Title and abstracts

1. Yi Liu

Title：Mapping tori and profinite properties

Abstract：In this talk, I will discuss recent results in studying profinite properties of

hyperbolic 3-manifolds, and explain how they are connected to Nielsen fixed point theory of surface automorphisms.

2. Xueyuan Wan，Chongqing University of Technology

Title：Signature for flat unitary bundles over surfaces with boundary

Abstract：This talk deals with the representations of the fundamental groups of compact

surfaces with boundary into classical simple Lie groups of Hermitian type. We relate work on the signature of the associated local systems of Atiyah-Patodi-Singer, to Burger-Iozzi-Wienhard's Toledo invariant. To measure the difference, we extend Atiyah-Patodi-Singer's rho invariant, initially defined on $U(p)$, to discontinuous class functions, first on $U(p,q)$, and then on other classical groups via embeddings into $U(p, q)$. In this way, we present three different invariants – signature, Toledo and rho invariant – in a unifying way, which is a version of the classical signature formula of Atiyah-Patodi-Singer for manifolds with boundary. This work is joint with Prof. Inkang Kim and Prof. Pierre Pansu.

3. Yuhao Xue，Tsinghua University

Title：Separating systole for random hyperbolic surfaces of Weil-Petersson model

Abstract：The Weil-Petersson metric on the moduli space of genus g hyperbolic surfaces

is of finite volume, and hence induce a probability measure. In this talk, we will discuss the behavior of some geometric quantities, especially the separating systole, for random hyperbolic surfaces with respect to this Weil-Petersson measure. We show that the length of separating systole is approximately $2\log(g)-4\log(\log(g))$ and it separates out a one-holed torus for random hyperbolic surfaces. This talk is based on joint works with Xin Nie, Hugo Parlier and Yunhui Wu.

4. Feng Rong, Shanghai Jiao Tong University
Title: On the local dynamics in Fuchsian directions
Abstract: In the first part of the talk, we give a brief survey of the local holomorphic dynamics in higher dimensions, focusing on maps tangent to the identity. In the second part of the talk, we present some new sufficient conditions for the existence of attracting

domains in Fuchsian characteristic directions.

5. Yan Gao，Shenzhen University

Title: Invariant graph and its application in complex dynamics
Abstract: Invariant graph is a fundamental tool in complex dynamics, since it induces a Markov partition on the Julia set. In the polynomial case, there are two kinds of natural invariant graphs, namely Yoccoz puzzle and Hubbard tree. But it is still an open problem to construct invariant graphs for general rational maps. In the talk, I will introduce the progress on this topic, including my joint works with G. Cui, H. Nie, J. Zeng.

6. Yue Gao，Anhui Normal University
Title：Shape of Thurston's filling systole subset in surface moduli space

Abstract：In this talk, I am going to talk about the sparseness of Thurston's subset. Sparseness is a geometric concept on Thurston's subset firstly raised by Anderson-Parlier-Pettet in 2016. We have proved the sparseness of Thurston's subset in the sense of Teichmüller distance and Weil-Petersson distance. More precisely, most surfaces in genus g surface moduli space have Teichmüller distance $\frac{1}{5}\log\log g$ and Weil-Petersson distance $0.6521(\sqrt{\log g}-\sqrt{7\log\log g})$ to the Thurston's subset. Some recent progresses on random surface (Mirzakhani-Petri, Nie-Wu-Xue) and estimate of the Weil-Petersson distance by systole (Wu) are important tools in our proof.

7. She Yang, Peking University

Title：Dynamical Mordell–Lang conjecture for totally inseparable liftings of Frobenius

Abstract: We prove that if K is a complete algebraically closed non-archimedian valuation field of positive characteristic and f is an endomorphism of the projective space over K which is totally inseparable and behaves as the Frobenius on the special fiber, then f satisfies the dynamical Mordell–Lang (DML) property.

8. Yuefei Wang，Shenzhen University

Title：On Collatz Conjecture

Abstract：We will talk about recent results of the Collatz conjecture about the periodic oibits of the Collatz maps on ${\mathbb Z}_2$.

