# BI-CO MATHEMATICS COLLOQUIUM

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## Institut des hautes études scientifiques (IHÉS)

*"Flips, Flops, and Surgery for Rings and Modules"*

### Monday, November 6, 2017

Talk at 4:00 – Park 338
Tea at 3:30 – Park 339, Math/Physics Lounge

**Abstract:**
Algebraic geometry is the study of solutions sets of polynomial equations, similar to how linear algebra studies the solution sets to systems of linear (degree one) equations. In contrast to other types of geometry, such solution sets are often quite rigid and don't bend, stretch, or deform easily, which makes classification problems quite delicate.

I'll review some methods introduced in the 90's by Thaddeus and Wlodarczyk which supply algebraic geometry with some general cut and paste type techniques, and which boil down to some surprisingly simple manipulations with commutative rings. In addition, I'll discuss efforts by the speaker (joint with M. Ballard and D. Favero) to revisit these methods by "closing up a circle action at infinity". Time permitting, I'll mention applications of this to some standing conjectures of Bondal-Orlov and Kawamata that concern how certain geometric invariants are preserved under such surgeries.

No prior background in algebraic geometry will be assumed, although some prior exposure to abstract algebra and linear algebra will be comforting.

**BRYN MAWR COLLEGE**