FRANCIS BONAHON
University of Southern California

Local representations of the quantum Teichmller space

The quantum Teichmller space of a punctured surface is a purely combinatorial/algebraic object associated to this surface. We investigate a certain type of representations of the corresponding algebra, called local representations. These are essentially classified by group homomorphisms from the fundamental group of the surface to the isometry group of hyperbolic 3-space. Using hyperbolic metrics on 3-manifolds fibering over the circle, we use this construction to extract invariants of diffeomorphisms of surfaces.

MARIO BONK
University of Michigan

Quasiconformal Geometry of Fractals

Many questions in analysis and geometry lead to problems of quasiconformal geometry on non-smooth or fractal spaces. For example, there is a close relation of this subject to the problem of characterizing fundamental groups of hyperbolic 3-orbifolds or to Thurston's characterization of rational functions with finite post-critical set. In recent years, the classical theory of quasiconformal maps between Euclidean spaces has been successfully extended to more general settings and powerful tools have become available. Fractal 2-spheres or Sierpinski carpets are typical spaces for which this deeper understanding of their quasiconformal geometry is particularly relevant and interesting. In my talk I will report on some recent developments in this area.

BRIAN BOWDITCH
University of Southampton

Ends of hyperbolic 3-manifolds

We describe another perspective on some aspects of the classification of kleinian groups, notably the resolution of Thurston's ending lamination conjecture by Minksy, Brock and Canary. Our approach follows a similar strategy, though the logic is somewhat different, which allows us to bypass some of the more technical aspects of the proof. The subject is closely linked to the study of Teichmuller space and curve complexes, and these ideas can be fed back to gain new insights into these subjects.

KENNETH BROMBERG
University of Utah

Drilling, grafting and the ending lamination theorerm

We will present a new proof of the Brock-Canary-Minsky ending lamination theorem. As in the original proof, our starting point will be Minsky's a priori bounds on the length of certain closed geodesics in hyperbolic 3-manifolds homotopy equivalent to a surface. From there the two proof's diverge. Roughly speaking we avoid many of the difficult geometric limit arguments of the original proof by using the techniques of grafting and drilling. This is joint work with J. Brock, R. Evans and J. Souto.

RICHARD CANARY
University of Michigan

Untouchable points in boundaries of deformation spaces of Kleinian groups

In the last decade it has been discovered that deformation spaces of Kleinian groups can have quite complicated topology. Most dramatically, Ken Bromberg recently showed that the space of punctured torus groups is not even locally connected. On the other hand, it is expected that the topology behaves well at quasiconformally rigid points in boundaries of deformation spaces of Kleinian groups. In various situations, we will show that there is no bumping or self- bumping at such points. This is joint work with Jeff Brock, Ken Bromberg and Yair Minsky.

DAVID GABAI
Princeton University

Volumes of Hyperbolic 3-Manifolds

We discuss our efforts to address the Thurston, Matveev - Fomenko, Weeks Complexity conjecture, that low volume hyperbolic 3-manifolds are of small combinatorial/topological complexity. Joint work with Rob Meyerhoff and Peter Milley.

STEVE KERCKHOFF
Stanford University

The other geometries

This will be a discussion of some of the other geometries in dimension 3 (connecting them to hyperbolic geometry, of course!). The point will be to view them in the context of projective geometry where the transition between geometries becomes seamless. Applications to deformation theory, local rigidity, and the orbifold theorem.

LEE MOSHER
State University of New Jersey

Axes in Outer Space (joint with M. Handel)

We develop a notion of axis in the Culler–Vogtmann outer space X_r of a finite rank free group F_r, with respect to the action of a fully irreducible outer automorphism phi. Unlike the situation of a loxodromic isometry acting on hyperbolic space, or a pseudo-Anosov mapping class acting on Teichmuller space, X_r has no natural metric, and phi seems not to have a single natural axis. Instead our axes for phi, while not unique, fit into an "axis bundle" A_ϕ with nice topological properties: A_ϕ is a closed subset of X_r proper homotopy equivalent to a line, it is invariant under phi, the two ends of A_ϕ limit on the repeller and attractor of the source–sink action of phi on compactified outer space, and A_ϕ depends naturally on the repeller and attractor. We propose various definitions for A_ϕ, each motivated in different ways by train track theory or by properties of axes in Teichmuller space, and we prove their equivalence.

MARK SAPIR
Vanderbilt University

Asymptotic cones and actions on tree-graded spaces

The talk is based on the joint work with Cornelia Drutu, Alexander Olshanskii and Denis Osin. Many questions about automorphisms and endomorphisms of groups, JSJ-decompositions, the Hopf and co-Hopf properties, solutions of equations in groups, etc. lead to actions of groups on asymptotic cones of themselves or asymptotic cones of other groups. In the hyperbolic case this leads to the Rips-Sela theory. We show that it can be extended to a very large class of groups whose asymptotic cones have cut points.

PETER SHALEN
University of Illinois at Chicago

Classical 3-manifold topology and hyperbolic volume

The study of volumes of hyperbolic 3-manifolds has developed into a rich subject in which many different techniques interact. In these talks I will describe ongoing work with Marc Culler in which we bring some of the most classical techniques in 3-manifold topology, in combination with such recent developments as the proof of Marden's conjecture and Perelman's estimates for the Ricci flow with surgery, to bear on the investigation of connections between the volume of a hyperbolic 3-manifold and such classical invariants as homology and Heegaard genus.

JUAN SOUTO
University of Chicago

Rank of the fundamental group and geometry of hyperbolic 3-manifolds

We describe the structure of those hyperbolic 3-manifolds which have injectivity radius at least ϵ and whose fundamental group can be generated by k elements. In particular, we prove that any such manifold admits a Heegaard splitting of genus $g(k, \epsilon)$ and hence that the radius of largest embedded ball can be bounded from above by a constant $r(k, \epsilon)$. This last result is related to a conjecture of McMullen.

PETER STORM
Stanford University

The minimal entropy conjecture for nonuniform rank one lattices

About ten years ago, Besson-Courtois-Gallot proved that a negatively curved rank one locally symmetric metric on a compact manifold uniquely minimizes volume growth entropy among all other metrics with the same volume. As usual, one would like to prove the same result in the finite volume case. Strong partial results were obtained by Boland-Connell-Souto and the general case was proved recently. I'll explain the background for this problem, and some of the ideas which go into the proof.