50 YEARS OF
GEOMETRIC
ANALYSIS

几何分析50周年学术研讨会

庆祝利昂 · 西蒙院士80寿诞 / 卡拉比猜想证明50年 /
乌伦贝克-丘成桐定理证明40年

CELEBRATING THE 80TH BIRTHDAY OF LEON SIMON,
THE PROOF OF THE CALABI CONJECTURE & THE UHLENBECK-YAU THEOREM

会议手册

CONFERENCE MANUAL

2026.5.11-17
北京 · 清华大学

清華大學丘成桐数学科学中心
Yau Mathematical Sciences Center, Tsinghua University
清華大學求真书院
Qiuzhen College, Tsinghua University
BIMSA 北京雁栖湖应用数学研究院
Beijing Institute of Mathematical Sciences and Applications
中国科学院晨兴数学中心
MORNINGSIDE CENTER OF MATHEMATICS
CHINESE ACADEMY OF SCIENCES

50 YEARS OF
GEOMETRIC
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Host

Yau Mathematical Sciences Center, Tsinghua University

Co-hosts

Qiuzhen College, Tsinghua University

Morningside Center of Mathematics, Chinese Academy of Sciences (MCM)

Beijing Institute of Mathematical Sciences and Applications (BIMSA)

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目录

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主办方介绍 / About YMSC

清华大学丘成桐数学科学中心
Yau Mathematical Sciences Center (YMSC)
Tsinghua University

数学科学中心成立于 2009 年 12 月，特聘国际著名数学大师丘成桐先生担任中心主任。作为支持清华大学发展数学学科的重大战略举措，教育部于 2014 年底同意依托清华大学成立“丘成桐数学科学中心”。笃行不怠、赓续前行，十七年来，数学中心在高端人才引进、杰出人才培养、高水平学术研究和数学学科建设等方面实现了跨越式发展，成为具有重要国际影响力的数学研究中心。

截至 2026 年 3 月，数学中心共有全日制在校教师和科研人员 190 人，其中教师 103 人（外籍 17 人），博士后 87 人（外籍 29 人）。中心已经建成以纯粹数学为核心的“五大领域”和“三个交叉研究方向”的综合性学科布局，共六大科研团队。代数与数论、数学物理以及动力系统与随机分析这三个科研团队，已达到世界顶尖水平。

中心国际一流学者云集，目前在职包括丘成桐、Caucher Birkar、Nicolai Reshetikhin、Akito Futaki、Vladimir Markovic、Kenji Fukaya 等国际知名教授，中心有 2 位菲尔兹奖获得者、2 位邵逸夫奖得主、5 位院士；中青年学者出类拔萃，多人入选国家级人才政策和科研基金支持项目。

集美清华，求真淬炼。清华大学丘成桐数学科学中心、数学科学系、求真书院，与北京雁栖湖应用数学研究院紧密合作，携手构筑高水平数学科学人才培养、学术研究的基地，为清华大学迈向世界一流大学前列和中国数学学科的繁荣发展贡献力量。

In December 2009, Tsinghua University established the Mathematical Sciences Center, with internationally renowned mathematician Professor Shing-Tung Yau as the director. In late 2014, China's Ministry of Education officially approved the establishment of the YMSC at Tsinghua University. Over 17 years of development, the YMSC has emerged as a world-class research institute. It has excelled in recruiting a prestigious group of faculty members, nurturing a new generation of talented scholars, and spearheading cutting-edge research across various disciplines within the Mathematical Sciences.

As of March 2026, the YMSC has a total of 190 full-time faculty members and researchers, including 103 faculty members (17 international faculty) and 87 postdoctoral researchers (29 international postdoctoral researchers). Mathematical research at YMSC covers five major areas and three interdisciplinary research fields. Notably, of the six pillar research teams, the research teams in Algebra and Number Theory, Mathematical Physics, Dynamical Systems and Random Analysis have achieved remarkable original results that contribute significantly to their respective fields.

The YMSC boasts internationally renowned scholars, currently working at YMSC including Shing-Tung Yau, Caucher Birkar, Nicolai Reshetikhin, Vladimir Markovic, Kenji Fukaya and Akito Futaki. Among these esteemed members, there are two Fields Medalists, 2 Shaw Prize Winners and five Academicians. Many promising young mathematicians of YMSC have been recognized with various national funds and talent support programs.

The YMSC has collaborated with the Department of Mathematical Sciences, the Qiuzhen College of Tsinghua University, and the Beijing Institute of Mathematical Sciences and Applications, to build a top platform for mathematical education and research, contributing to Tsinghua University's goal of becoming one of the world-class universities, and promoting the growth and prosperity of the mathematical sciences in China.

中心主任 Director

丘成桐
Shing-Tung Yau

清华大学讲席教授
中国科学院外籍院士
美国国家科学院院士
美国艺术与科学院院士

丘成桐教授开创了数学中极为重要的分支“几何分析”。他解决的卡拉比猜想在数学界和物理学界被称为卡拉比 - 丘空间， 不单单是代数几何和数论中的主要工具，也成为高能物理中宇宙的主要模型。他先后获得菲尔兹奖 (Fields Medal)、克拉福德奖 (Crafoord Prize)、沃尔夫奖 (Wolf Prize)、马塞尔· 格罗斯曼奖 (Marcel Grossmann Awards)、邵逸夫奖 (The Shaw Prize) 等国际科学大奖。

Shing-Tung Yau，a Member of the U.S. National Academy of Sciences, a Member of the American Academy of Arts and Sciences, and a Foreign Member of the Chinese Academy of Sciences. He is the Chair Professor of Tsinghua University, the emeritus William Casper Graustein Professor of Mathematics and emeritus professor of physics at Harvard University. He has received the Fields Medal (1982), the Crafoord Prize (1994), the Wolf Prize (2010), the Marcel Grossmann Award (2018), and the Shaw Prize (2023).

关于大会 / About the conference

组织者 / Organizers

Huai-Dong Cao

Lehigh University

Jixiang Fu

Fudan University

Conan Nai Chung Leung

The Chinese University of Hong Kong

Jun Li

Fudan University

Yi Li

Shanghai Institute for Mathematics and Interdisciplinary Sciences

Kefeng Liu

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Columbia University

Richard Schoen

University of California, Irvine & Stanford University

Ye Tian

Morningside Center of Mathematics, Chinese Academy of Sciences

Xin Zhou

Cornell University

Xi-Ping Zhu

Sun Yat-sen University

报告人 / Speakers

Werner Ballmann

Max Planck Institute for Mathematics

Caucher Birkar

Tsinghua University

Alexander I. Bobenko

Technische Universität Berlin

Huai-Dong Cao

Lehigh University

Bing-Long Chen

Sun Yat-sen University

Gao Chen

University of Science and Technology of China

Georgios Daskalopoulos

Brown University

Huijun Fan

Wuhan University

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Harvard University

Jixiang Fu

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Instituto de Ciencias Matemáticas

Sylvester James Gates

University of Maryland

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Stony Brook University

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Beijing Institute of Mathematical Sciences and Applications

Lan-Hsuan Huang

University of Connecticut

Gerhard Huisken

University of Tübingen

Motoko Kotani

Tohoku University

Brian Krummel

The University of Melbourne

Camillo De Lellis

Institute for Advanced Study

Conan Nai Chung Leung

The Chinese University of Hong Kong

Haizhong Li

Tsinghua University

Tian-Jun Li

University of Minnesota

Yong Lin

Tsinghua University

Jianfeng Lin

Tsinghua University

Zhenhua Liu

Harvard University

John Loftin

Rutgers University-Newark

Hui Ma

Tsinghua University

Vladimir Markovic

Tsinghua University

Ngaiming Mok

The University of Hong Kong

Sébastien Picard

University of British Columbia

Nicolai Reshetikhin

Tsinghua University

Tristan Rivière

ETH Zurich

Xiaochun Rong

Rutgers University

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Otto-von-Guericke University of Magdeburg

Carlos Simpson

Université Côte d'Azur

Song Sun

Zhejiang University

Freid Tong

University of Toronto

Valentino Tosatti

New York University

Neil S. Trudinger

Australian National University

Mu-Tao Wang

Columbia University

Zhihan Wang

Cornell University

Juncheng Wei

The Chinese University of Hong Kong

Richard A. Wentworth

University of Maryland

Neshan Wickramasekera

University of Cambridge

Yunhui Wu

Tsinghua University

Ge Xiong

Tongji University

Jinxin Xue

Tsinghua University

Xiaokui Yang
Tsinghua University

Shing-Tung Yau
Tsinghua University

Weiping Zhang
Nankai University

Ping Zhang
Chinese Academy of Sciences

Gaoyong Zhang
New York University

Shou-Wu Zhang
Princeton University

Fangyang Zheng
Chongqing Normal University

Xiangyu Zhou
Chinese Academy of Sciences

Xin Zhou
Cornell University

Kang Zuo
Wuhan University

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会议日程 Agenda

总体日程 Schedule

会议时间 Time	2026 年 5 月 11 日至 5 月 17 日 11th - 17th, May 2026 *All times are Beijing Time (China Standard Time, UTC+8).*
会议地点 Location	清华大学 Tsinghua University
Zoom Meeting ID	892 226 4912 主楼后厅、建华楼 A206、建华楼 LG1-16 Lecture Hall, Main Building; Jianhua Building A206 / LG1-16 276 366 7254 建华楼 A209、建华楼 LG1-21 Jianhua Building A209 / LG1-21
Passcode	YMSC

2026.5.11 星期一 Mon.

