Institute of Mathematical Research
HKU

Department of Mathematics
HKUST

Department of Mathematics and IMS
CUHK

Hong Kong Geometry Colloquium
November 8, 2025 (Saturday)
Room 210, Run Run Shaw Bldg., HKU

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Professor Shahn Majid

School of Mathematical Sciences

Queen Mary University, London

Finite group and braided Lie algebras

9:30 – 10:30am

We revisit the notion of braided-Lie algebras introduced 30 years ago as an abstract Lie object generating quantum groups such as $U_q(g)$. The notion makes sense in any braided category and consists of a coalgebra L in the category and a Lie bracket $[,]$ from the tensor square of L to L obeying certain axioms such as a pentagonal Jacobi identity. Every braided-Lie algebra gives rise to a solution of the braided-relations on L called its fundamental braiding. In the category of sets with trivial braiding, a braided-lie algebra reduces to a rack and the fundamental braiding is the rack braiding. This includes the case of a generating conjugacy class as a `Lie algebra of a finite group and we update on some conjectures about the braided Killing form in this case. Among new results with McCormack, we address a long-standing issue that the braided-enveloping bialgebra $U(L)$ is never a braided-Hopf algebra and we provide a notion of antisymmetry for the bracket. Braided-Lie algebras are also known to arise as the duals of the invariant 1-forms for a bicovariant calculus on a coquasitriangular Hopf algebra and we describe `braided racks that arise in this way from the Drinfeld codouble of a finite group.

10:30 – 10:45am *Tea Break*

Professor Xiaomeng Xu

Beijing International Center for Mathematical Research

Peking University, China

The quantum Riemann-Hilbert-Birkhoff maps

10:45 – 11:45am

This talk gives an introduction to the Stokes phenomenon and the Riemann-Hilbert-Birkho (RHB) map of meromorphic connections at a k-th order pole. The RHB map is a local analytic Poisson/symplectic isomorphism between the de Rham and Betti moduli spaces. It then introduces the quan- tum Stokes matrices at a k-th order pole, and explains how they give rise to a quantization of the RHB map. In the case of second order pole, the WKB approximation of the quantum Stokes matrices are described by the crystal structures of quantum groups.

This meeting is hosted by the Institute of Mathematical Research, HKU.

All are Welcome