

Book of Abstracts

Friday, October 9, 2026

New Developments in Birational Geometry

Simons Center for Geometry and Physics (SCGP)

Schedule of Talks

- **09:30–10:20** Maxim Kontsevich (IHÉS)
- **10:30–11:20** Jiaji Cai (Stony Brook University)
- **13:00–13:50** Daniel Pomerleano (University of Massachusetts Boston)
- **13:55–14:45** Leonardo F. Cavenaghi (IMI-BAS and ICMS-Sofia)
- **14:50–15:40** Andrew Harder (Lehigh University)
- **16:20–17:10** Ludmil Katzarkov (SCGP)

Abstracts

Maxim Kontsevich (IHÉS)

Chow atoms

The natural habitat for Gromov–Witten invariants of algebraic varieties is Chow groups, not just cohomology groups. Moreover, homology classes of curves should be enhanced to elements of the group of connected components of the Chow group of 1-cycles. I will propose natural generating series for Chow-enhanced invariants and discuss their applications to the theory of atoms. In the case of Calabi–Yau 3-folds, one also obtains new series deforming the usual genus-zero potential, associated with elements of the third integral homology.

Andrew Harder (Lehigh University)

Mirror symmetry and atoms

I'll describe how atoms seem to appear in the LG mirrors of weak Fano threefolds and how this, along with a deformation argument, informs proofs that all members of many smooth families of weak Fano threefolds are irrational. I'll explain how similar arguments can be used to show that 18 of the 22 families of weighted complete intersection Fano fourfolds contain no rational members. This is joint with Jiaji Cai and Sukjoo Lee.

Daniel Pomerleano (University of Massachusetts Boston)

Exotic affine spaces and Floer theory

I will explain an application of Floer theory and mirror symmetry to several questions in affine algebraic varieties and Stein geometry. Results come from joint work in progress with Denis Auroux and Shaoyun Bai.

Leonardo F. Cavenaghi (IMI-BAS and ICMS-Sofia)

A quantum connection approach to rationality

In this talk, we explain how the quantum connection coming from the A-model F-bundle can be used to define new birational invariants related to the theory of Hodge atoms. We also propose a conjectural formula relating them to the upper Serre dimension of the Kuznetsov component for an appropriate SOD in the case of complete intersections on projective spaces. Applications include nonrationality of ordinary smooth Gushel-Mukai threefolds, and ordinary smooth Gushel-Mukai threefolds cross $\mathbb{P}^1$. The key argument depends on Remark 3.14 in the foundational paper by Katzarkov–Kontsevich–Pantev–Yu, which we explain how to prove. This comes from joint work with L. Carazolli, L. Katzarkov, M. Kontsevich, and P. A. M. Martins.

Jiaji Cai (Stony Brook University)

Symplectic irrationality via Gromov–Witten invariants

I will explain how an atom theoretic approach to Gromov-Witten theory can be used to establish symplectic irrationality for smooth complete intersections in projective space.

Ludmil Katzarkov (SCGP)

MMP and Atoms

In this talk, we will discuss the interplay of MMP and the theory of atoms.