Week 3 Schedule

Events for:
Monday, July 15th - Friday, July 19th

Monday, July 15th

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

Title: Breakfast

9:30am **Workshop Mini-course 1: Andrew Neitzke - SCGP 102**

Speaker: Andrew Neitzke

Title: Higgs bundles and nonabelian Hodge

Abstract: I will discuss the hyperkahler metrics on moduli spaces of Higgs bundles. These metrics are difficult to describe explicitly, because their construction involves solving a nonlinear PDE (Hitchin's equation). There is a conjectural picture originating in quantum field theory which gives an alternative route to describing the metrics, expressing them in terms of period integrals and integer (Donaldson-Thomas) invariants. I will explain this picture, focusing on simple examples.

10:45am **Workshop: Coffee Break - SCGP Cafe**

Title: Coffee Break

11:30am **Workshop Mini-course 1: Melody Chan - SCGP 102**

Speaker: Melody Chan

Title: Moduli spaces of abelian varieties via tropical geometry

Abstract: In recent joint work with Francis Brown, Søren Galatius, and Sam Payne, we identify a Hopf algebra structure on the weight 0 cohomology with compact supports of the moduli space of abelian varieties, and we prove consequences of it that change the landscape of what is known about the unstable cohomology of A_g, GL_n(Z), and SL_n(Z). My goal will be to discuss certain ingredients to this work. The ingredients I'll highlight are related to the tropical varieties associated to toroidal compactifications of A_g, and invariant differential forms thereon. I intend for this lecture series to be accessible and will devote part of it to a crash course for new learners on some relevant algebraic structures.

12:45pm **Workshop: Lunch - SCGP Cafe**

Title: Lunch

3:30pm **Tea Break - SCGP Cafe**

Tuesday, July 16th

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

Title: Breakfast

9:30am **Workshop Mini-course 1: Martin Moeller - SCGP, 102**

Speaker: Martin Moeller

Title: Compactification of moduli spaces of differentials: logarithmic and multi-scale.

Abstract: We present two ways to construct a compactification of the strata of the moduli space of differentials given by a fixed type of zeros and poles, a geometric approach via multi-scale differentials and an equivalent approach in terms of logarithmic geometry. The main goal is to show that the compactification is a smooth orbifold with normal crossing boundary. In the second lecture we present applications to computations of invariants, such as the Euler characteristic and the Kodaira dimension.

10:45am **Group Photo - SCGP Lobby**

Title: Group Photo

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

Title: Lunch

2:30pm **Workshop Forward-looking talk: Mike Wolf - SCGP 102**

Speaker: Mike Wolf

Title: Forwad-looking talk

Abstract: We describe the asymptotics of holonomies in Hitchin components of surface group representations in ranks one and two. The goal is to relate (i) the holomorphic differentials that parametrize the component, (ii) the geometry of the high energy harmonic maps to a symmetric space which are associated to the Higgs bundle and (iii) singular metric spaces which are associated with both the differentials and the maps. The space of those singular spaces naturally define boundary points of the component. We illustrate with a concrete example in the most trivial case, but it will also be clear that there is much to settle in any setting that is at all less trivial. Joint work with John Loftin, Andrea Tamburelli, and if time allows, Huiping Pan.

5:00pm **Summer Concert Series**

Title: Summer Concert Series

Abstract: Performance by Ramtin Mohasselyazdi (composer and pianist); Eric Ness (cellist and composer); Evanglea Andreadis (violist); Athena Wilkinson (violinist); and Sophie May Bowden (violinist)

Wednesday, July 17th

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

Title: Breakfast

9:30am **Workshop Mini-course 2: Andrew Neitzke - SCGP 102**

Speaker: Andrew Neitzke

Title: Higgs bundles and nonabelian Hodge

Abstract: I will discuss the hyperkahler metrics on moduli spaces of Higgs bundles. These metrics are difficult to describe explicitly, because their construction involves solving a nonlinear PDE (Hitchin's equation). There is a conjectural picture originating in quantum field theory which gives an alternative route to describing the metrics, expressing them in terms of period integrals and integer (Donaldson-Thomas) invariants. I will explain this picture, focusing on simple examples.

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

Title: Lunch

2:30pm **Workshop Forward-looking talk: Nikita Nekrasov - SCGP 102**

Speaker: Nikita Nekrasov

Title: À la recherche de l'espace perdu : in search of good moduli spaces

Abstract: Progress in gauge theory and string theory is slowed by lack of several moduli spaces. I recall several old and very old questions which in the recent years have been nurtured by BPS/CFT correspondence : W-geometry; Compactifications of instanton moduli spaces; Gromov-Witten string field theory; Crossed, folded and spiked instantons and DT4 theory.
We hope the participants of the workshop will be actively involved in discussions and help the speaker in this search.

3:30pm **Tea Break - SCGP Cafe**

Thursday, July 18th

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

Title: Breakfast

9:30am **Workshop Mini-course 2: Melody Chan - SCGP, 102**

Speaker: Melody Chan

Title: Moduli spaces of abelian varieties via tropical geometry

Abstract: In recent joint work with Francis Brown, Søren Galatius, and Sam Payne, we identify a Hopf algebra structure on the weight 0 cohomology with compact supports of the moduli space of abelian varieties, and we prove consequences of it that change the landscape of what is known about the unstable cohomology of A_g, GL_n(Z), and SL_n(Z). My goal will be to discuss certain ingredients to this work. The ingredients I'll highlight are related to the tropical varieties associated to toroidal compactifications of A_g, and invariant differential forms thereon. I intend for this lecture series to be accessible and will devote part of it to a crash course for new learners on some relevant algebraic structures.

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

Title: Lunch

2:30pm **Workshop Talk: Laurent Fargues - SCGP 102**

Speaker: Laurent Fargues

Title: From the Classical Langlands Program to the geometric one

Abstract: I will explain the general strategy of how using ideas of the geometric Langlands Program we were able with Scholze to obtain results about the classical Langlands program.

3:30pm **Tea Break - SCGP Cafe**

6:00pm **Workshop Banquet - SGCP Cafe**

Title: Workshop Banquet Dinner

Friday, July 19th

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

Title: Breakfast

9:30am **Workshop Mini-course 2: Martin Moeller - SCGP, 102**

Speaker: Martin Moeller

Title: Compactification of moduli spaces of differentials: logarithmic and multi-scale.

Abstract: We present two ways to construct a compactification of the strata of the moduli space of differentials given by a fixed type of zeros and poles, a geometric approach via multi-scale differentials and an equivalent approach in terms of logarithmic geometry. The main goal is to show that the compactification is a smooth orbifold with normal crossing boundary. In the second lecture we present applications to computations of invariants, such as the Euler characteristic and the Kodaira dimension.

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

Title: Lunch