Special Session 3: Hyperbolic Geometry and Teichmüller Theory

Organizers: Gabino González Díez (Universidad Autónoma de Madrid, Spain) and Christopher J. Leininger (University of Illinois at Urbana-Champaign, USA).

The first cohomology group of mapping class groups

Javier Aramayona

Universidad Autónoma de Madrid, Spain

Tuesday 23, 16:50-17:25

We will discuss the existence or non-existence of homomorphisms from (pure) mapping class groups to the group of integers, depending on the topology of the underlying surface. This is joint with P. Patel and N. Vlamis.

Topological singular points in the moduli space of Riemann surfaces

Antonio Costa

UNED, Spain

Monday 22, 17:00-17:35

In 1962 E. H. Rauch established the existence of points in the moduli space of Riemann surfaces not having a neighbourhood homeomorphic to a ball. These points are called topologically singular. We give a different proof of some of the results of Rauch and also determine the topologically singular and non-singular points in the branch locus of some equisymmetric families of Riemann surfaces.

A Cannon-Thurston map for survival curve complex of a punctured surface

Funda Gultepe

Université du Luxembourg, Luxembourg

Tuesday 23, 16:10-16:45

Using Birman exact sequence for mapping class groups, we construct a universal Cannon-Thurston map for the boundary of a curve complex of a surface with punctures, which we call *surviving curve complex*. This is a joint work with Chris Leininger and Witsaruo Pho-on.

Winding Number, Monodromy, and Extension in Holomorphic Motion and Lifting in Teichmueller Theory

Yunping Jiang

CUNY, New York, USA

Wednesday 24, 09:25-10:00

In this talk, I will give a review of our work in the study of holomorphic motions of subsets in the Riemann sphere over hyperbolic Riemann surfaces. I will introduce the zero-winding number condition and the trivial monodromy condition for such a holomorphic motion. I will also introduce the lifting problem in Teichmueller theory and the extension problem in holomorphic motion. After that I will show that both conditions are necessary for a fully extendable holomorphic motion of a subset in the Riemann sphere over a hyperbolic Riemann surface. I will use an explicit counter-example to show that the zero-winding number condition is not sufficient for a fully extendable holomorphic motion of a subset in the Riemann sphere over a hyperbolic Riemann surface. Furthermore, by using the relation between the lifting in Teichmueller theory and the extension in holomorphic motion, I will show that the trivial monodromy condition is indeed sufficient for a fully extendable holomorphic motion of a subset in the Riemann sphere over a hyperbolic Riemann surface. Some other conditions will be also mentioned. This talk is based on the work of my long-time cooperation with Mike Beck, Fred Gardiner, Sudeb Mitra, Hiroshige Shiga, and Zhe Wang.

Quasi-isometric rigidity of 3-manifold groups

Cyril Lecuire

Université Paul Sabatier, France

Tuesday 23, 14:45-15:20

We will discuss the quasi-isometric rigidity of 3-manifold groups: A finitely generated groups that roughly (when viewed from far away) looks like the fundamental group of a compact 3-manifold contains a finite index subgroup iso-

morphic to thefundamental group of a compact 3-manifold. This a joint work with Peter Haissinsky.

Least Dilatation of Pure Surface Braids

Marissa Loving

University of Illinois, USA

Monday 22, 14:45-15:20

The n-stranded pure surface braid group of a genus g surface can be described as the subgroup of the pure mapping class group of a surface of genus g with n-punctures which becomes trivial on the closed surface. I am interested in the least dilatation of pseudo-Anosov pure surface braids. For the n=1 case, upper and lower bounds on the least dilatation were proved by Dowdall and AougabÑTaylor, respectively. In this talk, I will describe the upper and lower bounds I have proved as a function of g and n.

Real-analytic sections for Teichmueller curves

Sudeb Mitra

CUNY, New York, USA **Wednesday 24, 08:45-09:20**

We use a fundamental result of Douady and Earle to explicitly construct some real-analytic sections of Teichmueller curves. This gives an alternative approach to a paper of Cliff Earle.

We conclude with a brief discussion on real-analytic section for the Teichmueller space of a closed set in the Riemann sphere.

Volume forms on the SL(N,C)-moduli space of surfaces with boundary

Joan Porti

Universitat Autònoma de Barcelona, Spain

Tuesday 23, 15:25-16:00

For an oriented surface of finite type, we consider the moduli space of representations in a simply connected reductive Lie group (eg SL(N,C)), and also the moduli space relative to the boundary. We relate the complex valued volume forms in those moduli spaces, the relative and the absolute one. This is joint work with M. Heusener.

Thick parts of the moduli space of Riemann surfaces and pseudo-Anosov maps

Hiroshige Shiga

Tokyo Institute of Technology, Japan **Monday 22, 15:25-16:00**

Let R be a hyperbolic Riemann surface of finite type. The moduli space $M(R)$ of R is considered as a metric space with the Techmüller metric. Sometimes, it has properties similar to those of a hyperbolic Riemann surface with punctures. In this talk, we show some properties of $M(R)$ related to closed geodesics, which are given by pseudo-Anosov self-maps of R.

Modular forms cutting out Gothic Teichmüller curves

David Torres-Teigell

Universität des Saarlandes, Germany

Monday 22, 16:10-16:45

Teichmüller curves arise as the projection to the moduli space of certain orbits of the action of SL(2,R) on the space of flat surfaces. By results of Möller, the Jacobian of points in Teichmüller curves always contains a subvariety that admits real multiplication so that, in particular, there exists certain Prym-Torelli map that allows us to see the Teichmüller curve inside a Hilbert modular variety parametrising abelian varieties with real multiplication. In this talk we will introduce the Gothic Teichmüller curves, discovered by McMullen-Mukamel-Wright, and describe their Prym-Torelli images inside a Hilbert modular surface. Our main objective is to cut this image out as the vanishing locus of some Hilbert modular form and use this description to calculate their Euler characteristics. This is joint work with M. Möller.