

Department Colloquium

Speaker: Brent Pym, Oxford University

Date: Friday, January 8

Time: 2:30 p.m.

Place: Jeffery 234

Title: Deformation quantization of Poisson brackets on projective space

Abstract: Deformation quantization is the process by which the phase space of a classical mechanical system is deformed in order to produce its quantum mechanical analogue. In mathematical terms, we take a commutative ring and deform the product, making it noncommutative while preserving associativity. To first order, such a deformation is given by a classical Poisson bracket. A theorem of Kontsevich shows that, in principle, the higher order corrections may be computed from knowledge of the Poisson bracket alone. But in practice, the formula is too complicated to use directly and must be supplemented by a detailed geometric understanding of the given Poisson bracket. I will give an introduction to the subject, and describe several recent results concerning the algebraic geometry and deformation quantization of holomorphic Poisson brackets on projective space. For the projective space of dimension three, we obtain the solution of a problem in ring theory that has been open since the late 1980s: the classification of Artin-Schelter/Calabi-Yau deformations of the polynomial ring in four variables.