All Sessions at Lecture Hall, Main Building, Tsinghua University
清华大学主楼后厅

Time	Plenary / Main Venue	Chair
09:30–10:30	Opening Ceremony	
10:30–10:45	Group Photo	
10:45–11:45	Shing-Tung Yau	Leon Simon
14:00–14:45	Caucher Birkar	Shing-Tung Yau
14:45–15:30	Shou-Wu Zhang	Xiaokui Yang
15:30–15:45	Break	
15:45–16:30	Sylvester James Gates	Shou-Wu Zhang
16:30–17:15	Motoko Kotani	Shou-Wu Zhang

2026.5.12 星期二 Tue.

上午 / Morning Session

Plenary Sessions at Lecture Hall, Main Building, Tsinghua University
清华大学主楼后厅

Chair: Bo Zhu

Time	Plenary / Main Venue
09:30–10:15	Weiping Zhang
10:15–11:00	Xiangyu Zhou
11:00–11:15	Break
11:15–12:00	Ngaiming Mok

下午 / Afternoon Session

Parallel Sessions at Jianhua Building, Rooms A206 / A209
建华楼 A206 / A209

Chair: Jian Xiao (Jianhua A206) **Chair:** Zhifei Zhu (Jianhua A209)

Time	Jianhua A206	Jianhua A209
14:00–14:45	Fangyang Zheng	Juncheng Wei
14:45–15:30	Werner Ballmann (Online)	Kang Zuo
15:30–15:45	Break	
15:45–16:30	Jixiang Fu	Huijun Fan
16:30–17:15	Xiaokui Yang	Freid Tong

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2026.5.13 星期三 Wed.

上午 / Morning Session

Plenary Sessions at Lecture Hall, Main Building, Tsinghua University
清华大学主楼后厅

Chair: Shing-Tung Yau

Time	Plenary / Main Venue
09:30–10:15	Richard Schoen
10:15–11:00	Camillo De Lellis (Online)
11:00–11:15	Break
11:15–12:00	Gerhard Huisken

下午 / Afternoon Session

Parallel Sessions at Jianhua Building, Rooms LG1-16 / LG1-21
建华楼 LG1-16 / LG1-21

Chair: Chenglong Yu (Jianhua LG1-16) **Chair:** Weiyan Chen (Jianhua LG1-21)

Time	Jianhua LG1-16	Jianhua LG1-21
14:00–14:45	Neshan Wickramasekera (Online)	Richard A. Wentworth
14:45–15:30	Brian Krummel	Xin Zhou
15:30–15:45	Break	
15:45–16:30	Alexander Grigor'yan	Miles Simon
16:30–17:15	Zhenhua Liu	Zhihan Wang

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2026.5.14 星期四 Thu.

上午 / Morning Session

Plenary Sessions at Lecture Hall, Main Building, Tsinghua University
清华大学主楼后厅

Chair: Vladimir Markovic

Time	Plenary / Main Venue
09:30–10:15	Neil S. Trudinger (Online)
10:15–11:00	Tristan Rivière
11:00–11:15	Break
11:15–12:00	Dan Freed

下午 / Afternoon Session

Parallel Sessions at Jianhua Building, Rooms LG1-16 / LG1-21
建华楼 LG1-16 / LG1-21

Chair: Han Hong (Jianhua LG1-16) **Chair:** Honghao Gao (Jianhua LG1-21)

Time	Jianhua LG1-16	Jianhua LG1-21
14:00–14:45	Yuguang Shi	Georgios Daskalopoulos
14:45–15:30	John Loftin	Gao Chen
15:30–15:45	Break	
15:45–16:30	Jinxin Xue	Yong Lin
16:30-17:15	Haizhong Li	

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2026.5.15 星期五 Fri.

上午 / Morning Session

Plenary Sessions at Lecture Hall, Main Building, Tsinghua University
清华大学主楼后厅

Chair: Yong Lin

Time	Plenary / Main Venue
09:30–10:15	Ping Zhang
10:15–11:00	Huai-Dong Cao
11:00–11:15	Break
11:15–12:00	Alexander I. Bobenko

下午 / Afternoon Session

Parallel Sessions at Jianhua Building, Rooms LG1-16 / LG1-21
建华楼 LG1-16 / LG1-21

Chair: Xianfeng Wang (Jianhua LG1-16) **Chair:** Mao Sheng (Jianhua LG1-21)

Time	Jianhua LG1-16	Jianhua LG1-21
14:00–14:45	Tian-Jun Li	Conan Nai Chung Leung
14:45–15:30	Song Sun	Hui Ma
15:30–15:45	Break	
15:45–16:30	Carlos Simpson (Online)	Xianfeng Gu
16:30–17:15	Gaoyong Zhang	Ge Xiong

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2026.5.16 星期六 Sat.

上午 / Morning Session

Plenary Sessions at Jianhua Building, Room LG1-16
建华楼 LG1-16

Chair: Huai-Dong Cao

Time	Plenary / Main Venue
09:30–10:15	Nicolai Reshetikhin
10:15–11:00	Mu-Tao Wang (Online)
11:00–11:15	Break
11:15–12:00	Kenji Fukaya

下午 / Afternoon Session

Parallel Sessions at Jianhua Building, Rooms LG1-16 / LG1-21
建华楼 LG1-16 / LG1-21

Chair: Weifeng Sun (Jianhua LG1-16) **Chair:** Akito Futaki (Jianhua LG1-21)

Time	Jianhua LG1-16	Jianhua LG1-21
14:00–14:45	Xiaoli Han	Mario Garcia-Fernandez
14:45–15:30	Sébastien Picard	Jianfeng Lin
15:30–15:45	Break	
15:45–16:30	Lan-Hsuan Huang	Sebastian Heller
16:30–17:15		Artan Sheshmani

2026.5.17 星期日 Sun.

上午 / Morning Session

All Sessions at Jianhua Building, Room LG1-16
建华楼 LG1-16

Chair: Yunhui Wu

Time	Plenary / Main Venue
09:30–10:15	Vladimir Markovic
10:15–11:00	Akito Futaki
11:00–11:15	Break
11:15–12:00	Valentino Tosatti

下午 / Afternoon Session

All Sessions at Jianhua Building, Room LG1-16
建华楼 LG1-16

Chair: Kenji Fukaya

Time	Plenary / Main Venue
14:00–14:45	Yunhui Wu
14:45–15:30	Bing-Long Chen
15:30–15:45	Break
15:45–16:30	Xiaochun Rong

题目摘要 / Title and Abstract

Brief history of modern geometric analysis and its appreciation

Shing-Tung Yau

Abstract

This talk reviews the development of modern geometric analysis over the past fifty years, beginning with the proof of the Calabi conjecture. It highlights how nonlinear partial differential equations have transformed the study of differential geometry, complex geometry, and mathematical physics. We will discuss several major milestones in the field, together with some of the leading figures behind these developments. Through these events and contributions, it illustrates how geometric analysis has opened new directions and deepened the connections among geometry, physics, and algebraic geometry.

Altering families of algebraic varieties and applications

Caucher Birkar

Abstract

I will explain recent progress towards altering families of algebraic varieties in a uniform way with controlled singularities and discuss applications to multiple problems.

Geometric analysis with adelic metrics

Shou-Wu Zhang

Abstract

In this lecture, I will first introduce some analogies between complex geometry with hermitian metrics and non-Archimedean geometry with adelic metrics, such as Hermitian-Einstein metrics, Kähler-Einstein metrics, and constant scalar curvatures. Then we discuss their potential applications to algebraic geometry and number theory. The case of curves has been described in a letter to P. Deligne in 1993.

How Supersymmetric 2D Field Theory First Uncovered The Basic Representation Tool For Torsion-ful Kahler, CY Geometries, and Mirror Manifolds

Sylvester James Gates

Abstract

In 1984, two works on Sigma-models and Twisted Multiplets made the first discovery of the supersymmetric quantum field theory origin of previous unknown phenomena in geometric analysis.

