first recall the classical and fundamental L^2 theory in several complex variables, and then describe recent advances about general L^2 theory and applications in related areas.

杨晓奎 清华大学

题目: The prescribed Hermitian-Yang-Mills tensor equation and applications

摘要: In this talk, we present a solution to the prescribed Hermitian-Yang-Mills (HYM) tensor equation on compact complex manifolds. This result constitutes a natural vector bundle analogue of the classical Calabi-Yau theorem. As applications, we derive intrinsic Chern number inequalities for general holomorphic vector bundles and establish an iterative construction of Hermitian-Einstein metrics on stable bundles.

刘冰萧 大湾区大学

题目: Asymptotic expansion of induced Grassmannian Chern forms and distribution of random degeneracy sets

摘要: In this talk, we will explain a Tian-type approximation theorem for Grassmannian embeddings associated with $H^0(X, L^p \otimes E)$, where L is a positive line bundle and E is a holomorphic vector bundle over a compact complex manifold X . In particular, we establish a full asymptotic expansion of the induced Grassmannian Chern forms and compute the first coefficients explicitly. When X is Kähler, we combine the first-order asymptotics with Dinh-Sibony's theory of meromorphic transforms to prove that normalized currents of integration over the loci where several random sections become linearly dependent converge almost surely to the corresponding powers of the first Chern form of L .

This is joint work with T. Bayraktar, D. Coman, and G. Marinescu.

陈恒宇 南开大学

题目: Sharp leafwise width estimate for a class of foliated bands

摘要: Gromov conjectures a band width estimate for certain Riemannian bands with positive scalar curvature. Cecchini and Zeidler prove and refine this conjecture in a special case via a comparison theorem for scalar and mean curvature. We generalize their theorem to the foliated setting, following Zhang's work on positive scalar curvature on foliations. In particular, we prove a sharp leafwise width estimate for compact, spin, foliated bands with positive leafwise scalar curvature and infinite vertical $\hat{A}$ -cowaist, using Dirac operators.

朱锦天 西湖大学

题目: The Riemannian Penrose Inequality in All Dimensions

摘要: The Riemannian Penrose inequality relates the ADM mass of an asymptotically flat manifold with nonnegative scalar curvature to the area of its outermost minimal boundary. I will discuss joint work with Yuchen Bi proving this inequality in all dimensions in a setting that allows singular outermost minimizing horizons. Our approach extends Bray's conformal flow beyond the smooth setting. The main ingredients are a separation argument at singular points and a mass-capacity inequality for domains with singular boundary. I will explain how these lead to mass monotonicity along the flow, and how a boundary-energy variation establishes Schwarzschild rigidity in the equality case.

欧阳泽轩 西湖大学

题目: Positive Sectional Curvature on the exotic Gromoll–Meyer Sphere

摘要: The existence of metrics with positive sectional curvature on exotic spheres is a fundamental problem concerning the interaction between curvature and smooth structure. In this talk, I will discuss a construction of a positively curved metric on an exotic 7-sphere. The construction begins with a bi-invariant metric on $\mathrm{Sp}(2)$ and introduces an explicit deformation compatible with the relevant quotient structure. The main geometric problem is then reduced to the study of sectional curvature on horizontal two-planes. The argument combines the structure of the Lie algebra, the geometry of Riemannian submersions, and a detailed analysis of the behavior of curvature under the deformation. Special attention is given to the locus where the leading curvature contribution vanishes. By analyzing these locus more carefully and combining local curvature estimates with compactness, one obtains strict positivity of sectional curvature for sufficiently small deformation parameters.

李彦鹏 四川大学

题目: Cluster Structures on the Heisenberg Double

摘要: We construct a compatible cluster structure on the Heisenberg double of a complex semisimple Lie group G . Our approach relies on the underlying symplectic groupoid geometry and the Berenstein-Fomin-Zelevinsky (BFZ) cluster structure on G . Furthermore, we explore the connections between this framework and the Li-Li-Lu construction of integrable systems and extend our results to additional examples. This is based on ongoing joint work with Yu Li and Dmytro Voloshyn.

丁琪 复旦大学

题目: Hamiltonian stationary Lagrangian submanifolds

摘要: We will talk about the geometry and analysis of Hamiltonian stationary Lagrangian submanifolds in Ricci-flat Kähler manifolds, focusing on regularity and compactness of them.

杜承勇 四川师范大学

题目: Orbifold Morse Theory, CJS Realizations, and Morse Complexes

摘要: In this talk, we study the Morse theory on an orbifold groupoid X . We construct an orbifold flow category using compactified reduced trajectory of negative gradient of a Morse-Smale pair. We then present a geometric Cohen–Jones–Segal realization, homotopy equivalent to the classifying space BX of X . With the geometric Cohen–Jones–Segal realization, we construct a Morse multicomplex that computes the homology of BX with arbitrary coefficient.

李发贵 北京理工大学（珠海）

题目：A proof of the Simon conjecture and curvature rigidities

摘要： We prove all gaps in the Simon conjecture for connected closed minimal surfaces immersed in unit spheres. Our proof uses the line-bundle ladder of Lin, Wang, and Xu and a Dolbeault computation to obtain two-sided ordered spectral comparisons on the 2-sphere under Gaussian curvature $K_g \geq 1$ and $K_g \leq 1$, with rigidity in the equality case. Applying these comparisons at consecutive Calabi scales forces the Gaussian curvature to be one of the two endpoint values. We also establish the corresponding rigidity theorem for closed surfaces with parallel mean curvature vector. Finally, we prove a rotationally symmetric higher-dimensional analogue under a Ricci lower bound and a sectional-curvature upper bound. This is a joint work with Weiran Ding and Jianquan Ge.

