Titles and Abstracts

1. Sharp Ben, Imperial College London, UK
   Title: Compactness theorems for smooth minimal hypersurfaces with bounded index and area
   Abstract: We prove qualitative estimates on the total curvature of closed minimal hypersurfaces in closed Riemannian manifolds in terms of their index and area, restricting to the case where the hypersurface has dimension less than seven. In particular, we prove that if we are given a sequence of closed minimal hypersurfaces of bounded area and index, the total curvature along the sequence is quantised in terms of the total curvature of some limit surface, plus a sum of total curvatures of complete properly embedded minimal hypersurfaces in Euclidean space, yielding qualitative control on the topology of the hypersurfaces. This talk will involve a joint work with Lucas Ambrozio and Alessandro Carlotto, and also a joint work with Reto Buzano (Müller).

2. Albert Chau, University of British Columbia, Canada
   Title: An existence time estimate for Kahler Ricci flow and applications
   Abstract: In the talk I will discuss an existence time estimate for Kahler Ricci flow on non-compact manifolds, and related a priori estimates. I will discuss applications to the flow of unbounded curvature metrics in general, and also non-negatively curved Kahler metrics on Cn. Connections will be drawn to Yau's uniformization conjecture which states that a complete non-compact Kahler manifold with positive bisectional curvature is biholomorphic to Cn. The talk will is based on joint work with Luen Fai Tam and Ka Fai Li.

3. Qingtao Chen, ICTP, Italy
   Title: TBA
   Abstract: TBA

4. Frederick Tsz-Ho Fong, Hong Kong University of Science and Technology, Hong kong
   Title: Ricci Solitons and the Lichnerowicz's Equations
   Abstract: Lichnerowicz-type equations on symmetric 2-tensors naturally arise in the study of Ricci solitons. In this talk, I will showcase this relation and will demonstrate how the analyses of these Lichnerowicz-type equations were applied to prove uniqueness and stability results of Ricci solitons. It is partly a joint work with O. Chodosh.

5. Renjie Feng, Beijing International Center for Mathematical Research, China
   Title: Random Holomorphic Fields on Complex Manifolds
   Abstract: In the first part of the talk, I will define the random holomorphic fields and exhibit several well-known results. In the second part, I will

present a result on the mean value of the supremum of L^2-normalized fields, this is the joint work with S. Zelditch. I will also discuss several open problems.

6. Shouhei Honda, Krushu University, Japan
   Title: Spectral Convergence under Bounded Ricci Curvature
   Abstract: In this talk for a noncollapsed Gromov-Hausdorff convergent sequence of Riemannian manifolds with a uniform bound of Ricci curvature, we establish two spectral convergence. One of them is on the Hodge Laplacian acting on differential one-forms. The other is on the connection Laplacian acting on tensor fields of every type, which include all differential forms. These are generalizations of Cheeger-Colding's spectral convergence of the Laplacian acting on functions to the cases of tensor fields and differential forms. As a corollary we show the upper semicontinuity of the first Betti numbers with respect to the Gromov-Hausdorff topology, and give the equivalence between the continuity of them and the existence of a uniform spectral gap. We also define the Riemannian curvature tensor, the Ricci curvature, and the scalar curvature of the limit space, and show their properties. In particular the Ricci curvature coincides with the difference between the Hodge Laplacian and the connection Laplacian, and is compatible with Gigli's one and Lott's Ricci measure. Moreover a lower bound of the Ricci curvature is compatible with a reduced Riemannian curvature dimension condition. We also give a positive answer to Lott's question on the behavior of the scalar curvature with respect to the Gromov-Hausdorff topology. This talk is based on arXiv:1510.05349.

7. Zheng Huang, The City University of New York, USA
   Title: The Weil-Petersson Geometry of the Universal Teichmüller Space
   Abstract: The Weil-Petersson metric is one of the more canonical metrics on classical Teichmuller space and Riemann’s moduli space, with fascinating properties which relate to several different fields of mathematics. Its direct generalization is not well defined on the full tangent space of the universal Teichmuller space, an infinitely dimensional genetalization which contains all Teichmuller spaces of closed surfaces. To remedy this, Takhtajan-Teo introduced a Hilbert structure on a smaller tangent space (still infinitely dimensional) and set up the Weil-Petersson geometry on this new Hilbert manifold. The Weil-Petersson metric is now Kähler-Einstein and negatively curved. We will describe some recent results in this direction. This is based on joint work with Y. Wu.