Discrete surfaces and their convergence

Motoko Kotani

Abstract

We introduce a Discrete Surface theory. The discrete curvatures for immersed discrete surfaces in the 3-space are discussed. We discuss subdivision sequences of a given surface and their convergence to a continuum object. When a surface is harmonic, it converges to a classical minimal surface.

The Lichnerowicz vanishing theorem revisited

Weiping Zhang

Abstract

The famous Lichnerowicz vanishing theorem states that if a closed spin manifold carries a metric of positive scalar curvature, then its Hirzebruch A-hat genus equals to zero. We will discuss some recent extensions of this classical result.

Some Recent Results in Several Complex Variables

Xiangyu Zhou

Abstract

We'll introduce some recent advances in several complex variables and their applications in related areas, consisting of

- results on the strong openness conjecture and the zero-mass conjecture related to plurisubharmonic functions;
- results on the converse L^2 theory, and characterizations of plurisubharmonic functions and positivity of metrics on holomorphic vector bundles;

- results on singular metrics on holomorphic vector bundles, including L^2 extension theorems, the strong openness property, and isomorphisms and vanishing theorems for connecting vector and line bundles valued cohomology groups.

Canonical Kähler-Einstein metrics in relation to a rigidity theorem concerning irreducible lattices in $Aut(\Omega)$ for bounded symmetric domains Ω of rank $\geqslant 2$

Ngaiming Mok

Abstract

On a bounded domain $D \subset C^n$, the most elementary canonical Kähler metric is the Bergman metric dD_s^2, which descends to any quotient of D by a torsion-free discrete subgroup $\Gamma' \subset Aut(D)$ and can hence be used to study (quasi-) projective manifolds N uniformized by D. The Bergman metric dD_s^2 is however not necessarily complete. In contrast, it was established by Cheng-Yau (1980) and Mok-Yau (1983) that bounded domains of holomorphy admit canonical Kähler-Einstein metrics of negative Ricci curvature. We will show that these Kähler-Einstein metrics are applicable to study rigidity problems for holomorphic maps.

Let $\Omega \subset C^n$ be a bounded symmetric domain of rank $\geqslant 2$ and $\Gamma \subset Aut(\Omega)$ be a torsion-free irreducible lattice. Let $\Omega \subset C^N$ be any bounded domain, $\Gamma' \subset Aut(D)$ be a discrete subgroup such that $Volume(Y_{\Gamma'}, d\mu) < \infty$ for $Y_{\Gamma'} := D/\Gamma'$ and $d\mu$ denoting the Kobayashi-Eisenmann volume form on $Y_{\Gamma'}$. Let $F:\Omega \to D$ be a holomorphic map Γ- equivariant with respect to an isomorphism $\Phi:\Gamma \to \Gamma'$. Together with Kwok-Kin Wong we have recently proven that $F:\Omega \to D$ must be a biholomorphism.

To prove $F:\Omega \to D$ biholomorphism it suffices to be able to invert the holomorphic map. To do this we first construct a holomorphic map $R:D \to \Omega$ such $\circ$ that $R\,F = id_\Omega$. Hence, $F:\Omega \to F(\Omega)$ such that, writing $\varphi : F(\Omega) \to \Omega$ for its inverse, we have $R = \varphi \circ \varpi$ for a holo morphic retraction $\varpi : D \to F(\Omega)$. To construct R we introduce an averaging process on bounded holomorphic functions on Ω belonging to $H := F^* H^\infty(D)$ in order to prove that there exist $h_1, \ldots h_n \in H^\infty(D)$ such that $(F^* h_1, \ldots F^* h_n) = id_\Omega$. The averaging process involves harmonic analysis applied to fibers of the Cayley projection on Ω, which are holomorphic isometric copies of the complex unit ball, and also Moore's ergodicity theorem on semisimple Lie groups. Finally, to prove that F is a biholomorphism it remains to show that the fibers of $\varpi : D \to F(\Omega)$ are 0-dimensional. When D is a domain of holomorphy we proved this by exploiting the geometry of $Y_{\Gamma'}$ as a complete Kähler-Einstein manifold of finite volume. In general, we replaced D by its hull of holomorphy D' and proved the same by deducing from the hypothesis $Volume(Y\_\Gamma', d\mu) < \infty$ that $D \subset D'$ is a schlicht domain such that $D' \mid D$ is of zero Lebesgue measure.

On locally Chern homogeneous Hermitian manifolds

Fangyang Zheng

Abstract

In this talk, we will discuss a special type of compact locally homogeneous Hermitian manifolds, those whose Chern or Bismut connection has parallel torsion and curvature. In the Chern connection case, we show that such manifolds must be covered by products of Hermitian symmetric spaces with complex Lie groups, and in the Bismut connection case, we will present some examples of such manifolds other than Hermitian symmetric spaces or Bismut flat spaces. We will also discuss results of AK type for metric connections, after the classic theorem of Alekseevskii and Kimelfeld which states that any Ricci flat homogeneous Riemannian manifold must be flat.

Global convergence of the Gursky-Malchiodi Q-curvature flow

Juncheng Wei

Abstract

In [JEMS2015], Gursky and Malchiodi introduced a non-local conformal flow in dimensions $n \geqslant 5$ to resolve the constant Q-curvature problem. They proved **sequential convergence** of the flow for initial metrics with positive scalar curvature and Q-curvature, provided the initial energy is **sufficiently small**. The question of global convergence for large initial energy has remained open.

In this talk, we resolve this problem by proving **global convergence** of the flow for **arbitrary** initial energy under the same positivity assumptions. Our approach centers on establishing a non-local version of the Lojasiewicz-Simon inequality for the Paneitz-Sobolev quotient along the flow.

We construct test bubbles and estimate their Paneitz-Sobolev quotients, a strategy that was carried out in the celebrated work of Brendle ([Invent 2006]) in the context of the Yamabe flow. We develop a more geometric and systematic proof that addresses the algebraic and computational complexity inherent in the Q-curvature and the Paneitz operator. Along the way, we derive a stability inequality for the Paneitz-Sobolev quotient using a higher-order Koiso-Bochner formula established in recent work of Bahuaud, Guenther, Isenberg, and Mazzeo (2025). Joint work with Sanghoon Lee and Liuwei Gong.

Spectral stability and instability of finite Riemannian coverings

Werner Ballmann

Abstract

The pull-back of an eigenfunction from the base M of a Riemannian covering to the covering manifold M' is an eigenfunction on M'. In the talk, I will discuss the existence of new eigenfunctions on M'. This is joint work with Sugata Mondal and Panagiotis Polymerakis.

Hyperbolicity and Finiteness in Moduli Spaces of Varieties

Kang Zuo

Abstract

Moduli spaces of varieties provide a natural testing ground for Bombieri-Lang type finiteness, as nontrivial variation in families tends to force geometric negativity on the base. We propose a program connecting Hodge theory, hyperbolicity, and negativity properties of moduli spaces to finiteness for families of higher dimensional varieties in general position. Boundedness is governed by an Arakelov type inequality inspired by Shing Tung Yau's Schwarz lemma. We conjecture a description of the loci where finiteness fails and provide strong evidence under the local Torelli assumption, particularly for moduli spaces of Calabi-Yau manifolds. We also outline a possible extension beyond this setting. This talk is based on joint works with S. Lu, R. R. Sun, K. Chen, T. Z. Hu, and C. L. Yu.

On the Critical LYZ Equation in Kähler Geometry

Jixiang Fu

Abstract

In Kähler geometry, the LYZ equation, also known as the deformed Hermitian-Yang-Mills equation, is a fully nonlinear elliptic partial differential equation that originates from mirror symmetry. In this talk, we present the existence of smooth solutions to the LYZ equation at the critical phase, thereby resolving a problem posed by Collins-Jacob-Yau and Y. Li. This is based on joint work with Professors Shing-Tung Yau and Dekai Zhang.

Novikov type Landau-Ginzburg model

Huijun Fan

Abstract

Landau-Ginzburg (LG) models arise naturally in the study of mirror symmetry, and a prominent conjecture—the Landau-Ginzburg / Calabi-Yaucorrespondence—links them to Calabi-Yau geometry. Consequently, a geometric analysis of LG models is of fundamental importance. In this talk, I introduce a class of Novikov-type Landau-Ginzburg models (NLGMs), exemplified by hyperplane arrangements. For well-behaved NLGMs, we establish a Hodge decomposition theorem, which opens several natural directions for further investigation. This work is joint with Jieran Wang.

