Titles and Abstracts of the conference

1. Title: "On a proof of Labastida-Marino-Ooguri-Vafa conjecture".

Pan Peng, Harvard University

Abstract: This is a joint work with K. Liu. Based on the duality between Chern-Simons gauge theory and topological string theory, Labastida-Marino-Ooguri-Vafa conjectured certain remarkable new algebraic structure of link invariants and the existence of infinite series of new integer invariants. In the talk, I will report a proof of this conjecture and its relation with volume conjecture, Khovanov homology, large N Chern-Simons / Topological string duality, etc.

2. Stephan Tillmann, University of Melburne

2.1. Research talk: Spun normal surfaces and the boundary maps.

2.2. Educational talk: Two lectures on the A-polynomial

The A-polynomial of a compact, connected, orientable 3-manifold M with torus boundary is a two variable polynomial which encodes the peripheral data of the set of representations of $\pi_1(M)$ into SL(2,C) and PSL(2,C). It first appeared in work by Cooper, Culler, Gillet, Long and Shalen. Character variety techniques (which originated in work by Culler and Shalen) have contributed to the proofs of the Smith conjecture, the cyclic surgery theorem and the finite surgery theorem. The above target groups have a special place in the current theory since PSL(2,C) is isomorphic to the group of orientation preserving isometries of hyperbolic 3-space.

In these lectures, I will give two different definitions of the A-polynomial: the first uses the SL(2,C)-character variety, and the second uses the deformation variety of a 3-manifold arising from a decomposition of the manifold into ideal tetrahedra. I then describe some of the basic properties of the A-polynomial and the information it gives about the manifold. I'll also discuss the information it gives about the volume of representations of the fundamental group and the fact that the A-polynomial detects the trivial knot among all knots in S^3 (due independently to Boyer-Zhang and Dunfield-Garoufalidis).

3. Sun X-F, Lehigh University

L^2 cohomology and vanishing theorems on the curve moduli

In this talk I will describe some recent work jointed with Liu and Yau on the framework of bundle valued L^2 cohomology and dual nakano negativity of the WP metric. Combining with the Mumford goodness of the WP and Ricci metrics we derive the infinitesimal rigidity of the complex structure of the curve moduli

4. Futer, Dave, Michigan State University

Research talk: Angled triangulations and Dehn surgery.

Recently, Francois Gueritaud, Gabriel Indurskis, and I have classified all exceptional Dehn fillings of hyperbolic punctured torus bundles. The proof is topological, and involves studying Montesinos links and closed 3- braids. But here's the interesting thing: almost all of the exceptional slopes can be "detected" by looking at angled triangulations of the punctured torus bundle before filling. In particular, all toroidal fillings come up as boundary points of the deformation space of angled triangulations. This suggests interesting (speculative) connections to normal surface theory and possibly character varieties. It could be a lot of fun to ponder these speculations.

Futer will give two educational talks introducing combinatorial methods and linear programming problems related to triangulated 3-manifolds in the week of July 1.

5. K. Rafi, University Connecticut

5.1. Curve complex and Teichmuller geodesics

Abstract: A geodesic in the Teichmuller space of S is described by a quadratic differential on S. We discuss how the behavior of the geodesic can be described using the combinatorial properties of the vertical and horizontal foliations of the corresponding quadratic differential.

5.2. Educational talks: Introduction to Teichmuller theory.

6. Li Tao, Boston College

Title: Saddle tangencies and the distance of Heegaard splittings

Abstract: We give another proof of a theorem of Scharlemann and Tomova and of a theorem of Hartshorn. The two theorems together say the following. Let M be a compact orientable irreducible 3–manifold and P a Heegaard surface of M. Suppose Q is either an incompressible surface or a strongly irreducible Heegaard surface in M. Then either the Hempel distance $d(P) <= 2$ genus(Q) or P is isotopic to Q. This theorem can be naturally extended to bicompressible but weakly incompressible surfaces.

Li Tao will give two more educational talks introducing Heegaard splitting of 3-manifolds.

7. Schleimer, S, Rutgers

Research talk:

7.1 Title: The geometry of the curve complex

Abstract: This lecture will be a leisurely introduction to the complex of curves C(S) of an orientable surface S, with an eye towards its local and global structure. We'll also explore a "zoo" of complexes related to the curve complex (the arc complex, the separating curve complex, the disk complex, the Hatcher-Thurston complex, and so on). These are all related in a somewhat subtle way – for example the complex of non-separating curves is quasi-isometric to C(S) but the complex of separating curves is not.

7.2 Two educational talks: introduction to the complex of curves.

8. Luo, Rutgers and Zhejiang University

Title: New Coordinates for the Teichmuller spaces

abstract: using variational principle on triangulated surfaces, we produce for each real variable t, a coordinate for the Teichmuller space of a surface with boundary. The images of the Teichmuller space under the coordinates are always an open convex polytope. We will indicate briefly how convex polytopes arise in these coordinates.