CENTRE FOR QUANTUM GEOMETRY OF MODULI SPACES
DEPARTMENT OF MATHEMATICS
AARHUS UNIVERSITY

Conference program 19-22 Aug 2013

Pressure metric and Higgs bundles

Monday 19 Aug

Location: Aud. G1

09:30 - 10:30 *The pressure metric on the Hitchin component* **Dick Canary**

11:00 - 12:00 *Involutions of the moduli space of Higgs bundles and branes* by **Oscar Garcia-Prada**

12:00 - 14:00 Lunch

14:00 - 15:00 *TBA* by **François Ledrappier**

15:30 - 16:30 *Cluster algebra compatible with Cremmer-Gervais Poisson-Lie bracket on SL*(*n*) by **Michael Shapiro**

18:00 - **Social networking dinner in "MatLab"** (Bldg.1536, 1st floor)

Tuesday 20 Aug

Location: Aud. G1

09:30 - 10:30 *Products of twists, geodesic-lengths, shears and projective twist-bulge deformations* by **Scott A. Wolpert**

11:00 - 12:00 *Weil Petersson metics and Thermodynamic Formalism* by **Mark Pollicott**

12:00 - 14:00 Lunch

14:00 - 15:00 *A new formulation of the Teichmüller TQFT* by **Rinat Kashaev**

15:30 - 16:30 *TBA* by **Tudor Dimofte**

Wednesday 21 Aug

Location: Aud. G1

09:30 - 10:30 *Geometric rank of Teichmüller space* by **Howard Masur**

11:00 - 12:00 *The Zariski closure of Hitchin representations* by **Olivier Guichard**

12:00 - 14:00 Lunch

14:00 - 15:00 *Polynomial Pick forms for affine spheres and real projective polygons* by **Mike Wolf**

15:30 - 16:30 *A Weil-Petersson metric for graphs* by **Richard Sharp**

17:30 **Walk from QGM** (meeting point: main entrance next to the information office)
18:00 - **Special dinner at "Ministeriet",** Klostertorvet 5, 8000 AARHUS C (see the city map)

Thursday 22 Aug

Location: Aud. G1

09:30 - 10:30 *Small dilatation pseudo* Anosovs by **Greg Mcshane**

11:00 - 12:00 *Components of moduli spaces of Higgs bundles* by **André Gama Oliveira**

12:00 - 14:00 Lunch

14:00 - 15:00 *Geometry of the Quot scheme* by **Indranil Biswas**

15:30 - 16:30 *On the Cayley and Hitchin-Kobayashi correspondences* by **Ignasi Mundet Riera**

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SCIENCE & TECHNOLOGY
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Abstracts - Conference 19-22 Aug 2013

Pressure metric and Higgs bundles

Dick Canary
The pressure metric on the Hitchin component

Oscar Garcia Prada
Involutions of the moduli space of Higgs bundles and branes

François Ledrappier

Michael Shapiro
Cluster algebra compatible with Cremmer-Gervais Poisson-Lie bracket on SL(n)
Endowing a Lie group with a Poisson structure that respects group multiplication (Poisson-Lie structure) is instrumental in a study of classical and quantum mechanical systems with symmetries. In turn, a Poisson structure on a variety can be compatible with a cluster structure - an useful combinatorial tool that organizes generators of the ring of regular functions into a collection of overlapping clusters connected via rational transformations. We conjectured that this is the case for an important class of Poisson-Lie groups. We verified this conjecture for a group of invertible matrices equipped with a non-standard (Cremmer-Gervais) Poisson-Lie structure. This is joint work with M.Gekhtman and A.Vainshtein.

Scott A. Wolpert
Products of twists, geodesic-lengths, shears and projective twist-bulge deformations
We study projective representations of the fundamental group of a surface with finite topology. The goal is to use generalizations of the Fenchel-Nielsen twist deformation to understand the geometry of the representation space. For PSL(2;R) representations of punctured surfaces, we consider hyperbolic surfaces triangulated by ideal geodesics and weighted sums of geodesics with weights summing to zero at each cusp. We analyze such configurations by “doubling across cusps” and “opening nodes” to obtain compact surfaces with FN twists. We show that the dual of a Thurston shear is the total length, that the WP symplectic pairing is given by weight summation by parts at punctures and by a new formula for the Penner form and we describe the formula for the WP metric pairing. For PSL(3;R) representations of compact surfaces, we review the basic considerations for the Hitchin component, particularly Anosov representations and the Labourie & Fock Goncharov positivity condition for the “flag curve”. We describe the twist-bulge deformation for PSL(3;R) representations. We present the formula of our student Terence Long for the twist-bulge derivative of a generalized cross ratio.

