



Workshop on Geometry and Topology

Thursday, 10 March, 2016

Room 210, Run Run Shaw Building, HKU

10:00 – 11:00 **Philip Boalch** (Université de Paris-Sud)

Non-perturbative symplectic manifolds and non-commutative algebras

Abstract: From a moduli-theoretic viewpoint the irregular Riemann-Hilbert correspondence can be viewed as a machine that takes as input a simple “additive” symplectic/Poisson manifold and outputs a more complicated “multiplicative” symplectic/Poisson manifold (a wild character variety). Since 2000 (arXiv:math/0011062) it has been understood that this machine returns the dual Poisson Lie group G^* (the nonlinear Poisson manifold underlying the Drinfeld-Jimbo quantum group) when the input is the linear Poisson manifold $\text{Lie}(G)^*$. In this talk I will describe some more recent (and more complicated) examples. For example in 2008 (arXiv:0806.1050) it was understood that a large class of Nakajima quiver varieties (often far from the affine case) can be taken as input. If we look at their non-perturbative versions (arXiv:1307.1033) we see a generalisation of the theory of multiplicative quiver varieties. In turn this yields some new noncommutative “fission algebras” which generalise the deformed multiplicative preprojective algebras of Crawley-Boevey and Shaw (simple cases of which contain the generalised double affine Hecke algebras of Etingof-Oblomkov-Rains). We obtain new noncommutative algebras even in the case of the triangle and the doubled edge (affine A_2 and affine A_1). Much of this work involves the wild extension (started in 2002 arXiv:0203161) of the quasi-Hamiltonian geometry of Alekseev-Malkin-Meinrenken.

Coffee / Tea Break

11:30 – 12:30 **Xiaomeng Xu** (University of Geneva)

Stokes phenomenon and quantum groups

Abstract: In this talk, we will compare two new approaches to the Ginzburg-Weinstein linearization theorem, i.e., Boalch’s approach using certain irregular Riemann-Hilbert correspondence, and Enriquez-Etingof-Marshall’s approach based on the theory of dynamical r -matrices and quantization of Lie bialgebras. Motivated by this comparison, we will briefly explain how Drinfeld’s quantum groups can be constructed via Stokes phenomenon.

Lunch Break

14:30 – 15:30 **Florian Naef** (University of Geneva)

Formality of the Goldman-Turaev Lie bialgebra in genus 0

Abstract: Let Σ be an oriented closed surface of genus g with n marked points. The vector space spanned by the homotopy classes of free loops on Σ carries a canonical structure of Lie bialgebra. The Lie bracket and cobracket were discovered by Goldman and Turaev, respectively. Moreover, the Goldman-Turaev Lie bialgebra is canonically filtered. We are addressing the formality question for this Lie bialgebra, that is, finding an isomorphism to its associated graded.

For the case of $g = 0$, we settle the formality question in the positive. In more detail, we show that each solution of the Kashiwara-Vergne problem induces an isomorphism between the GT Lie algebra and its associated graded. In the proof, we are using the Van den Bergh formalism of double brackets and the theory quasi-Poisson spaces.

Coffee / Tea Break

16:00 – 17:00 **Johnathan Bock** (University of Pennsylvania)

Residues of holomorphic foliations revisited

Abstract: Using the description of the derived category of coherent sheaves on a complex manifold as well as some ideas from derived geometry, we look at Baum and Bott’s theorem on residues of singular holomorphic foliations.

All are Welcome