

Moduli of Meromorphic Quadratic Differentials: June 3-7, 2024

Events for:
Monday, June 3rd - Friday, June 7th

Monday, June 3rd

8:30am **Workshop: Breakfast - SCGP Cafe**

Title: Breakfast

9:30am **Workshop: Dawei Chen - SCGP 102**

Speaker: Dawei Chen

Title: Differentials, Contractions, and Singularities

Abstract: TBD

10:30am **Workshop: Coffee Break - SCGP Cafe**

Title: Coffee Break

11:00am **Workshop: Paul Apisa - SCGP 102**

Speaker: Paul Apisa

Title: Affine surfaces, monodromy, and the moduli space of meromorphic connections on Riemann surfaces

Abstract: TBD

12:00pm **Workshop: Lunch - SCGP Cafe**

Title: Lunch

2:30pm **Workshop: Charlie Reid - SCGP 102**

Speaker: Charlie Reid

Title: Boundaries of Hitchin components

Abstract: The Thurston boundary of Teichmuller space isn't just an abstract sphere of dimension $6g-6-1$, it is a moduli space of geometric objects. These objects can either be thought of as measured laminations on the surface or \mathbb{R} -trees with action of the fundamental group of the surface. We will describe an approach to generalizing Thurston's compactification from $SL(2, \mathbb{R})$ to $SL(n, \mathbb{R})$, with more detailed results in the case $n=3$ using asymptotics of solutions to the Hitchin equation.

3:30pm **Workshop: Tea Time - SCGP Cafe**

Title: Tea Time

4:00pm **Workshop: Andrea Tamburelli - SCGP 102**

Speaker: Andrea Tamburelli

Title: Cubic differentials and harmonic maps into real buildings

Abstract: Higgs bundles and the nonabelian Hodge correspondence provide a way to produce many equivariant harmonic maps from the universal cover of a Riemann surface into symmetric spaces of noncompact type. In general, the construction involves non-explicit solutions to systems of elliptic PDEs (the Hitchin equations) and ODEs (a parallel transport). Consider a closed Riemann surface S of genus g at least 2 equipped with a holomorphic cubic differential q . Following Hitchin, Labourie and Loftin, we construct a Higgs bundle from U over S so that the Hitchin system reduces to a single PDE, and the induced harmonic map is a minimal embedding into the symmetric space $X=SL(3, \mathbb{R})/SO(3)$. Along a real ray tq as t goes to infinity, we find an explicit description of the geometry of the limiting minimal surface in the asymptotic cone of X (which is a real building), in terms of the geometry of q . This is joint work with John Loftin and Mike Wolf.

Tuesday, June 4th

8:30am **Workshop: Breakfast - SCGP Cafe**

Title: Breakfast

9:30am **Workshop: Anthony Licata - SCGP 102**

Speaker: Anthony Licata

Title: Spherical objects and expansive frameworks in 2 CY categories

Abstract: There are a number of tools available to study stability conditions on a triangulated category with a large enough stock of spherical objects, especially when the category is 2-CY. I'll explain some general conjectures about the relationship between spherical objects and stability conditions in 2CY categories, and explain the role of these conjectures in proving the contractility of the stability manifold.

10:30am **Workshop: Coffee Break - SCGP Cafe**

Title: Coffee Break

11:00am **Workshop: Anna Barbieri - SCGP 102**

Speaker: Anna Barbieri

Title: Multi-scale stability conditions for An-Ginzburg categories

Abstract: TBD

12:00pm **Workshop: Lunch - SCGP Cafe**

Title: Lunch

12:00pm **Workshop: Group Photo - SCGP Lobby**

Title: Group Photo

2:30pm **Workshop: Scott Mullane - SCGP 102**

Speaker: Scott Mullane

Title: Weil-Petersson volumes and wall crossing for moduli spaces of cone surfaces

Abstract: TBD

3:30pm **Workshop: Tea Time - SCGP Cafe**

Title: Tea Time

4:00pm **Workshop: Marco Bertola - SCGP 102**

Speaker: Marco Bertola

Title: Quadratic differential in approximation theory on Riemann surfaces

Abstract: As the quadratic-differentials aficionados that we certainly all are, most participants are likely to be more focused on geometrical aspects of these objects. I will try to remind the audience of some practical applications of quadratic differential, which are close to some of their old (and new) uses in extremal problems. In particular I will remind the occurrence of “Jenkins-Strebel—like” differentials in approximation theory and the classical problem of maximal capacity domain of analytic continuation (Stahl), and its relation to the convergence domain of Padé approximations. Maybe closer to the theme of the conference, I will then present a new direction of research that mixes the geometry of Riemann surfaces of higher genus with the theory of approximation. Namely, I will introduce the notion Padé approximation scheme on a Riemann surface, its relation to certain orthogonality property and how quadratic differentials with a Jenkins-Strebel (a.k.a. Boutroux) property provide the essential tool in the approximation scheme using a matrix Riemann—Hilbert problem (of index g) on the Riemann surface. This is part of an ongoing project.