9. Weixu Su

Title：The geometry of horospheres in Teichmuller space and its applications

Abstract：The study of the Teichmuller metric is inspired by analogies with geodesic

spaces of negative curvature. In this talk, we will discuss some geometric properties of the horospheres in Teichmuller space. As applications, we obtain: (1) A new proof of the Royden Theorem that every isometry of the Teichmuller metric is induced by an element of the mapping class group. (2) A sufficient and necessary condition when two points in the horofunction boundary of Teichmuller space are"connected"by a Teichmuller geodesic. The work is jointed with Dong Tan and Xiaoke Lou.

10. Ze Zhou，Shenzhen University

Title: Polygons inscribed in Jordan curves with prescribed edge ratios

Abstract: Let J be a smooth Jordan curve. For a tuple of positive numbers $a_1, \cdots, a_n$, each of which is less than the sum of the others, we show that there exists a polygon Q_n inscribed in J with sides of lengths $\mu a_1, \cdots, \mu a_n$ for some $\mu > 0$. This is a joint work with Yaping Xu.

11. Fei Yang, Nanjing University

Title: Rational maps with smooth degenerate Herman rings

Abstract: We prove the existence of rational maps having smooth degenerate Herman rings. This answers a question of Eremenko affirmatively. The proof is based on the construction of smooth Siegel disks by Avila, Buff and Chéritat as well as the classical Siegel-to-Herman quasiconformal surgery. A crucial ingredient in the proof is the surgery's continuity, which relies on the control of the loss of the area of quadratic filled-in Julia sets by Buff and Chéritat. As a by-product, we prove the existence of rational maps having a nowhere dense Julia set of positive area for which these maps have no irrationally indifferent periodic points, no Herman rings, and are not renormalizable.

12. Han Hong, Tsinghua University
Title: Large Steklov eigenvalue on hyperbolic surfaces

Abstract: The first nonzero Steklov eigenvalue on a Riemannian surface is controlled by the surface's topology. As a result, a sequence of surfaces with a divergent first nonzero Steklov eigenvalue will have its topology blowing up. We presented new constructions for this sequence of surfaces with divergent eigenvalues but a fixed number of boundary components. Our work is inspired by the excellent and fundamental contributions of Mirzakhani and Nie-Wu-Xue in the theory of random surfaces. Additionally, we explored hyperbolic surfaces with a connected boundary and large Steklov eigenvalue in the Moduli space. This is a joint work with X. L. Han and Y. X. He.

13. Jie Cao，Zhejiang University
Title：Boundaries of capture hyperbolic components

Abstract：In complex dynamics, the boundaries of high dimensional hyperbolic components in a reasonable space of polynomials or rational maps are mysterious objects. In this talk, we discuss some typical families of polynomials defined by periodic critical relations, and show that the boundary of a capture hyperbolic component is homeomorphic to the sphere. Moreover, we establish a relation for

Hausdorff dimensions between the parameter space and the dynamical space. This is a joint work with Xiaoguang Wang and Yongcheng Yin.

14. Junyi Xie, Peking University

Title: Rigidity of length spectrum in complex dynamics

Abstract: This talk is based on a joint work with Zhuchao Ji. We show that aside from the flexible Lattès family, the length spectrum of periodic points determines the conjugacy class of rational maps up to finitely many choices. This generalize the McMullen's rigidity theorem for multiplier spectrum.

15. Zhe Sun, University of Science and Technology of China

Title: Asymmetric intersection number and Fock-Goncharov duality

Abstract: Fock and Goncharov introduced a pair of mirror moduli spaces associated to

G and G^L which generalized the Teichmüller space and the decorated Teichmüller space, and they proposed a duality: the canonical basis of the regular function ring of one space X is parameterized by the tropical integral points of its mirror X^V. In this talk, I will explain my joint work with Linhui Shen and Daping Weng, where we introduce the asymmetric intersection numbers between webs on the surface to investigate the duality for SL3 (in progress for SLn).

16. Fei Hu, Nanjing University
Title: An upper bound for polynomial volume growth of automorphisms of zero entropy
Abstract: Let X be a smooth projective variety (or a compact Kähler manifold) of dimension $d \geq 2$ and f an automorphism of X.

Suppose that the pullback $f^*|_{H^{1,1}(X)}$ of f on the Dolbeault cohomology $H^{1,1}(X)$ is unipotent and denote the index of the eigenvalue 1 by $k + 1$.

