Math 295 - Mathematics Colloquium

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Endomorphisms and Automorphisms of Varieties

Abstract:
Jointly with Rafael Andrist we have recently shown that an affine variety $X$ is determined, up to base field automorphisms, by the abstract semigroup of endomorphisms, provided $X$ contains a copy of the affine line.

A more interesting question is how much information about $X$ can be retrieved from the group $\text{Aut}(X)$ of automorphisms of $X$. This group has the structure of an ind-group, i.e. an infinite dimensional algebraic group, a concept introduced by Shafarevich in 1966. It was recently studied by several authors, in particular in the case of affine $n$-space $A^n$. However, not much is known about this group in general, but there are a number of very interesting examples and conjectures.

In connection with the question above, we can prove the following.

Theorem. If $X$ is a connected affine variety such that $\text{Aut}(X)$ is isomorphic to $\text{Aut}(A^n)$ as an ind-group, then $X$ is isomorphic to $A^n$ as a variety.

We will explain these concepts and results, and describe some recent development.

Host: Nolan Wallach

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