

Fall 2025 Colloquia

Date: Wednesday, September 17th, 2025 from 4:00 - 5:00pm

Speaker: Daniel Álvarez-Gavela (Brandeis University)

Title: Does the Symplectic Topology of a Cotangent Bundle Remember the Smooth Topology of the Base?

Abstract: If two smooth manifolds are diffeomorphic, then their cotangent bundles are symplectomorphic, i.e. they are not just equivalent as smooth manifolds but also as symplectic manifolds. Whether the converse holds is a major open problem in symplectic topology. I will give a survey of known results in this direction, as well as for related problems such as the nearby Lagrangian conjecture, and present some recent progress joint with M. Abouzaid, S. Courte and T. Kragh.

Date: Wednesday, September 24th, 2025 from 4:00 - 5:00pm

Speaker: Agniva Roy (Boston College)

Title: Fillings of Contact manifolds -- From symplectic to Stein

Abstract: Contact and symplectic geometry is a branch of mathematics that is born from classical mechanics and optics. Contact structures arise on the boundary of symplectic domains, and in some cases this symplectic structure comes associated with a Stein structure. There are natural inclusions on the notion of fillability of a contact manifold, with a Stein filling being the strongest notion -- in this case the contact manifold is the sublevel set of a Stein manifold, a complex manifold that properly embeds into standard complex space for high enough dimension. The fillability of contact 3-manifolds has been studied using pseudoholomorphic foliations, as well as techniques coming from algebraic geometry, singularity theory, and low-dimensional topology. In this talk I will give an overview of these ideas and present some of my own work, joint with Hyunki Min (UGA) and Luya Wang (IAS), in studying and classifying fillings using a new technique called spinal open books.

Date: Wednesday, October 22nd, 2025 from 4:00 - 5:00pm

Speaker: Nathan Chen (Harvard University)

Title: On the complexity of curves on very general hypersurfaces

Abstract: In this talk, we will explore several invariants for curves on (very) general hypersurfaces and complete intersections, which will have applications to measures of irrationality. This is joint work with Ben Church and Junyan Zhao.

Date: Wednesday, November 5th, 2025 from 4:00 - 5:00pm

Speaker: Robin Young (UMass Amherst)

Title: Shock Waves and Sound Waves in the Compressible Euler Equations

Abstract: I will review the Euler equations modeling compressible gas dynamics from an historical perspective, including the development of the theory of sound waves and shock waves, including a paradox identified by Stokes. I will then present a modern treatment of the equations and will describe some recent results, including the generic existence of nonlinear sound waves, which provides a satisfactory resolution of Stokes' paradox.

Date: Wednesday, November 12th, 2025 from 4:00 - 5:00pm

Speaker: Hansol Hong (Yonsei University, Korea)

Title: Local Mirror Symmetry via Koszul Duality in Lagrangian Floer Theory

Abstract: I'll apply Koszul duality to the Fukaya A-infinity algebra of a compact Lagrangian L to investigate several questions in mirror symmetry, focusing on a localized mirror constructed intrinsically from the Floer theory of L . This gives a natural equivalence between the local Fukaya category (generated by L) and the category of finite-dimensional representations of the quiver algebra that is Koszul dual to $CF(L, L)$. Furthermore, under suitable finiteness conditions, the Hochschild invariants of the mirror can be canonically recovered from the Lagrangian Floer complex of L . As an application, we establish closed-string mirror symmetry for punctured Riemann surfaces whose mirrors arise as NC crepant resolutions of three-dimensional toric Gorenstein singularities.