We prove an upper bound for the polynomial volume growth $\mathrm{plov}(f)$ of f, or equivalently, for the Gelfand--Kirillov dimension of the twisted homogeneous coordinate ring associated with (X, f), as follows:

$$\mathrm{plov}(f) \leq (k/2 + 1)d.$$

Combining with the inequality $k \leq 2(d-1)$ due to Dinh--Lin--Oguiso--Zhang, we obtain an optimal inequality that

$$\mathrm{plov}(f) \leq d^2,$$

which affirmatively answers questions of Cantat--Paris-Romaskevich and Lin--Oguiso--Zhang.

This is joint work with Chen Jiang.

17. Aihua Fan，Central China Normal University

Title:　Weighted Birkhoff averages and Bohr Chaoticity

Abstract:　The Sarnak conjecture, which concerns with the Birkhoff averages weighted by the Möbius sequence, asserts that all zero entropy systems are orthogonal to the Möbius sequence. Which systems are orthogonal to none of non-trivial weights? We define such systems as Bohr chaotic systems. The Bohr chaoticity is a complexity measure and is a topological invariant; it implies the positivity of entropy. However, the positivity of entropy doesn't imply the Bohr chaoticity. We prove that a system (X, T) admitting a horseshoe (i.e a susbsytem of some power T is conjugate to a full shift) is Bohr chaotic. Thus the usual nice systems of positive entropy are Bohr chaotic. But systems having few ergodic measures are not Bohr chaotic.　Another class of systems which are proved to be Bohr chaotic are the algebraic principal systems.
The presented results are joint works with Shilei FAN (Wuhan), Valery RYZHYKOV (Moscou), Klaus SCHMIDT (Vienna), Weixiao SHEN (Shanghai) et Evgeny VERBITSKIY (Leiden).

18. Changyu Guo, Shandong University
Title: Geometric parametrization of metric spaces
Abstract: In this talk, we shall give an overview of the geometric parametrization problem of metric spaces, which is a very active topic in the recent research about quasiconformal analysis. We shall also discuss some natural connecitons with Analysis on metric spaces, Geometric measure theory, Geometric analysis (around harmonic maps) and Harmonic analysis.

19. Xin Nie, Southeast University

Title：Higher Teichmüller theory and minimal surfaces in pseudo-hyperbolic spaces

Abstract: We will first explain 1) the link between Teichmüller theory and maximal surfaces in the anti-de Sitter space (works of Mess and Bonsante-Schlenker); 2) Higgs bundles and surface group representations in Lie groups ("higher Teichmüller theory"); 3) a generalization of 1) to higher Teichmüller theory, which solves a conjecture of Labourie for the Lie group SO(2,n) (work of Collier-Tholozan-Toulisse). Then we will talk about a further generalization of 3) which allows us to tackle the exceptional Lie group G_2'.

20. Wenyuan Yang

Title：Conformal density for groups with contracting elements

Abstract：In 1976, S. Patterson introduced a class of conformal measures on the limit set of Fuchsian groups, and further developed by D. Sullivan in Kleinian groups with various applications in spectral geometry, Mostow rigidity, geodesic flows and complex dynamics etc. These now called Patterson-Sullivan measures are important instances of

conformal density for rank-1 symmetric spaces. In this talk, we will explain how to establish a theory of Patterson-Sullivan measures on the horofunction boundary for any discrete group on a geodesic metric space with contracting elements. Such group actions include CAT(0) groups and mapping class groups, so our theory could be applied. Applications to growth problems and geodesic flows shall be mentioned, if time permits.

21. Huiping Pan，South China University of Technology

Title：Ray structures on the Teichmuller space

Abstract：Teichmuller space admits several ray structures, such as the Teichmuller geodesic ray, Thurston stretch ray, harmonic map (dual) ray, grafting ray, etc. In the first part of this talk, we will depict harmonic map ray structures on Teichmuller space as a geometric transition between Teichmuller ray structures and Thurston geodesic ray structures. In particular, by appropriately degenerating the source of a harmonic map between hyperbolic surfaces, the harmonic map rays through the target converge to a Thurston geodesic; by appropriately degenerating the target of the harmonic map, those harmonic map dual rays through the domain converge to Teichmuller geodesics. In the second part, we will discuss applications to Thurston geodesics. While there may be many Thurston metric geodesics between a pair of points in Teichmuller space, we find that by imposing an additional energy minimization constraint on the geodesics, thought of as limits of harmonic map rays, we select a unique Thurston geodesic through those points. Extending the target surface to the Thurston boundary yields, for each point Y in Teichmuller space, an "exponential map" of rays from that point Y onto Teichmuller space with visual boundary the Thurston boundary of Teichmuller space. This is a joint work with Michael Wolf.