6:00pm **Workshop: Banquet Dinner - SCGP Cafe**

Title: Banquet Dinner

Wednesday, June 5th

8:30am **Workshop: Breakfast - SCGP Cafe**

Title: Breakfast

9:30am **Workshop: Eric Zaslow - SCGP 102**

Speaker: Eric Zaslow

Title: Skeins, Clusters and Wavefunctions

Abstract: TBD

10:30am **Workshop: Coffee Break - SCGP Cafe**

Title: Coffee Break

11:00am **Workshop: Sergey Cherkis - SCGP 102**

Speaker: Sergey Cherkis

Title: The Landscape of Tesserons

Abstract: Complete non-compact hyperkahler four-manifolds, called tesserons, are examples of gravitational instantons. Their recent classification presents a natural problem of describing their parameter space and relating them to each other via various Gromov-Hausdorff limits. We report on the program realizing every tesseron as a moduli space of monopoles and what it teaches about their parameter space structure.

12:00pm **Workshop: Lunch - SCGP Cafe**

Title: Lunch

3:30pm **Workshop: Tea Time - SCGP Cafe**

Title: Tea Time

Thursday, June 6th

8:30am **Workshop: Breakfast - SCGP Cafe**

Title: Breakfast

9:30am **Workshop: Yu Qiu - SCGP 102**

Speaker: Yu Qiu

Title: Moduli spaces of quadratic differentials: Abel-Jacobi map and deformation

Abstract: We study the moduli space of quadratic differentials with simple zeros and prescribed polar type. We prove the fundamental group of which equals the kernel of Abel-Jacobi map. Then we discuss the partial compactification (with orbifolding) and categorification.

10:30am **Workshop: Coffee Break - SCGP Cafe**

Title: Coffee Break

11:00am **Workshop: Ian Le - SCGP 102**

Speaker: Ian Le

Title: Spectral networks from Legendrian weaves

Abstract: Spectral networks (discovered by Gaiotto-Moore-Neitzke) give convenient coordinates on the moduli space of G -local systems on a Riemann surface. Among the systems of coordinates that they recover are the cluster coordinates defined by Fock and Goncharov. Legendrian weaves (discovered by Casals-Zaslow) are another planar combinatorial object that give a robust formalism for encapsulating cluster coordinates on moduli of G -local systems. We show how to construct spectral networks associated to any Demazure Legendrian weave. This allows us to construct spectral networks for a large family of examples, including all Grassmannians, and also allows us to construct spectral networks for any reductive group. This is joint work with Roger Casals and Daping Weng.

12:00pm **Workshop: Lunch - SCGP Cafe**

Title: Lunch

2:30pm **Workshop: Yan Zhou - SCGP 102**

Speaker: Yan Zhou

Title: WKB analysis and Stokes geometry

Abstract: We study the Riemann-Hilbert maps of a class of irregular connections on the trivial rank n bundle over the projective line that appears in various contexts of geometry and representation theory. The Stokes data give the generalized monodromy data of these connections. The compactification of the parameter space of the irregular types of these connections is $\bar{M}_{0,n}$. At the deepest stratum of $\bar{M}_{0,n}$, we show that the WKB leading terms of the Stokes matrices are periods on the spectral curves. Near the deepest stratum of $\bar{M}_{0,n}$, we study the WKB approximation of Stokes data via the frame of spectral networks. If time permits, we will comment on the picture of the quantized Riemann Hilbert maps. The talk will be based on joint work with Alekseev, Neitzke and Xu.

3:30pm **Workshop: Tea Time - SCGP Cafe**

Title: Tea Time

4:00pm **Workshop: Kohei Iwaki - SCGP 102**

Speaker: Kohei Iwaki

Title: Conjectures on resurgent structure of topological recursion and BPS invariants

Abstract: TBD

Friday, June 7th

8:30am **Workshop: Breakfast - SCGP Cafe**

Title: Breakfast

9:30am **Workshop: Qianyu Hao - SCGP 102**

Speaker: Qianyu Hao

Title: Abelianization of Virasoro conformal blocks at $c=1$

Abstract: The Virasoro conformal blocks are very interesting since they have many connections to other areas of math and physics. For example, when $c=1$, they are related to tau functions of Painlevé equations. I will first explain what Virasoro conformal blocks are. Then I will describe a new way to construct Virasoro blocks at $c=1$ on \mathbb{C} by using the "abelian" Heisenberg conformal blocks on a branched double cover of \mathbb{C} . The main new idea in our work is to use a spectral network. It is closely related to the idea of nonabelianization of the flat connections in the work of Gaiotto-Moore-Neitzke and Neitzke-Hollands. This nonabelianization construction enables us to compute the harder-to-get Virasoro blocks using the simpler abelian objects. This is based on a joint work with Andrew Neitzke.

10:30am **Workshop: Coffee Break - SCGP Cafe**

Title: Coffee Break

11:00am **Workshop: Pietro Longhi - SCGP 102**

Speaker: Pietro Longhi

Title: Exponential networks

Abstract: Moduli spaces of meromorphic differentials arise in physics as moduli spaces of vacua of certain four-dimensional supersymmetric quantum field theories. Introducing a compact fifth dimension leads to a deformation of these QFTs and of their moduli spaces, whose low energy dynamics is related to multivalued meromorphic differentials. In this talk I will discuss the framework of Exponential Networks, a generalization of Spectral Networks based on foliations of logarithmic differentials. I will survey recent results and open problems with connections to enumerative geometry and to the study of q-difference equations.

12:00pm **Workshop: Lunch - SCGP Cafe**

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3:30pm **Workshop: Tea Time - SCGP Cafe**

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