沈伟明 首都师范大学

题目：The Monge-Ampere equation in convex polytope

摘要： I will talk about the existence and regularity of solutions for the Monge-Ampere equation in convex polytope. We give sharp conditions for the existence of global C^2 and $C^{2,\alpha}$ convex solutions provided that a global C^2 , convex subsolution exists. An innovative contribution in this work is the discovery of A -condition, which plays a crucial role in the C^2 and $C^{2,\alpha}$ regularity theory of solutions, and the establishment of a nontrivial connection between this condition and bounded simple polytopes. This is based on joint works with Genggeng Huang.

梁睿明 北京大学

题目：Complete Calabi–Yau metrics on noncompact K3-fibered threefolds

摘要： In this talk, I will briefly review the history of constructions of complete noncompact Calabi–Yau metrics. I will then explain my recent construction on K3 fibrations [1]. A central difficulty is that the semi-Ricci-flat approximation at infinity yields an ansatz with unbounded sectional curvature, so the standard Tian–Yau–Hein framework cannot be applied directly. Our strategy is to introduce a collapsing parameter and perform a global gluing construction. We then develop a uniform linear theory for the resulting collapsing ansatz, allowing us to solve the nonlinear problem by a contraction argument in weighted Banach spaces and perturb the ansatz to a genuine Calabi–Yau metric. Finally, I will discuss possible connections with the construction of metrics with full G2 holonomy.

Reference:

[1] Liang R. Complete Calabi-Yau metrics on noncompact K3 fibered threefolds[J]. arXiv preprint arXiv:2606.13011, 2026.

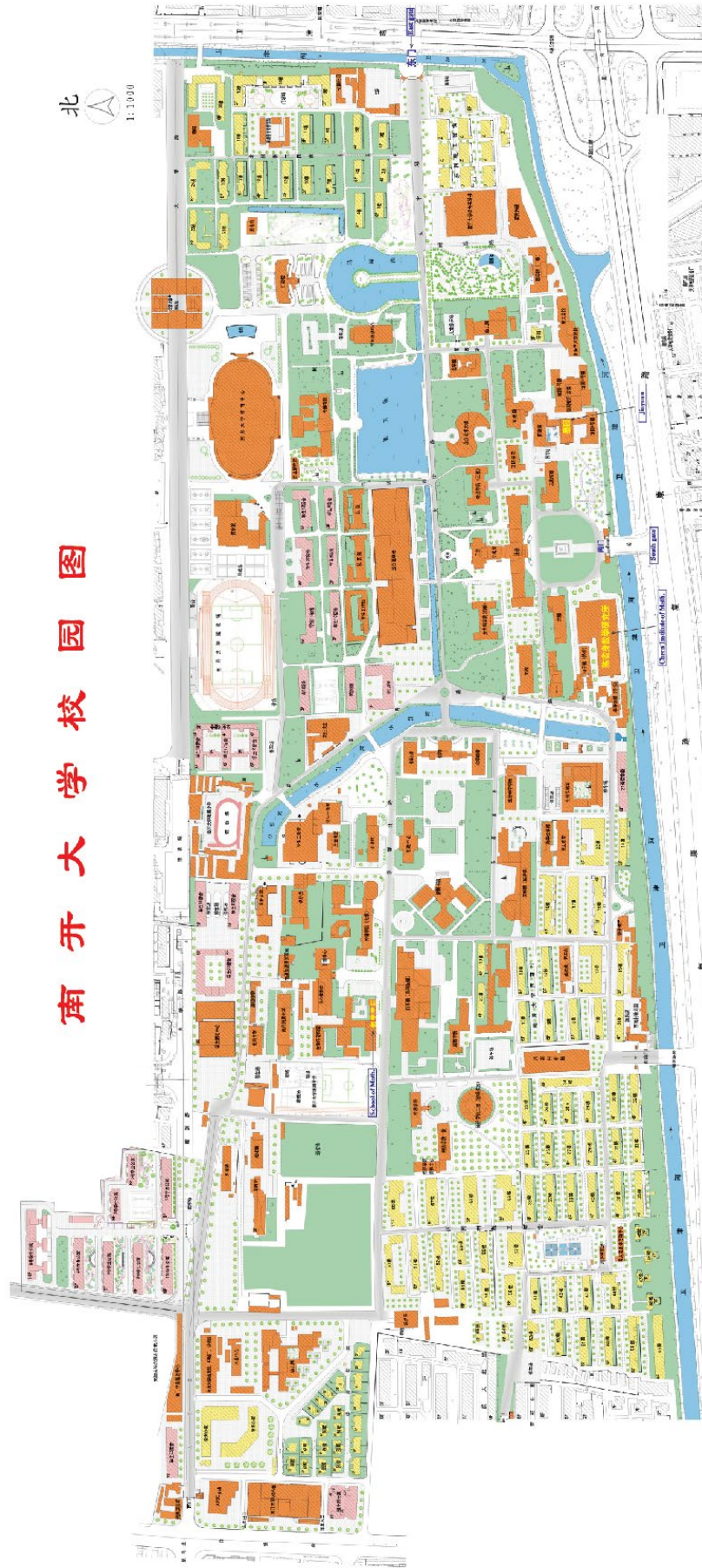
戴嵩 天津大学

题目：Applications of Higgs bundle theory to problems in geometric analysis

摘要： In this talk, we will first introduce some background on Higgs bundles and non-Abelian Hodge theory. Then we will discuss some applications of Higgs bundle theory to problems in geometric analysis, such as harmonic maps, minimal surfaces, and Ricci solitons.

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