8. Brett Kotschwar, Arizona State University, USA
   Title: Some problems of uniqueness for curvature flows on noncompact manifolds.
   Abstract: I will discuss some recent results related to problems of uniqueness

and unique continuation for the Ricci flow and other parabolic geometric evolution equations on noncompact manifolds.

9. Martin Kell, University of Tuebingen, Germany
   Title: Geometry and Analysis via Optimal Transport
   Abstract: Optimal Transport can be used to understand the interplay of geometry and analysis better. In this talk I give an overview of the following two aspect: (1) Controlled bounds on the densities of interpolation measures give doubling and Poincare conditions which results in an abstract PDE calculus and a first order Taylor formula for Lipschitz functions.
   (2) The identification of heat and entropy flows shows that in the Riemannian-like setting, i.e. on spaces with linear heat flow, a curvature condition in terms of convexities of the entropy is equivalent to contraction estimates of the heat flow and a Bochner inequality. As this identification also holds in the non-linear setting there is hope that an appropriate weak contraction estimate is equivalent to the curvature condition.

10. Haozhao Li, University of Science and Technology of China, China
    Title: Regularity scales and convergence of the Calabi flow
    Abstract: We define regularity scales as alternative quantities of $\left(\max_M |Rm| \right)^{-1}$ to study the behavior of the Calabi flow. Based on estimates of the regularity scales, we obtain convergence theorems of the Calabi flow on extremal Kähler surfaces, under the assumption of global existence of the Calabi flow solutions. Our results partially confirm Donaldson's conjectural picture for the Calabi flow in complex dimension 2. Similar results hold in high dimension with an extra assumption that the scalar curvature is uniformly bounded. This is joint work with Bing Wang and Kai Zheng.

11. Ovidiu Munteanu, University of Connecticut, USA
    Title: Ricci solitons
    Abstract: Ricci solitons are self similar solutions of the Ricci flow, and as such, they model the possible singularities of the flow. The shrinking solitons are completely classified in dimension three, which was important for the resolution of the Poincare conjecture. This talk will report some recent progress on the higher dimensional problem, especially in dimension four.

12. Shiguang Ma, Nankai University, China
    Title: Nonnegatively Curved Hypersurfaces in H^{n+1}
    Abstract: In this talk, I will discuss the problem of isometric immersions of a non compact complete Riemannian n-manifold into H^{n+1}. If such a map is an embedding, there is a good classification. Our aim is to discuss whether the isometric immersions are embeddings. This problem should be considered in different way when n = 2 and $n \geq 3$. This is a joint work with Jie Qing and

Vincent Bonini.

13. Li Sheng, Sichuan University, China
    Title: The Exponential Decay of Gluing Maps and Gromov-Witten Invariants
    Abstract: We prove the exponential decay of the derivative of gluing maps with respect to the gluing parameter, therefore the Gromov-Witten invariants can be defined as an integral over top strata of virtual neighborhood。

14. Ryosuke Takahashi, Harvard University, USA
    Title: Zero Loci for Z/2-Harmonic Spinors in Dimension 3
    Abstract: Let M be a compact oriented 3-dimensional smooth manifold. In this talk, we will construct a moduli space consisting of the following date $\{(\Sigma, \psi)\}$ where Σ is a C^1-embedding S^1 curve in M, ψ is a Z/2-harmonic spinor vanishing only on Σ and $\|\psi\|_{L^2_1} = 1$. We will prove that this moduli space can be parametrized by the space $X = \{$ all Riemannian metrics on M$\}$ locally as the kernel of a Fredholm operator.
    Moreover, I will show you a possible way to define a new invariant on 3 and 4 dimensional manifolds.

15. Hang Wang, University of Adelaide, Australia
    Title: A Fixed Point Theorem on Noncompact Manifolds
    Abstract: This talk is a generalization of the Atiyah-Segal-Singer fixed point formula for noncompact manifolds. Tools in operator algebra are used to deal with elliptic operators having infinitely dimensional kernels. Consequences in representation theory will be discussed. This is joint work with Peter Hochs.

16. Chao Xia, Xiamen University, China
    Title: A new Reilly type formula and its geometric applications
    Abstract: In references, Reilly's formula is an integral Bochner formula for manifolds with boundary, which was derived by Reilly. It has numerous applications to manifolds with non-negative Ricci curvature. In this talk, a new Reilly type formula will be discussed. Compared with the original Reilly formula, applications on manifolds with possibly negative curvature will be involved. In particular, we prove a Heintze-Karcher type inequality for manifolds with sectional curvature bounded from below and a Minkowski type inequality for hypersurfaces in space forms. Part of this work is joint with Guohuan Qiu.

