TITLES AND ABSTRACTS

Alex Bene:

"Fatgraphs and Representations of the Mapping Class Group"

Abstract: In this talk, I will describe the general framework of how certain combinatorial objects called fatgraphs can be employed to study the mapping class group of a surface. I will then give examples of applying this correspondence to extend and explore several known representations of the mapping class group. This will include reporting on joint works with J. E. Andersen, N. Kawazumi and R. C. Penner.

Alexey Bondal:

"Symplectic Groupoids"

Abstract: We will explain what symplectic groupoids are. We will describe examples of symplectic groupoids that are related in a natural way to non-symmetric bilinear forms and explain how they are related to Poisson-Lie groups. We will outline their quantization.

Aasa Feragen:

"Topological Stability of Smooth Maps"

Abstract: A smooth map $f:M \to N$ is said to be topologically/smoothly stable if there exists a neighborhood $\mathcal{U}$ of f in $C^\infty(M,N)$ such that for each $g \in \mathcal{U}$ we can find homeomorphisms/-diffeomorphisms h and k of M and N such that $g = k \circ f \circ h$. Smoothly stable maps are well understood, and they are generic when the dimensions of source and target belong to the "nice dimensions". Outside the nice dimensions, however, smoothly stable maps are no longer generic – but the topologically stable ones are, and many of the properties of smoothly stable maps extend to the topologically stable maps as well.
We study the topological stability of smooth maps $f:M \to N$ which are of finite singularity type. When topological stability fails we study the unfoldings of maps whose germs at the instability locus are weighted homogeneous. The existence and construction of a minimal smoothly stable unfolding of f is well-known, but what can we say about its topologically stable unfoldings? In examples we can show that the smoothly stable unfolding retracts nicely onto its non-negatively weighted part, which then turns out being of a topologically stable unfolding of f, and we conjecture that this will hold in general. Such results would facilitate the use of a transversality characterization of topologically stable maps, by du Plessis and Wall (1995).

Jens Fjelstad:

"Conformal Field Theory as a Frobenius Algebra"

Hajime Fujita:

"Quantum Clebsch-Gordan Condition and Heisenberg Action"

Abstract: In this talk we construct a certain Heisenberg action starting from a trivalent graph and its admissible weights. Our construction gives a combinatorial realization of the Heisenberg action on the space of conformal blocks studied by Andersen and Masbaum.

Niels Leth Gammelgaard:

"Hitchin's Connection in Half-Form Corrected Quantization"

Thomas Kragh:

"Finite Reduction of Floer Homology in Cotangent Bundles"

Jens Christian Larsen:

"Groups of Hyperbolic Isometries Preserving a Quadratic Form"

Abstract: Let $Q_p=diag(1,1,-p)$ be a quadratic form. For a natural number p the group of integer valued 3x3 matrices that preservs Q_p is a non-free discrete group of hyperbolic isometries. When p is prime there is an effective way to construct elements of this group and to construct a fundamental domain for the group's action on hyperbolic 2-space.
The talk will focus on presenting the properties of the groups and prove following theorem: When p is congruent to 3 modulo 4 the quotient space is a marked sphere.

Cristina Martínez:

"Torsion Points of Jacobians Acting on Moduli Spaces of Vector Bundles"

Gwénaël Massuyeau:

"On the Torelli Lie Algebra and the Lie Algebra of Homology Cylinders"

Abstract: Let S be a compact connected oriented surface with one boundary component. The mapping cylinder construction defines an embedding of the Torelli group of S into the monoid of homology cylinders over S. In a joint work with Kazuo Habiro, we give a combinatorial description of this map at the level of graded Lie algebras: This is achieved by combining Hain's infinitesimal presentation of the Torelli group with the Le-Murakami-Ohtsuki invariant of homology cylinders or, dually, with clasper surgery. Our description involves the associative algebra of "symplectic Jacobi diagrams" whose multiplication is a diagrammatic analogue of the Moyal-Weyl product.

Jean-Baptiste Meilhan:

"Borromean Surgery Formula for the Casson Invariant"

Abstract: Every oriented integral homology 3-sphere can be obtained from S^3 by a finite sequence of Borromean surgeries.
We give an explicit formula for the variation of the Casson invariant under such a surgery move. The formula involves simple classical invariants of the link, namely the framing, linking number and Milnor's triple linking number.
We also show a more general statement, for n independent Borromean surgeries.
The proofs mix elements of knot theory and the (more recent) notion of finite type invariants.

Robert Penner:

"Asymptotics of the Cell Decomposition of Teichmüller Space"

Abstract: Recent joint work with Greg McShane has answered the following question: Which curves can be short in a given cell of the decomposition of Teichmüller space? The answer involves a new combinatorial structure called "screens on fatgraphs" as we shall describe. The techniques of proof involve Fock's path-ordered product expansion of holonomies, Ptolemy transformations, and the triangle inequalities. This is a main step in giving a combinatorial description of the Deligne-Mumford compactification of moduli space which we shall also discuss as time permits.

Nuno Miguel Romão:

"Spectral Data of Singular Monopoles"

Abstract: Magnetic monopoles (solutions to the Bogomol'nyi equation on a 3-manifold) develop "abelian" singularities in rather general situations. At first, this was seen as a somewhat embarrassing fact by physicists, yet singular monopoles have become important in recent applications of gauge theory to geometry. In this talk, I shall review some basic facts about monopoles in euclidean space, and explain how they are described by certain compact curves embedded in a complex surface equipped with a singularity divisor. I will also illustrate how these data can be obtained for monopoles of "nonabelian" charge 2, for which the underlying curves are elliptic.

Guillaume Théret:

"Pseudo-Anosov Maps, Geodesic Laminations and Stretches"

Abstract: I will discuss the connection between the action of pseudo-Anosov mapping classes on Teichmüller space and stretch deformations on that space. This discussion will essentially take place in the hyperbolic disk, in Nielsen's spirit.

Roland van der Veen:

"The Volume Conjecture for Knotted Trivalent Graphs"

Abstract: We propose to extend the Volume Conjecture to knotted trivalent graphs (KTGs) and show that it holds for all augmented KTGs. By an augmented KTG we mean a KTG to which a number of unknotted, mutually unlinked components have been added in a specific way.

Rasmus Villemoes:

"Degree One Cohomology of the Mapping Class Group with Twisted Coefficients"

Abstract: We consider the mapping class group Γ of a compact surface of genus g, possibly with boundary. There is an action of the mapping class group on the moduli space $\mathcal{M}$ of flat $SL_2(\mathbf{C})$-connections over the surface, making the space $\mathcal{O}(\mathcal{M})$ of algebraic functions on the moduli space a Γ-module. We prove that the first cohomology group of Γ with coefficients in $\mathcal{O}^*(\mathcal{M})$ is non-trivial, where $\mathcal{O}^*(\mathcal{M})$ is the algebraic dual of $\mathcal{O}(\mathcal{M})$. In fact we prove that the cohomology may be expressed as a direct product of finite-dimensional components, and we give an algorithm for computing the dimensions of these. At the end, we give an example showing that in the case of a closed torus, also the cohomology with $\mathcal{O}(\mathcal{M})$ as coefficients is non-trivial.

Emmanuel Wagner:

"Virtual Diagrams and Triply Graded Link Homology"

Abstract: We construct a triply graded link homology which categorifies the quantum specializations of the HOMFLY-PT link polynomial. We explain how to recover the bigraded link homology introduced by Khovanov and Rozansky and how to use the additional grading.