The prescribed Hermitian-Yang-Mills tensor equation

Xiaokui Yang

Abstract

In this talk, we present a solution to the prescribed Hermitian-Yang-Mills tensor equation, which is closely related to both the Calabi-Yau equation and the Hermitian-Yang-Mills equation. The C^0 estimate is established by a new comparison principle. This is joint work with Mingwei Wang and Shing-Tung Yau.

On the regularity of optimal transport maps on convex domains

Freid Tong

Abstract

The optimal transport problem seeks to find the most efficient way to transport a measure to another while optimizing a certain cost function. The regularity of optimal transport maps have been a central question in the subject. In this talk, I will discuss some new perspectives on the regularity of optimal transport maps, which is deeply connected and motivated by problems arising from Kähler geometry. This is based on some joint works with T. Collins, and S.-T. Yau.

Free boundary minimal surfaces in product domains

Richard Schoen

Abstract

In this talk we will describe recent work using eigenvalue optimization to construct free boundary minimal surfaces in products of euclidean balls. We will briefly outline the general theory and apply it in a specific case to explain and generalize the Schwarz p-surface, which is a free boundary minimal surface in the three dimensional cube with one boundary component on each face of the cube. We will show how the method can be used to construct such surfaces in rectangular prisms with arbitrary side lengths. We will also show that when the side lengths are not all the same, there are at least two minimal surfaces of the type of the Schwarz p-surface and both are embedded.

Boundary Plateau Laws

Camillo De Lellis

Abstract

Dipping a wire of metal or plastic in soapy water and taking it out is a favorite classroom experiment: typically the soapy water will form a thin film which is attached to the wire. The classical Plateau laws, stated by the Belgian physicist Joseph Plateau in the nineteenth century, assert that, away from the wire, the local geometry of a soap film is described by the following list of shapes: a 2-dimensional plane, three halfplanes meeting at a common line with equal angles, and the cone over the 1-dimensional skeleton of a regular tetrahedron.

Is there a similar list of possible shapes for the points where the film touches its "boundary", namely the wire of the classroom experiment? The classical Plateau laws were translated into a mathematical theorem by Jean Taylor in the seventies: as a byproduct Taylor's theorem rigorously classifies 2-dimensional conical shapes which minimize the area. In this talk I will illustrate a recent joint work with Federico Glaudo, classifying conical shapes which minimize the area and include a boundary line: the corresponding list suggests an analog of Plateau's laws at the boundary of the soap film, which is very much in agreement with both real-life and numerical experiments.

Mean curvature flow sweep-out of asymptotically flat 3-manifolds

Gerhard Huisken

Abstract

The lecture describes joint work with Carlo Sinestrari on the existence of a unique sweep-out from infinity to the horizon on asymptotically flat 3-manifolds of positive mass given by a solution of mean curvature flow. The sweep-out provides an analogue of the Newton potential and defines a center of mass compatible with the center of mass given by constant mean curvature surfaces.

Analysis of singularities of area-minimizing currents: a new framework

Neshan Wickramasekera (Part 1)

Brian Krummel (Part 2)

Abstract

In this two-part talk we provide an overview of a new framework for studying singularities of an n-dimensional locally area-minimizing rectifiable current T in R^{n+m} (or more generally in a Riemannian manifold of dimension $n+m$), $m \geqslant 2$. Almgren's foundational 1983 work established the sharp Hausdorff dimension upper bound $n-2$ for the singular set of T. The most complex part of this classical theory is analyzing *branch points* i.e. singular points where at least one tangent cone is supported on a plane.

Our work shifts the focus to the local structure of the current. This work provides a higher-dimensional generalization of the classical two-dimensional structure theory of White, Chang, and Micallef--White, while yielding a more direct geometric proof of Almgren's theorem. The framework builds on key ingredients from Almgren's theory (clarified by De Lellis and Spadaro) and methods inspired by Leon Simon's fundamental work, establishing a unified approach to several basic questions. By developing new uniform a priori estimates for T, this program aligns the higher-codimension theory more closely with the spirit of codimension 1 regularity (for area-minimizers, or more generally for stable varifolds) and classical PDE. Our new results include:

1. *Uniqueness of tangent cones:* T has a unique tangent cone at H^{n-2}-a.e. singular point;

2. *Higher-order asymptotics:* T has a unique higher-order asymptotic expansion at H^{n-2}-a.e. branch point, with precise error estimates;

3. *Singular-set structure:* the singular set of T is locally a finite union of pairwise disjoint, locally compact, locally $n-2$-rectifiable sets;

4. *Local topology:* near each branch point satisfying a specific rate-of-decay (i.e. frequency) criterion, the support of T is topologically an n-dimensional disk admitting a $C^{1,\mu}$-parameterization. (Classical algebraic examples show that this conclusion need not hold in the absence of the frequency criterion).

As part of our approach, we introduce a new intrinsic frequency function---*the planar frequency*---quantifying the rate at which T decays to a fixed plane P on approach to a fixed base point Z. We establish an approximate monotonicity formula for the planar frequency function on intervals of radii where T decays towards P. When T is a cone, the planar frequency at $Z=0$ is $\leqslant 1$.

Our first application of the planar-frequency monotonicity is to obtain a decomposition, for any integer q, of density-q singular points into a disjoint union: $sing_q\, T = S \cup B$. At each point in B the current decays ``rapidly" to a unique tangent plane, with a uniform estimate dictating the convergence, and at points in S the current satisfies a quantitative non-planar approximation property locally uniformly at all small scales. Planar frequency monotonicity prevents indefinite oscillation between these two behaviors when scaling about a singularity. This quantitative

decomposition replaces the qualitative branch/non-branch point division used in the classical theory. Its built-in estimates facilitate our subsequent asymptotic analysis and limit the reliance on Almgren's ``center manifolds" to a single canonical setting, entirely avoiding the technically demanding iterative constructions used in past work.

The asymptotic analysis of S is based on the non-planar approximation property and a new uniform height bound for T. These allow us to prove decay of T at H^{n-2}-a.e. point of S to a unique tangent cone supported on a union of two or more planes intersecting along an n-2-dimensional subspace. This decay is based on techniques originally developed by Simon for multiplicity 1 classes and extended to (other) higher-multiplicity settings in our previous work on stable codimension 1 varifolds and Dirichlet energy minimizing multi-valued functions.

Finally, for the asymptotic analysis of B we proceed in two steps: for the subset $B^{(\neq 2)} \subset B$ of points of planar-frequency $\neq 2$, the analysis is based on the approximate monotonicity formula for planar frequency and further new height bounds. Here again the arguments are geometric and in particular, the planar frequency replaces the iterative center manifolds constructions. This analysis leads to higher order asymptotics and topological conclusions for the current as well as to rectifiability properties for this part. In our program Almgren's center manifold is only necessary and reserved for the study of the set $B^{(=2)}$ of planar-frequency 2 branch points. This is a canonical setting in which there is a single center manifold at each point $Z_0 \in B^{(=2)}$ which passes through all nearby points of $B^{(=2)}$. Moreover, these points are all contained in the critical nodal set of an approximating multi-valued normal map over the center manifold, facilitating the use of geometric/PDE methods to extend the higher order asymptotics, rectifiabililty and toplogical conclusions to $B^{(=2)}$.

Our results complement the contemporaneous and independent fundamental work of De Lellis, Skorobogatova and Minter who established a.e. uniqueness of tangent cones (conclusion 1 above) and the countable rectifiability of the singular set (part of conclusion 3) using methods based on iterative center manifold constructions for each branch point and upper Minkowski-content bounds.

The Uhlenbeck-Yau Theorem at Forty

Richard A. Wentworth

Abstract

I will discuss work from a few years ago on generalizations of the existence of special hermitian metrics and the nonabelian Hodge correspondence for multipolarizations. I will also give a brief survey of subsequent results on the existence of Hermitian-Einstein metrics in the setting of (singular) normal varieties.

Meeks-Simon-Yau and Simon-Smith theory revisit

Xin Zhou

Abstract

We will review the celebrated Meeks-Simon-Yau theory for isotopy minimizing minimal surfaces and the Simon-Smith min-max theory for minimal spheres, and then discuss some recent developments.

Leibenson's equation on Riemannian manifolds

Alexander Grigor'yan

Abstract

We consider on arbitrary Riemannian manifolds the Leibenson equation

$$\partial_t u = \Delta_p u^q.$$

where Δ_p is the p-Laplace-Beltrami operator. This equation comes from hydrodynamics where it describes filtration of a turbulent compressible liquid in porous medium. Our main result says that if $p>1$ and $q>1/(p-1)$ then any bounded solution of this equation has finite propagation speed. In R^n this result has been long known due to explicit Barenblatt solutions. The proof in the setting of manifolds is based on a certain mean value inequality for subsolutions.

