Workshop on Representation Theory, Geometry & Combinatorics

Organizer: Mark Haiman

Monday June 2–Friday June 6, 9:30–5:00pm, Bechtel 120ABC

David Hernandez, CNRS, Versailles

Geometric small property, Kirillov-Reshetikhin conjecture, and double affine quantum algebras

In this series of lectures we will explain how a certain general regularity property of representations of quantum affine Kac-Moody algebras allows to solve two problem of different nature. The first problem is the Nakajima geometric smallness problem for resolutions of quiver varieties (on the small property in the sense of Borho-MacPherson of these projective morphisms). The second problem is the Kirillov-Reshetikhin conjecture (on character formulas and branching rules for certain simple representations of quantum affine Kac-Moody algebras). For both proofs the crucial point is a "cone property" for Frenkel-Reshetikhin q-characters that we establish in general.

In the spirit of the generalization of representation theory of affine Hecke algebras to Cherednik algebras, we will also explain how our results are also extended to quantum double affine (toroidal) algebras, in particular by construsting a fusion tensor category associated to the Drinfeld "coproduct."