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<th>Date</th>
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<td>Thursday, January 28, 2016</td>
<td>5:10-6:00pm</td>
<td>Student Representation Theory -- Gabriel Frieden (University of Michigan)</td>
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<td>Thursday, February 04, 2016</td>
<td>5:10-6:00pm</td>
<td>Student Representation Theory -- Drew Ellingson (University of Michigan)</td>
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<td>Thursday, February 11, 2016</td>
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<td>Student Representation Theory -- Visu Makam (University of Michigan)</td>
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<td>Thursday, February 18, 2016</td>
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Abstracts

Student Representation Theory
Thursday, January 28, 2016, 5:10pm-6:00pm
3096 East Hall
Gabriel Frieden (University of Michigan)

Representations of Affine Lie Algebras

For each simple Lie algebra, there is an associated infinite-dimensional "affine" Lie algebra. For example, in the case of the Lie algebra sl_n (the set of trace zero n x n matrices with entries in \( \mathbb{C} \)), the corresponding affine Lie algebra \( \hat{\text{sl}}_n \) can be realized as the set of trace zero n x n matrices with entries in the ring of Laurent polynomials \( \mathbb{C}[t,t^{-1}] \) (plus a little bit of extra stuff).

In this talk, I will describe two different ways of thinking about affine Lie algebras, and then I will discuss two important categories of representations of these algebras: the highest weight representations, which are analogous to the irreducible representations of simple Lie algebras, and the level zero representations, which are an "affine" phenomenon.

Student Representation Theory
Thursday, February 04, 2016, 5:10pm-6:00pm
3096 East Hall
Drew Ellingson (University of Michigan)

Quiver Representations

A quiver is a finite directed graph with allowed multi-edges and self-edges. By choosing the correct definitions, it is possible to build a representation theory of quivers in analog to the representation theory of finite groups. In this talk, we give basic definitions and examples of quiver representations, and discuss how these objects arise naturally in several disparate areas of mathematics. If time permits, we will discuss Gabriel's Theorem, which gives a condition on quivers of finite representation type in terms of extended Dynkin graphs.

Student Representation Theory
Thursday, February 11, 2016, 5:00pm-6:00pm
3096 East Hall
Visu Makam (University of Michigan)

Quiver representations II: Gabriel and Kac's theorems

In last week's talk, we ended with Gabriel's theorem on classification of quivers of finite type. I'll sketch a proof, since much of it can be proved by some very concrete observations. I will then explain the finite-tame-wild trichotomy and describe Kac's theorem on the indecomposable representations for a general quiver. Most of the talk will rely heavily on explicit examples.
Take a unitary matrix uniformly (with respect to left multiplication) at random. How are the eigenvalues distributed around the circle? We shall answer this question and as a corollary, prove the Weyl character formula for semisimple Lie algebras over the complex numbers.

Beilinson-Bernstein localization connects the representation theory of a semisimple lie algebra to geometric objects on flag varieties. We will introduce D modules, state the localization theorem, and give examples and applications.