**几何与数学物理青年学者研讨会**

2019年4月19-21日，省身楼216教室

4月19日 上午

开幕式 9:00-9:10

主持人： 苏广想 南开大学

9:10-9:50 张振雷 首都师范大学

Kahler-Ricci flow on smooth minimal models

9:50-10:20 合影，茶歇

主持人： 王作勤 中国科学技术大学

10:20-11:00 盛利 四川大学

Gromov-Witten invariants and Virtual neighborhoods

11:10-11:50 刘博 华东师范大学

An Geometric Application of Differential K-Theory

4月19日 下午

主持人：陈大广 清华大学

14:00-14:40 吴云辉 清华大学

Small eigenvalues of closed Riemann surfaces for large genus

14:50-15:30 李琼玲 南开大学

Harmonic maps for Hitchin representations

15:30-15:50 茶歇

主持人： 彦文娇 北京师范大学

15:50-16:30 张永胜 同济大学

On Dirichlet problem for minimal surface system

16:40-17:20 顾娟如 浙江工业大学

On Sphere Theorems in Geometry and Topology of Manifolds

4月20日 上午

主持人： 常亮 南开大学

8:40-9:20 葛建全 北京师范大学

Isoparametric polynomials and sums of squares

9:30-10:10 李平 同济大学

The rigidity on the second fundamental form of projective manifolds

10:10-10:30 茶歇

主持人： 朱家林 复旦大学

10:30-11:10 吴鹏 复旦大学

Einstein four-manifolds of positive determinant self-dual Weyl curvature

11:20-12:00 田垠 清华大学

Towards a categorical boson-fermion correspondence

4月20日下午

自由讨论

4月21日上午

主持人：马辉 清华大学

9:00-9:40 周麒 南开大学

Quantitative almost reducibility and its spectral applications

9:40-10:00 茶歇

10:00-10:40 杨晓奎 清华大学

The geometry of manifolds with RC-positive tangent bundles

4月21日下午

离会

**Titles and Abstracts**

张振雷 首都师范大学

Title：Kahler-Ricci flow on smooth minimal models

Abstract: In the talk we present the recent progress on the Gromov-Hausdorff convergence of Kahler-Ricci flow on minimal models. We confirm the convergence on a large class of manifolds. It is based on the joint work with professors Song and Tian.

盛利 四川大学

Title: Gromov-Witten invariants and Virtual neighborhoods

Abstract: We use the approach of Ruan and Li-Ruan to construct virtual neighborhoods and show that the Gromov-Witten invariants can be defined as an integral over top strata of virtual neighborhood. We prove that the invariants defined in this way satisfy all the Gromov-Witten axioms of Kontsevich and Manin.

刘博 华东师范大学

Title: An Geometric Application of Differential K-Theory

Abstract: In 1957, Grothendieck introduces the K-theory in algebraic geometry. Later, Atiyah and Singer apply its real counterpart, the topological K-theory, to give a proof of the famous index theorem. In 1990's, in Arakelov geometry and arithmetic algebraic geometry, the K-theory is extended to the arithmetic K-theory. In this century, motivated by  the study of the superstring theory and the quantum field theory, people extend the topological K-theory to the differential K-theory as the real analogue of the arithmetic K-theory. Naturally, people expect that a property holds in one K-theory may also holds in the other three and imply the nontrivial consequences in their respective fields.
In this talk, we will compare the lambda-ring property, Riemann-Roch property and the Lefschetz formula in four K-theories. As an consequence of the Lefschetz formula in differential K-theory, we obtain a localization formula of eta invariants, which is a purely geometric formula but cannot be proved geometrically until now. This is a joint work with Xiaonan Ma recently.

吴云辉 清华大学

Title: Small eigenvalues of closed Riemann surfaces for large genus

Abstract: We study the asymptotic behavior of small eigenvalues of Riemann surfaces for large genus. We show that for any integer k>0, as the genus g goes to infinity, the smallest k-th eigenvalue of a Riemann surface in any thick part of moduli space of Riemann surfaces of genus g is uniformly comparable to 1/g^2 in g. This is a joint work with Yuhao Xue.

李琼玲 南开大学

Title: Harmonic maps for Hitchin representations

Abstract: Let j be a Hitchin representation for PSL(n,R) and f be the unique j-equivariant harmonic map from the universal cover of the hyperbolic surface to the corresponding symmetric space. We show the energy density e(f) is at least 1 and the rigidity holds. In particular, we show given a Hitchin representation, every equivariant minimal immersion from a hyperbolic plane into the corresponding symmetric space is distance-increasing. Moreover, the equality holds at one point only if it holds everywhere and the representations j is an n-Fuchsian representation.

张永胜 同济大学

Title: On Dirichlet problem for minimal surface system

Abstract: I will report on recent developments in this topic after Lawson-Osserman's Acta paper.

顾娟如 浙江工业大学

Title: On Sphere Theorems in Geometry and Topology of Manifolds

Abstract: In this talk, we focus on the sphere theorems in differential geometry. We will first give a short survey on sphere theorems in Riemannian geometry. Secondly, we will discuss the pinching problem arising from the famous Micallef-Moore sphere theorem. Thirdly, we will introduce some new topological and differentiable sphere theorems for submanifolds in space forms.

葛建全 北京师范大学

Title **:** Isoparametric polynomials and sums of squares

Abstract: We introduce a recent joint work with Prof. Zizhou Tang on nonnegative polynomials induced from isoparametric polynomials. We completely solve the question that whether they are sums of squares of polynomials, giving infinitely many explicit examples to Hilbert's 17th problem as well as some applications.

李平 同济大学

Title: The rigidity on the second fundamental form of projective manifolds

Abstract: We review some known gap phenomena related to the second fundamental form of

the minimal submanfolds and complex submanifolds in the unit spheres and complex projective spaces respectively, and then present our

recent progress on them.

吴鹏 复旦大学

Title:  Einstein four-manifolds of positive determinant self-dual Weyl curvature

Abstract: The question that when a four-manifold with a complex structure admits a compatible Einstein metric
of positive scalar curvature has been answered by Tian, LeBrun, respectively. Tian classified Kahler-Einstein four-manifolds with positive scalar curvature, LeBrun classified Hermitian Einstein four-manifolds with positive scalar curvature. In this talk we consider the inverse problem, that is, when a four-manifold with an Einstein metric of positive scalar curvature admits a compatible complex structure. We will show that if the determinant of the self-dual Weyl curvature is positive then the manifold admits a compatible complex structure.

田垠 清华大学

Title: Towards a categorical boson-fermion correspondence

Abstract: The celebrated boson-fermion correspondence is an isomorphism between the bosonic Fock space and the fermionic Fock space. We present categorification of the Heisenberg algebra as a modification of Khovanov's Heisenberg category. The categorifcation of the fermionic Fock space is based on Honda's category studying contact topology in dimension three.

周麒 南开大学

Title: Quantitative almost reducibility and its spectral applications

Abstract: We survey the recent advances of almost reducibility and its applications in the spectral theory of one dimensional quasi-periodic Schrodinger operators, especially to the most important example: almost Mathieu operator.

杨晓奎 清华大学

Title: The geometry of manifolds with RC-positive tangent bundles

Abstract: In this presentation, we will give some recent progress on the geometry of compact complex manifolds with RC-positive tangent bundles including various rigidity theorems

of  harmonic maps and holomorphic maps.