Pinching theorems, Ricci flow liftings and sigma-Ricci balls

Miles Simon

Abstract

We survey some resolved and unresolved conjectures about curvature-pinched Riemannian manifolds. In particular, we discuss the recent result of Deruelle, Lee, Si., Schulze, Topping, that PIC1-pinched manifolds with nonnegative scalar curvature are flat or compact. We explain the main ideas behind the proof, focusing in particular on new methods involving Ricci flow liftings and sigma-Ricci balls.

The Hasse Principle for Geometric Variational Problems: An Illustration via Area-minimizing Submanifolds

Zhenhua Liu

Abstract

The Hasse principle in number theory states that information about integral solutions to Diophantine equations can be pieced together from real solutions and solutions modulo prime powers. We show that the Hasse principle holds for area-minimizing submanifolds: information about area-minimizing submanifolds in integral homology can be fully recovered from those in real homology and mod n homology for all $n \in \mathbb{Z} \geqslant 2$. As a consequence, we derive several surprising conclusions and answer several questions of Almgren, Morgan, and White. We conjecture that the Hasse principle holds for all geometric variational problems that can be formulated on chain spaces over different coeffiicients, e.g.,Almgren-Pitts min-max,mean curvature flow, Song's spherical Plateau problem, minimizers of elliptic and other general functionals, etc.

Generic regularity for minimizing hypersurfaces in dimension 11

Zhihan Wang

Abstract

I'll discuss a recent work joint with Otis Chodosh, Christos Mantoulidis and Felix Schulze, in which we prove generic regularity of area-minimizing hypersurfaces in ambient dimension 11, extending the previous result of my co-authors in dimension 9 & 10.

Nonlinear elliptic PDEs in affine and conformal geometry

Neil S. Trudinger

Abstract

This talk concerns the application and theory of nonlinear elliptic partial differential equations arising in affine and conformal geometry. After briefly surveying the earlier work, including the solution of the Yamabe problem for compact Riemannian manifolds by Schoen in 1984 and the resolution of the Chern conjecture for two-dimensional affine maximal surfaces by Trudinger and Wang in 2000, we will present some recent and ongoing research on the nonlinear Yamabe problem with boundary and the higher dimensional affine Bernstein problem.

Topological Singularities of S^2 valued Harmonic Maps

Tristan Rivière

Abstract

In the early 80's Richard Schoen proposed to consider the Hilbert XXth problem for the Dirichlet Energy of maps taking values into S^2 or into a given closed sub-manifold of an Euclidian space in general: does every homotopically trivial data at the boundary of a ball admits a smooth harmonic map extension? We shall review the contributions made to this question in the last 45 years and illustrate the difficulty posed by the possible existence of topological singularities in the S^2 case while implementing Minmax Procedures for the Dirichlet Energy among approximable maps. We will explain how Gauge Theory can be used to overcome some of the difficulties.

3-dimensional invariants from PDE and quantum theory

Dan Freed

Abstract

Geometric analysis has been used to solve problems in 3-dimensional geometry ranging from the Smith conjecture to the Poincare conjecture. The underlying PDEs are closely related to physics. Quantum physics has also had an impact, though with very different techniques. In this talk I will survey some of these developments, including new work in collaboration with Claudia Scheimbauer and Constantin Teleman (arXiv: 2601.05518) in which we apply the cobordism hypothesis to construct Reshetikhin–Turaev topological field theories.

A proof of Positive mass theorems up to dimension 19

Yuguang Shi

Abstract

In this talk, I will present a proof of Riemannian positive mass theorem up to dimension 19, building on a combination of toric symmetrization and the singularity blow-up technique developed in a joint work with S. He, and H. Yu, together with the generic regularity theory for area-minimizing hypersurfaces established in a work by O. Chodosh, C. Mantoulidis, F. Schulze, and Z. Wang. Similar ideas are also employed to investigate the Geroch conjecture up to dimension 12. The talk is based on my recent joint work with Y. Bi, T. Hao , S. He and J. Zhu.

Best Lipschitz Maps

Georgios Daskalopoulos

Abstract

I will describe joint work with Karen Uhlenbeck on best Lipschitz maps between surfaces. While our original motivation was to understand Thurston's theory in Teichmueller space, it has connections with older ideas. I will first remind listeners of infinity-harmonic functions and describe their relation to geodesic laminations. For maps between surfaces, I will use certain conservation laws to show a new connection between best Lipschitz maps and earthquakes-one that has not previously been described by topologists.

Limits of cubic differentials and conformal harmonic maps into a real building

John Loftin

Abstract

Following fundamental work of Cheng-Yau on affine differential geometry, a cubic differential on a marked Riemann surface of genus at least 2 provides a Hitchin representation of the fundamental group into SL(3,R). This construction can also be described in terms of Higgs bundles, and the nonlinear Hodge correspondence provides an equivariant conformal harmonic map from the universal cover to the symmetric space X=SL(3,R)/SO(3). If the cubic differential Q is scaled as tQ as t goes to infinity, we produce a conformal harmonic map to the asymptotic cone of X, which is a type of singular space of non-positive curvature known as a real building modeled on SL(3,R). We can read off the geometry of the image from the geometry of Q.

We also discuss work in progress concerning the uniqueness of such equivariant maps into real buildings. This is joint work with Mike Wolf and Andrea Tamburelli.

On the ellipticity of generalised Monge-Ampère equations on vector bundles

Gao Chen

Abstract

In this talk, we discuss Monge-Ampère, J-equation, dHYM, and σ_k equations on vector bundles. We show that these equations are not elliptic when the rank, dimension, and the number k in σ_k are all at least three. This is a joint work with Kartick Ghosh.

Geometry and dynamics of mean curvature flows

Jinxin Xue

Abstract

We study evolution of hypersurfaces in Euclidean spaces under mean curvature flows. The flow always develops singularities. We shall pay special attention to cylindrical singularities and show that the asymptotic dynamics of the rescaled flow approaching the limiting cylinder reveals important geometric information of the flow.Similar theme can be found in the work of Leon Simon on minimal surfaces. For an important class of cylindrical singularities called nondegenerate singularities, we prove that the flow through singularity behaves as if a surgery is performed. We also prove that the cylindrical singularity set is always embedded in a $C^{2+\alpha}$ submanifold modulo a set of smaller dimension. This talk is based on a series of joint work with Ao Sun and Zhihan Wang.

Ricci flows on graphs

Yong Lin

Abstract

We study the Ricci flow equations of Ollivier-Lin-Lu-Yau curvature defined on weighted graphs. Our main result is the existence and uniqueness theorem for solutions to the continuous time Ricci flows. For the tree and graphs with girth of at least 6, we analyze long-time dynamics of edge weights and curvatures, providing precise characterizations of their limiting behaviors. For graphs with girth of at least 6, we prove that the Ricci flow converges exponentially to weights of prescribed curvature if and only if this prescribed curvature is attainable (namely, there exist weights realizing it), which has application on the circle parking. These are based on the joint works with Bai, Hua, Liu, Lu, Wang and Yau.

Inverse mean curvature flow and Steklov eigenvalue in hyperbolic space

Haizhong Li

Abstract

In this talk, by inverse mean curvature flow we establish optimal Weinstock inequality for the first non-zero Steklov eigenvalue on star-shaped mean convex domains in hyperbolic space H^n. In particular, when the domain is convex, we give an affirmative answer to an open question by Colbois-Girouard-Gordon-Sher.

A refined estimate of the analyticity radius for 3D Navier-Stokes equations

Ping Zhang

Abstract

We study the three-dimensional incompressible Navier–Stokes equations with general Sobolev initial data in $W^{\gamma,p}$, where $\gamma > -1 + 3/p$ and $1 < p < \infty$. We develop a new framework which allows us to prove that, locally in time, the analyticity radius of the unique local strong solution enjoys the following refined estimate:

$$\mathrm{rad}(u(t)) \geqslant \sqrt{2(\gamma + 1 - 3/p)t(|\ln t| + \ln|\ln t| + tK(t))}$$

for any $t \in (0, T_0]$, where $K(t) \to \infty$ and $tK(t) \to 0$ as $t \to 0^+$. In the case $p = 2$, this refined estimate in particular settles a decade-long conjecture of Herbst and Skibsted. Moreover, this refined estimate continues to hold in the critical scenario $\gamma = -1 + 3/p$ and $1 < p < \infty$. This is joint work with Dong Li from the University of Hong Kong.

Curvature pinching estimates of four-dimensional Ricci solitons

Huai-Dong Cao

Abstract

In this talk, I will discuss some recent progress on curvature pinching estimates of four-dimensional self-similar solutions to the Ricci flow (gradient Ricci solitons). It is based on joint work with Junming Xie.

The Bonnet problem: Is a surface characterized by its metric and curvatures?