22. Yang Shen，Tsinghua University
Title：On the Cheeger constants of Belyi surfaces

Abstract：Brooks and Makover developed a combinatorial model of random hyperbolic surfaces by gluing certain hyperbolic ideal triangles. In this talk we show that for any $\epsilon>0$, as the number of ideal triangles goes to infinity, a generic hyperbolic surface in Brooks-Makover's model has Cheeger constant less than $\frac{3}{2\pi}+\epsilon$. This is a joint work with Yunhui Wu.

23. Haojie Ren，Fudan University

Title：A Dichotomy for the dimension of SRB measure

Abstract: We study dynamical systems generated by skew products:

$$T:[0,1)\times R \to [0,1)\times R$$

$$T(x,y)=(bx \quad \mathrm{mod}\, 1, \quad \gamma y+\phi(x))$$

where integer, and is a real analytic Z-periodic function. We prove the following dichotomy for the SRB measure for T: Either the support of is a graph of real analytic function, or the dimension of is equal to. Furthermore, given b and, the former alternative only happens for finitely many unless is constant.

24. Yitwah Zhang, Tsinghua University
Title: Geodesics in moduli space
Abstract: There are many canonical metrics on the moduli space of closed Riemann surfaces, of which the Teichmuller metric is the best understood. Not only is it known that the typical geodesics of the Teichmuller metric is dense, but further it is known that relatively compact ones form a set of measure zero, albeit of full Hausdorff dimension. Many of these results about Teichmuller geodesics are inspired by corresponding results regarding symmetric spaces and exploit analogies from Diophantine approximation. In this talk, I will give a survey of these results about Teichmuller geodesics and some open problems inspired by them.

25. Zhiqiang Li, Peking University
Title: Recent progresses in ergodic optimization
Abstract: In this talk, we discuss some recent progresses in an area in ergodic theory called ergodic optimization. The focus of ergodic optimization is on the properties of invariant measures that maximizes the integral of potential functions, which has close connections to zero temperature behaviors of dynamical systems and multifractal analysis.

26. Zhuchao Ji，Westlake University
Title：Dynamical André-Oort conjecture for curves
Abstract：This is a joint work with Junyi Xie. The Dynamical André-Oort conjecture for curves proposed by Baker and DeMarco asserts the following: Given an non-isotrivial algebraic family of rational maps parametrized by an algebraic curve, then there are infinitly many PCF parameters in this curve if and only if the family has at most one independent critical orbit. In this talk we will sketch a proof of this conjecture.

27. Ying Zhang，Soochow University

Title：Trace polynomials for closed curves on the enlarged modular torus: Monotonicity, positivity, and log-concavity

Abstract：The modular torus is a once-cusped hyperbolic torus with the maximal order of symmetry. The traces of the simple closed geodesics on the modular torus give the geometric version of the classical Markoff numbers. We study trace polynomials for the

closed curves on the enlarged modular torus, with the single variable the enlargement factor. We obtain partial ordering of the polynomials for certain simple closed curves, and positivity of the polynomials for all closed curves. We have observed log-concavity for these polynomials and confirmed log-concavity of the polynomials for the simple closed curves. We mention the problem to enlarge an arbitrary complete one-holed hyperbolic torus. This is joint work with Xiangfei Li.

28. Shaoshi Chen, Academy of Mathematics and Systems Science, Chinese Academy of Sciences
Title: Dynamics of P-recursive Sequences
Abstract: P-recursive sequences satisfy a linear recurrence with polynomial coefficients, which appear ubiquitously in combinatorics. This talk will present some dynamical results on P-recursive sequences related to the stability problem and the Skolem problem on the zero structure of these sequences.