Center for Mathematics at Notre Dame

THEMATIC PROGRAM ON GEOMETRIC REPRESENTATION THEORY
AND SYMPLECTIC VARIETIES

Graduate Student and Postdoc Summer School

Monday June 18 – Friday June 22, 2018
University of Notre Dame

ABSTRACTS

All talks will be held in 127 Hayes-Healy

Tom Braden (University of Massachusetts - Amherst)
Introduction to category O and symplectic duality in the hypertoric setting.

Hypertoric varieties provide one of the most accessible ways to explore phenomena in the representation theory of symplectic varieties. They share many properties with their more complicated cousins such as nilpotent cones and Nakajima quiver varieties, but the proofs are much more explicit and elementary. Topics we will cover include the basic geometry of affine and smooth hypertoric varieties, their quantizations, localization, and category O and its most important properties: the highest weight structure and the Koszul duality between symplectic dual pairs of hypertoric varieties.

Victor Ginzburg (University of Chicago)
Symplectic algebraic geometry and quantization.

In these lectures I plan to cover the following topics: Basics of symplectic and Poisson geometry, quantum and classical Hamiltonian reduction, overview of GIT. An important example of quiver varieties. Then, we will discuss more advanced topics: Poisson deformations, symplectic resolutions and their quantizations.

Kevin McGerty (University of Oxford)
Localization theory in positive characteristic.

We will begin by reviewing some basic features of the representation theory of algebraic groups in positive characteristic, including the technique of Frobenius splitting. We will then discuss some of the work of Bezrukavnikov and collaborators on derived localization for representations of Lie algebras in positive characteristic and, time permitting how these ideas give techniques for studying derived equivalences both in positive characteristic and characteristic zero.

Ben Webster (University of Waterloo)
Coulomb branches and their applications.

My talks will focus on understanding Coulomb branches, as defined by Braverman, Finkelberg and Nakajima. This is a new and interesting family of noncommutative algebras that includes many interesting examples, such as Cherednik algebras, W-algebras, hypertoric enveloping algebras, etc. I'll discuss geometric and algebraic definitions of these algebras, the analysis of their representation theory, physical motivation and applications to constructions of tilting vector bundles.