17. Jingang Xiong, Beijing Normal University, China
    Title: Splitting theorem for a boundary conformally invariant problem of polyharmonic equations
    Abstract: In view of boundary GJMS operators in conformal geometry, we consider polyharmonic equations with conformally invariant nonlinear

boundary conditions on the upper half space. We show that positive solutions have to be the "*polynomials plus bubbles*" form. Applied to conformal geometry, it asserts that single boundary point singular metrics of flat Q curvature in the unit ball and constant odd order Q curvature on the boundary do exist and are classified. The splitting phenomenon and single boundary point singular metrics do not occur in the Laplace situation which was studied by [Li, Y.Y. & Zhu, M.: Duke Math. J. 80 (1995), 383-417.] A crucial ingredient of our proofs is developing an approach to separate the higher order linear effect and the boundary nonlinear effect. This is joint work with Liming Sun.

18. Ling Yang, Fudan University, China
    Title: Bernstein Type Theorems for Spacelike Stationary Graphs in Minkowski Spaces
    Abstract: For entire spacelike stationary 2-dimensional graphs in Minkowski spaces, we establish Bernstein type theorems under specific boundedness assumptions either on the W -function or on the total (Gaussian) curvature. These conclusions imply the classical Bernstein theorem for minimal surfaces in R^3 and Calabi's theorem for spacelike maximal surfaces in R_1^3.

19. Naoto Yotsutani, Fudan University, China
    Title: Algebro-Geometric relative stabilities of toric Fano manifolds
    Abstract: In this talk, we discuss about Chow stability and *K*-stability of toric Fano manifold. In particular, we determine all the relative *K*-stable toric Fano threefolds. If time permitted, we present a new example of asymptotically Chow unstable Kähler-Einstein orbifold in dimension 3. This is a joint work with Zhou Bin.

20. Xiaokui Yang, The Chinese Academy of Sciences, China
    Title: Holomorphic sectional curvature and the geometry of compact Kaehler manifolds
    Abstract: The holomorphic sectional curvature of a Kahler metric is the Riemannian sectional curvature of holomorphic 2-planes, which determines the whole curvature tensor. But in a nontrivial way, and it has remained a rather mysterious object. I will describe some very recent progress around this topic. The talk is based on joint work with Valentino Tosatti, building on earlier work of Wu-Yau.

21. Entao Zhao, Zhejiang University, China
    Title: Curvature pinching and curvature flows
    Abstract: The study of the topological structure of Riemannian manifolds and submanifolds under curvature pinching conditions is one of the most striking themes in differential geometry, while the curvature flows are efficient tools to investigate the topology of Riemannian manifolds and submanifolds. In

this talk, I will concentrate on the differentiable sphere theorems and curvature flows on Riemannian submanifolds with suitably pinched curvatures. The talk is mainly based on the joint works with professor K. F. Liu, professor H. W. Xu and other collaborators.

22. Weiyi Zhang, University of Warwick, England
    Title: Geometric Structures, Gromov Norm And Kodaira Dimensions
    Abstract: Kodaira dimension provides a very successful classification scheme for complex manifolds. The notion was extended to symplectic 4-manifolds. In this talk, we will define the Kodaira dimension for 3-manifolds through Thurston's eight geometries. It is compatible with the mapping order and other Kodaira dimensions in the sense of additivity. This idea could be extended to 4-dimensional geometric manifolds. Those with highest Kodaira dimension are distinguished by nonvanishing Gromov norm. Finally, we will see how it is sitting in a potential classification of 4-manifolds.

23. Miaomiao Zhu, Max Planck Institute for Mathematics in the Sciences
    Title: Boundary Value Problems for Dirac Equations and the Dirac-harmonic Map Flow
    Abstract: In this talk, we shall first discuss the existence, uniqueness and elliptic estimates for Dirac equations under a class of local elliptic boundary conditions. Then we introduce a heat flow approach to the existence of Dirac-harmonic maps from Riemannian spin manifolds with boundary and prove the short time existence and uniqueness of the flow. When the energy of the initial map and the L^2−norm of the boundary values of the spinor are sufficiently small, we show the existence of a global weak solution of the flow. These are joint works with Qun Chen, Juergen Jost, Linlin Sun and Lei Liu.