Alexander I. Bobenko

Abstract

A longstanding problem in differential geometry, known as the Bonnet problem, is whether a compact surface is uniquely determined by its metric and mean curvature function. It is known that this is the case for generic surfaces, and also for topological spheres. We explicitly construct a pair of immersed tori in three-dimensional Euclidean space that are related by a mean curvature preserving isometry. These tori are the first examples of compact Bonnet pairs. Moreover, we prove these isometric tori are real analytic. This resolves also a second longstanding open problem on whether real analyticity of the metric already determines a unique compact immersion. Discrete differential geometry is used to find crucial geometric properties of surfaces. This is a joint work with Tim Hoffmann and Andrew Sageman-Furnas.

Geometry of symplectic log Calabi-Yau surfaces

Tian-Jun Li

Abstract

We begin by surveying what is known about the geometry and topology of the symplectic analogue of Calabi-Yau manifolds. 4-dimensional symplectic CYs resemble the Kähler CY surfaces topologically, in particular, their Betti numbers are bounded. Geometric analysis is essential in getting such bounds via Taubes' almost Kähler Seiberg-Witten theory. A main question is whether all symplectic forms on the K3 surface are Kähler forms, for which Donaldson suggested an approach via the almost Kähler CY equation. In contrast, in higher dimensions, symplectic CYs are known to be much more flexible, for instance, any finitely presented group can be realized as the fundamental group of a six dimensional symplectic CY.

We also report the recent advances on symplectic log Calabi-Yau surfaces, based on joint works with Cheuk Yu Mak, Jie Min and Shengzhen Ning. These include the almost toric fibrations--log CY correspondence, a Torelli type theorem and applications to symplectic fillings, symplectic affine ruledness, symplectic Hirzebruch-Jung strings and symplectic weighted projective planes.

CY, DUY, SYZ and beyond

Conan Nai Chung Leung

Abstract

In this talk,we will discuss Calabi-Yau theorem, Uhlenbeck-Yau theorem and their roles in mirror symmetry.

Gravitational instantons and harmonic maps

Song Sun

Abstract

In this talk, I will explain how to use the analysis of axisymmetric harmonic maps into the hyperbolic plane to construct new complete Ricci-flat Riemannian metrics in 4 dimensions. This is inspired by the related black hole uniqueness question in general relativity. The central issue is to get rid of codimension 2 conical singularities. Time permitting I will discuss a version of Riemannian black hole uniqueness conjecture. Based on joint work with Mingyang Li (SCGP, Stony Brook).

Capillary Rigidity in Euclidean Wedges

Hui Ma

Abstract

In this talk, we begin by reviewing rigidity results for capillary hypersurfaces in various settings-including Alexandrov-type theorems as well as stability characterizations. Then we extend the theory to anisotropic settings in a Euclidean wedge: any smooth, compact, embedded anisotropic capillary hypersurface with constant anisotropic mean curvature and prescribed contact angles is a truncated Wulff shape. This talk is based on a joint work with Jiaxu Ma and Mingxuan Yang.

Higher local monodromy using the logarithmic de Rham stack

Carlos Simpson

Abstract

Given a semistable map $f: X \to S$ of smooth varieties in characteristic 0, if $s \in D$ is a point of the discriminant divisor then the local monodromy is an action of a free abelian group on the homotopy type of the fiber. This action may be viewed in a higher homotopy-coherent way. Using logarithmic de Rham stacks we can define an action of the space of residues at s, on the logarithmic de Rham nearby homotopy type of the singular fiber X_s. We show that these two actions are the same, in the case when f is relatively simply connected. We discuss questions that are suggested by this setup.

A Geometric Perspective of Generative AI

Xianfeng Gu

Abstract

This talk explores the fundamental mechanisms of generative AI through the lens of differential geometry and optimal transport theory. While generative models have achieved remarkable success, a deep understanding of their underlying principles remains a challenge. We aim to answer key questions from a geometric perspective: What structures do these models truly learn? How do they learn them? And, crucially, how can we prevent common failure modes like mode collapse and hallucinations?

Our core hypothesis is based on the Manifold Distribution Principle, which posits that natural data distributions lie on or near low-dimensional manifolds. A generative model, therefore, performs two central tasks: learning the manifold structure and learning the probability distribution on that manifold.

We introduce a geometric framework that bridges statistics and differential geometry to reinterpret optimal transport (OT) theory within the context of popular generative models. A key insight from this geometric view is the link between the regularity of the Monge-Ampère equation and the root causes of mode collapse and hallucinations. To address these issues, we propose a novel generative model, the AE-OT model, based on our geometric optimal transport theory. This model is designed to improve theoretical rigor, interpretability, computational stability and eliminate hallucinations. We will present experimental results validating our hypothesis and demonstrating the superior performance of the AE-OT model compared to popular models, including Normalizing Flow (NF), Neural ODE (CNF), Flow Matching (FM) and Denoise Diffusion Probabilistic Models (DDPM).

Minkowski Problems,Brunn-Minkowski Inequalities, and Monge-Ampère Equations

Gaoyong Zhang

Abstract

This talk explains topics in convex geometric analysis that explore the interplay among Minkowski problems, Brunn-Minkowski inequalities, and Monge-Ampère equations. We start with classical examples of Minkowski problems, and then describe the recently proposed dual Minkowski problem from convex geometry and the chord Minkowski problem from integral geometry. Related unsolved problems of Brunn-Minkowski-type inequalities in convex geometry and uniqueness and regularity problems in partial differential equations are mentioned.

Fixed and periodic points of the intersection body operators of lower orders

Ge Xiong

Abstract

For the intersection body operator of lower order I_iK of a star body K in R^n, $i \in \{1,2,...,n-2\}$, we prove that $i_1^2 K=cK$ iff K is an origin-symmetric ball, and hence $I_i K=cK$ iff K is an origin-symmetric ball. As applications, we show that for the spherical Radon transform R, a non-negative $\rho \in L^{\infty}(S^{n-1})$ satisfies $R(\rho^i)=c\rho$ for some $c>0$ iff ρ is constant. This talk is based on the joint work with LIN Cheng.

On geometry of superintegrable systems

Nicolai Reshetikhin

Abstract

Superintegrable Hamiltonian system on a symplectic manifold M is a geometric structure that consists of two Poisson projections, one is from M to a Poisson manifold P, the other is from P to a Poisson manifold B with trivial Poisson structure. The fibers of the second projection are symplectic leaves of P and dimensions of P and B add up to the dimension of M. This structure generalizes the notion of a Lagrangian fibration which is the main geometric feature in Liouville integrable systems. After reviewing basic properties superintegrable systems in relation to Hamiltonian dynamics, a number of examples will be given and some examples, demonstrating new features by comparison with Lagrangian fibrations.

Calibrating forms for minimal graphs in arbitrary codimension

Mu-Tao Wang

Abstract

We introduce a family of closed differential forms associated with minimal graphical submanifolds in Euclidean space in arbitrary codimension. For each minimal graph, we construct an explicit closed form whose restriction agrees with the induced volume form, and which admits a geometric interpretation as the pullback of a tautological form on the Grassmannian via the Gauss map. Unlike classical calibrations, these forms are generally non-parallel and do not arise from special holonomy. The calibration problem is thus reduced to estimating their pointwise comass. We characterize this bound in terms of explicit inequalities involving the singular values of the defining map, expressed through its two-dilation, and identify sharp conditions ensuring the comass is at most one. It follows that any minimal graph satisfying these conditions is calibrated and therefore area-minimizing. This provides a broad new class of calibrated minimal graphs, extending the codimension-one theory, as well as a practical criterion for determining when a minimal graph is area-minimizing. As an application, we verify a conjecture of Lawson–Osserman under two-dilation conditions in arbitrary codimension. This is based on joint work with Chung-Jun Tsai.

Q structure, Galois symmetry and cyclic symmetry in open-closed Lagrangian Floer theory

Kenji Fukaya

Abstract

In this talk I will explain the way to construct A infinity category and open-closed closed-open maps linear over Novikov ring with rational numbers as the ground ring keeping all the symmetry including cyclic symmetry. (Such structure was constructed over the real numbers in a joint paper with Abouzaid-Oh-Ohta-Ono.) I will explain how it could be related to the Q structure in non-commutative Hodge theory and Mirror symmetry.

LYZ equation

Xiaoli Han

Abstract

I will survey some recent progress on the LYZ equation, covering topics such as the existence of solutions and the Chern number inequality. Finally, I will discuss recent developments concerning heat flows associated to the LYZ equation.

