Courant Institute of Mathematical Sciences
Mathematics Colloquium
April 15, 2013

Speaker: Christian Bohning, Universitat Hamburg

Title: Rationality problems: a bird's eye view

Abstract:

Rational varieties and varieties close to rational ones are probably among the most basic objects in algebraic geometry, Diophantine geometry and number theory; at the same time, they are the ones that occur most frequently in applications such as computer aided geometric design and geometric modeling or robotic motion planning. In this survey talk, after introducing the basic definitions, mentioning some guiding open problems and foundational results, we will focus on two topics: linear group quotients and categorical approaches to the rationality problem for cubic fourfolds. The former constitute an important class of geometric models, and we will discuss several recent results concerning them. We will then explain the consequences of the existence of phantom categories and the failure of the Jordan-H"older property for semiorthogonal decompositions in derived categories for the rationality problem for cubic fourfolds.