Mark Pollicott
Weil Petersson metics and Thermodynamic Formalism
We will discuss the connections between the Weil Petersson metric, the differentiability of the boundary correspondence between Fuchsian groups and zeta functions. This is motivated by works of Bridgeman and McMullen, and is joint work with Richard Sharp.

Rinat Kashaev
A new formulation of the Teichmüller TQFT
By using the Weil-Gel'fand-Zak transform of Faddeev's quantum dilogarithm, we propose a new state-integral model for the Teichmüller TQFT, where the circle valued state variables live on the edges of oriented leveled shaped triangulations. This is a joint work with J. Andersen.

Tudor Dimofte

Howard Masur
Geometric rank of Teichmüller space
One aspect in the study of the coarse geometry of a metric space is the geometric rank. This is the largest dimensional Euclidena space which quasi-isometrically embeds in the space. We determine the geometric rank of Teichmüller space with the Teichmüller metric. This is joint work with Alex Eskin and Kasra Rafi.

Olivier Guichard
The Zariski closure of Hitchin representations

Mike Wolf
Polynomial Pick forms for affine spheres and real projective polygons
Discrete surface group representations into PSL (3,R) correspond geometrically to convex real projective structures on surfaces; in turn, these may be studied by considering the affine spheres which project to the convex hull of their universal covers. As a sequence of convex projective structures leaves all compacta in its deformation space, a subclass of the limits is described by polynomial cubic differentials on affine spheres which are conformally the complex plane. We show that those particular affine spheres project to polygons; along the way, a strong estimate on asymptotics is found, which translates to a version of the Stokes data. We begin by describing the basic objects and context and conclude with a sketch of some of the useful technique. This is joint work with David Dumas.

Richard Sharp
A Weil-Petersson metric for graphs
A (finite) graph may be made into a metric graph by assigning lengths to the edges. The space of all such assignments on a given graph (suitably normalized) is, in some sense, an analogue of the moduli space of a Riemann surface. In this talk, we shall propose an analogue of the Weil-Petersson metric in the graph case, defined using thermodynamic formalism, and discuss some of its properties. This is joint work with Mark Pollicott.

Greg Mcshane
Small dilatation pseudo Anosovs
We will present an approach based on Teichmüller theory giving a finiteness result for the number of pseudo Anosovs with normalised dilatation less than 1 + epsilon. This is joint work with Sadayoshi Kojima

André Gama Oliveira
Components of moduli spaces of Higgs bundles
Given a real reductive Lie group G, let MG be the moduli space of G-Higgs bundles over a compact Riemann surface. We give an overview on the general techniques used to detect the connected components of MG. Emphasis will be given on some examples such as G = Sp(2p; 2q). Joint work with Oscar Garcia-Prada.

Indranil Biswas
Title: Geometry of the Quot scheme
Let E be the trivial holomorphic vector bundle of rank r on a compact connected Riemann surface. For a fixed d > 0, let Q denote the Quot scheme that parametrizes the torsion quotients of E of degree d. We investigate the geometry of Q. In particular the automorphism group of Q is computed. These are joint works with N. Romao, A. Dhillon, J. Hurtubise.

Ignasi Mundet Riera
On the Cayley and Hitchin-Kobayashi correspondences
The Cayley correspondence for symplectic Higgs bundles gives a bijection between: (1) the moduli space of (polystable) maximal Sp(2n,R)-Higgs bundles on a Riemann surface S, and (2) the moduli space of (polystable) K^2 twisted GL(n,R)-Higgs bundles on S. The Hitchin-Kobayashi correspondence states that polystability is equivalent in each case to the existence of solution to some natural equations (which in the case of Sp(2n,R)-Higgs bundles give rise to symplectic local systems). The equations corresponding to the two moduli spaces related by the Cayley correspondence are different. We will explain a relation between them, by using a natural parameter in the equations for Sp(2n,R)-Higgs bundles and making it go to infinity.