Complete cohomogeneity one solutions of the IIB System

Mario Garcia-Fernandez

Abstract

We present the construction of infinitely many examples of distinguished non-Kähler Hermitian metrics on non-compact Calabi-Yau 3-folds. These metrics solve a system of equations known as the IIB system, which arises in Type IIB string theory, and can be regarded as a special class of generalized Ricci solitons. The examples we construct include infinitely many solutions that enjoy a cohomogeneity one symmetry (i.e. there is a symmetry group that acts with 1-dimensional orbit space), on the small resolution of the ordinary double point singularity and its smoothing. We will discuss the expected significance of these solutions in the program of geometrization of conifold transitions. The talk is based on joint work with Lorenzo Foscolo.

Special Lagrangian submanifolds and circle collapse on K3

Sébastien Picard

Abstract

We consider K3 surfaces degenerating to a three-dimensional affine base. We discuss how straight lines on the base lift to degenerating sequences of special Lagrangian two-spheres. The proof involves a gluing construction of compact special Lagrangians. This is joint work with Federico Trinca.

The monodromy diffeomorphism of weighted singularities and Seiberg--Witten theory

Jianfeng Lin

Abstract

We prove that the monodromy diffeomorphism of a complex 2-dimensional isolated hypersurface singularity of weighted-homogeneous type has infinite order in the smooth mapping class group of the Milnor fiber, provided the singularity is not a rational double point. This is a consequence of our main result: the boundary Dehn twist diffeomorphism of an indefinite symplectic filling of the canonical contact structure on a negatively-oriented Seifert-fibered rational homology 3-sphere has infinite order in the smooth mapping class group. Our techniques make essential use of analogues of the contact invariant in the setting of Z/p-equivariant Seiberg--Witten--Floer homology of 3-manifolds. Based on joint work with Konno, Mukherjee and Munoz-Echaniz.

Boundary value problems for Einstein manifolds

Lan-Hsuan Huang

Abstract

There are several strong motivations for studying boundary value problems for Einstein manifolds in either the Riemannian or Lorentzian setting. For example, existence problems are closely related to the study of quasi-local mass in general relativity, as well as to associated mass minimization problems. These questions also arise in the geometric formulation of holography, which asks whether an Einstein manifold can be constructed from its boundary data. In this talk, I will present recent progress on the existence of Einstein manifolds with prescribed boundary data in both the Riemannian and Lorentzian settings.

Embedded special Legendrian surfaces in the 5-sphere

Sebastian Heller

Abstract

In this talk, I will describe the first examples of compact embedded special Legendrian surfaces of genus $g>1$ in the 5-sphere. The construction combines integrable systems techniques with gauge-theoretic methods. In the first part, I will outline the main ideas underlying the construction of these surfaces; in the second part, I will explain how to show their embeddedness. This talk is based on arXiv: 2604.21521.

Derived Calabi-Yau metrics, Derived Calabi-Yau theorem, and the Donaldson–Uhlenbeck–Yau Correspondence for Objects of the Derived Category

Artan Sheshmani

Abstract

We report on joint work with Shing-Tung Yau and Jacob Kryczka. We introduce a derived-categorical framework for Hermitian metrics on objects of the derived category of coherent sheaves. We introduce and construct the derived Hermitian metrics and their associated derived Hermitian connections on the stack of objects in derived category. We prove a theorem that every shifted hyperkähler stack is naturally shifted symplectic-a result that can be interpreted as a derived-categorical analogue of the Calabi–Yau theorem (S.T. Yau 1976). If time permits we discuss how those construction leads to a derived version of Donaldson- Uhlenbeck-Yau theorem.

Non-uniqueness of minimal surfaces in higher rank symmetric spaces

Vladimir Markovic

Abstract

I will discuss the uniqueness problem for minimal surfaces in higher rank symmetric spaces.

On the YTD conjecture concerning canonical Kähler metrics

Akito Futaki

Abstract

This talk will survey on the YTD conjecture which aims to give K-stability characterizations for the existence of canonical Kähler metrics. We mainly focus on the uniform version.

Immortal solutions of the Kähler-Ricci flow

Valentino Tosatti

Abstract

I will discuss the problem of understanding the long-time behavior of Ricci flow on a compact Kähler manifold, assuming that a solution exists for all positive time. I will present recent work with Lee and Zhang, and with Hein and Lee, where we give a complete understanding of the limiting behavior of the flow when the canonical bundle is semiample (which conjecturally always holds).

Nearly optimal spectral gaps for random hyperbolic surfaces

Yunhui Wu

Abstract

In this talk, we will introduce some recent developments on nearly optimal spectral gaps for random hyperbolic surfaces. For example, joint with Yang Shen, we show that a random hyperbolic surface in the Brooks-Makover model has nearly optimal spectral gap.

On the existence of maximal foliations in general relativity

Bing-Long Chen

Abstract

In the recent works of the bounded L2 curvature conjecture (proposed by S. Klainerman in 1999), the maximal foliations played a crucial role in the proof. Moreover, the earlier breakthrough on global stability of Minkowski spacetimes also relied on the gauge of maximal foliations. Nevertheless, the usual approaches on the construction of maximal foliations encounter fundamental difficulties in solving Cauchy problems with a non-maximal initial data.

We will provide a construction of maximal foliations around any initial asymptotically flat Cauchy surface satisfying vacuum Einstein constrain equations, under a suitable smallness condition on the mean curvature. This is a joint work with Ruo-Bin Wu.

Collapsed manifolds of local bounded covering geometry

Xiaochun Rong

Abstract

Fixing $\epsilon > 0$, a complete Riemannian n-manifold M is called ϵ-collapsed, if every unit ball in M has a volume $< \epsilon$. In Riemannian geometry, interplays between a collapsing geometry and topology has been an important component, and complexities in topology of a collapsed M is linked to a bound on curvature. Around 1980-2000, collapsed manifolds of bounded sectional curvature was intensively studied by Cheeger-Fukaya-Gromov and many others, which has found several applications.

In this talk, we will survey progress in investigating a collapsed manifold M of Ricci curvature/ sectional curvature bounded from below and universal covering of every unit ball in M is not collapsed.

会务信息
Conference Service Information

现场注册 On-site Registration

时间 Date & Time 5 月 11 日 -15 日上午 9:00-11:30 May 11-15,9:00-11:30 a.m.
地点 Location 清华大学主楼后厅 The Main building of Tsinghua University

酒店信息 Hotel Information

会议酒店信息

甲所宾馆：清华大学校内甲所宾馆 , 010-62783166
文津酒店：中关村东路一号院 5 号楼 (清华大学南门外)，010-62525566

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公付房费的报告人，住宿日期超过会期（会期 5 月 10 日至 5 月 18 日），需自付超出部分房费。在酒店所产生的房杂费，洗衣费、房间食品、餐费等额外费用，需自付。

2. 酒店入住及退房政策
甲所：退房时间为退房当日 12:00，超过 12:00 加收半天房费。
文津国际酒店：退房时间可延迟到退房当日 14:00 ，14:00-18:00 退房加收半天房费，超过 18:00 退房加收一天房费。

Hotel Information

Jiasuo Hotel: Inside Tsinghua University campus. Phone: 010-62783166
Wenjin Hotel Address: Building 5, No.1 Courtyard, Zhongguancun East Road, Haidian District, Beijing Phone: 010-62525566

Room rates

For the speakers whose room rates are paid by the organizer, the organizer only pays the room rates from May 10--May 18 (not including extended-stay room charges). The expenses for meals and laundry as well as the incidental expenses and extra consumption in the hotels shall be paid by the participants themselves.

Check-in/out policies

Jiasuo: The check-out time is 12:00 (noon) on the check-out day, and half-day room rate will be charged for checking-out after 12:00.
Wenjin Hotel: The check-out time can be postponed to14:00 on the check-out day, and half-day room rate will be charged for checking-out at 14:00-18:00 and 1-day room rate for checking-out after 18:00.

餐饮安排：(5 月 11-17 日)

餐饮	时间	用餐人员	用餐地点
早餐	6:30-9:30	报告人	酒店（以酒店通知为准）
午餐	12:15-13:40	报告人	清华大学熙春园餐厅
		注册参会人	清华大学玉树园餐厅
晚餐 （5 月 14-15 日除外）	17:30-19:00	仅报告人和邀请嘉宾	清华大学熙春园餐厅 * 注册参会人不提供晚餐
晚宴	5 月 14 日 18:00	仅报告人和特邀嘉宾	文津酒店四层多功能厅
欢迎晚宴	5 月 15 日 18:00	仅报告人、特邀嘉宾和受邀注册参会人	辽宁大厦七层沈阳厅

** 参会期间均需凭胸牌到指定地点用餐，请您佩戴胸牌。*

Catering （May 11-17)

Catering	Time	Dining arrangements	Venue
Breakfast	6:30-9:30	Speakers	Provided by the Hotel
Lunches	12:15-13:40	Speakers	Xi'chun'yuan Canteen of Tsinghua University
		Registered participants	Yu'shu'yuan Canteen of Tsinghua University
Dinners (except for May 14 and 15)	17:30-19:00	Speakers	Xi'chun'yuan Canteen of Tsinghua University
		Registered participants	No dinner
Banquet (May14)	18:00	Only for speakers and invited guests	On the 4th floor of Wenjin Hotel
Welcome Banquet (May 15)	18:00	Only for speakers and invited guests	On the 7th floor of Liaoning International Hotel

**During the conference, you are required to bring your badge to the designated location for dining.*

交通安排

主办方根据会议日程安排车辆接送，具体信息如下：

发车时间	发车地点→到达地点
5 月 11 日 , 开幕式 + 学术报告	
09:00	文津酒店 / 甲所→清华大学主楼
12:00	清华大学主楼→玉树园餐厅 / 熙春园餐厅
13:40	玉树园餐厅 / 熙春园餐厅→清华大学主楼
17:30	清华大学主楼→熙春园餐厅
5 月 12 日 -15 日，学术报告	
09:00	文津酒店 / 甲所→清华大学主楼
12:10	清华大学主楼→玉树园餐厅 / 熙春园餐厅
13:40	玉树园餐厅 / 熙春园餐厅→清华大学建华楼
17:30	清华大学建华楼→熙春园餐厅（5 月 14 和 15 晚除外）
19:00	熙春园餐厅→文津酒店
5 月 16-17 日，学术报告	
09:00	文津酒店 / 甲所→清华大学建华楼
12:10	清华大学建华楼→玉树园餐厅 / 熙春园餐厅
13:40	玉树园餐厅 / 熙春园餐厅→清华大学建华楼
17:30	清华大学建华楼→熙春园餐厅
5 月 14 日晚，晚宴	
17:30	甲所→文津酒店
20:00	文津酒店→甲所
5 月 15 日晚，晚宴	
17:30	建华楼→辽宁大厦
20:00	辽宁大厦→甲所 / 文津酒店

备注：会议期间主办方安排车辆到指定地点，您也可以步行前往。所有车辆有“2026 几何分析 50 周年学术研讨会”标识 。

Transportation

Time	Departure → Arrival
May 11	
09:00	Wenjin Hotel/Jiasuo → The Main building of Tsinghua University
12:00	The Main building → Xi'chun'yuan Canteen/Yu'shu'yuan Canteen
13:40	Xi'chun'yuan Canteen/Yu'shu'yuan Canteen → The Main building
17:30	The Main building → Xi'chun'yuan Canteen
19:00	Xi'chun'yuan Canteen → Wenjin Hotel
May 12-15	
09:00	Wenjin Hotel/Jiasuo → The Main building
12:10	The Main building → Yu'shu'yuan Canteen/Xi'chun'yuan Canteen
13:40	Yu'shu'yuan Canteen/Xi'chun'yuan Canteen → Jianhua Building
17:30	Jianhua Building → Xi'chun'yuan Canteen(except for May 14 and 15)
19:00	Xi'chun'yuan Canteen → Wenjin Hotel
May 16-17	
09:00	Wenjin Hotel/Jiasuo → Jianhua Building
12:10	Jianhua Building → Yu'shu'yuan Canteen/Xi'chun'yuan Canteen
13:40	Yu'shu'yuan Canteen/Xi'chun'yuan Canteen → Jianhua Building
17:30	Jianhua Building → Xi'chun'yuan Canteen
May 14, Banquet	
17:30	Jiasuo → Wenjin Hotel
20:00	Wenjin Hotel → Jiasuo
May 15, Banquet	
17:30	Jianhua Building → Liaoning Hotel
20:00	Liaoning Hotel → Jiasuo/Wenjin Hotel

Note: All shuttle buses are marked with a sign of "2026 Fifty Years of Geometric Analysis"

50 YEARS OF
GEOMETRIC
ANALYSIS

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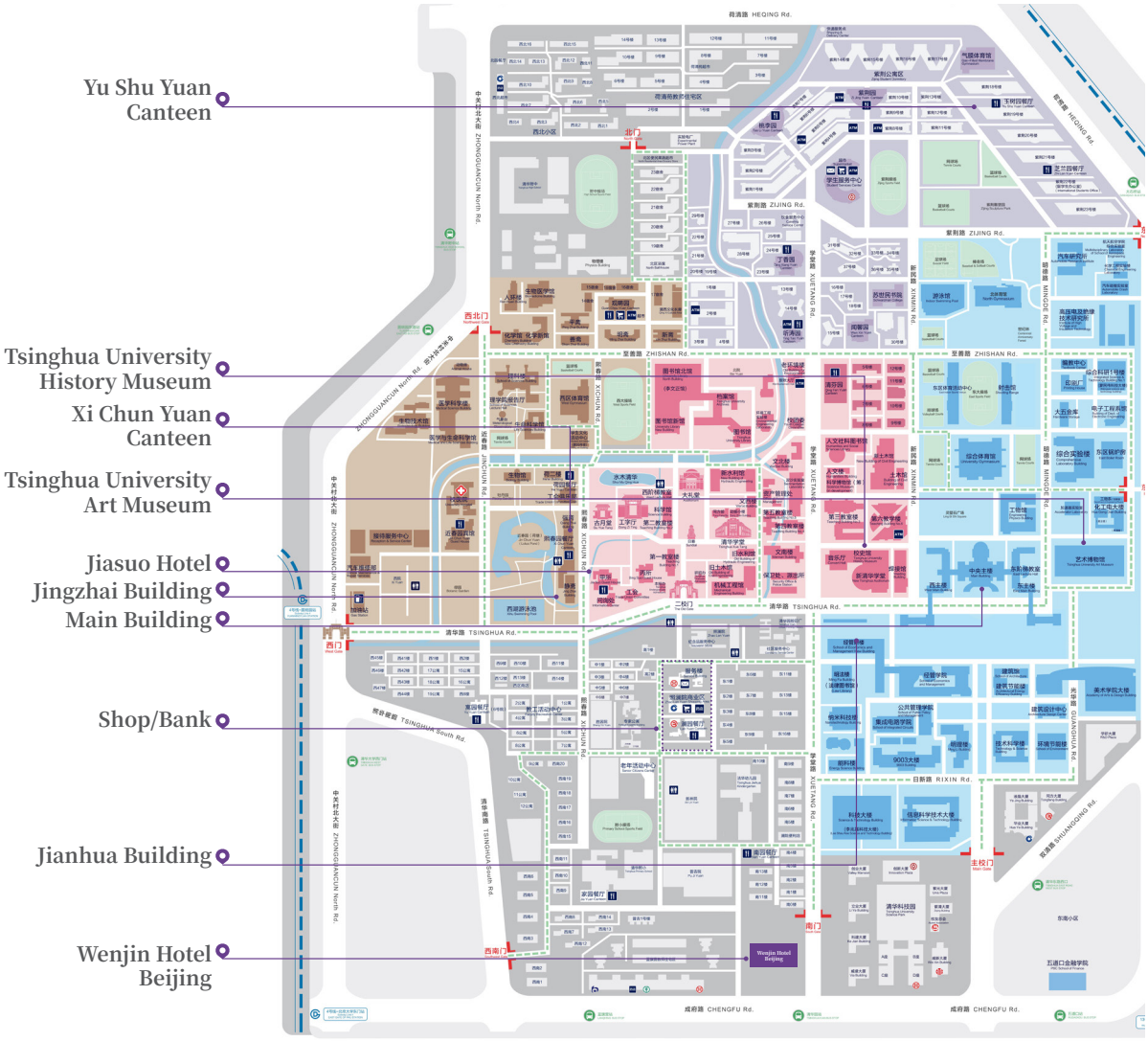
会议场地分布图 Map

Map


Yu Shu Yuan Canteen
Tsinghua University History Museum
Xi Chun Yuan Canteen
Tsinghua University Art Museum
Jiasuo Hotel
Jingzhai Building
Main Building
Shop/Bank
Jianhua Building
Wenjin Hotel Beijing
荷清路 HEQING Rd.
紫荆路 ZIJING Rd.
至善路 ZHISHAN Rd.
清华路 TSINGHUA Rd.
学堂路 XUETANG Rd.
新民路 XINMIN Rd.
日新路 RIXIN Rd.
成府路 CHENGFU Rd.
中关村北大街 ZHONGGUANCUN North Rd.
中关村大街 ZHONGGUANCUN North Rd.
清华南路 TSINGHUA South Rd.
北门
西北门
西门
南门
西南门
二校门
主校门
Wenjin Hotel Beijing

50 YEARS OF GEOMETRIC ANALYSIS