

**Five-year impact statement**  
**Program on Homological Mirror Symmetry**

Retrospectively, the program marked a turn in the subject, away from proving the Homological Mirror Symmetry conjecture for specific classes of manifolds, and towards new directions, such as:

*Functoriality and gluing for Fukaya categories*, allowing one to build a more systematic picture of Homological Mirror Symmetry. “The main outcome of my IAS visit was to shift focus from explicit calculations to [more structural questions](#)” (Denis Auroux). This tendency is clearly visible in Abouzaid’s work on [family Floer homology](#), and Ganatra-Pardon-Shende’s on Liouville sectors. “Both my collaborators Sheel Ganatra and Vivek Shende spent time at the program. We developed the key ideas of our [paper](#) *sectorial descent for wrapped Fukaya categories*. I taught a mini-course focused on Liouville sectors and locality in Fukaya categories” (John Pardon).

*The interaction of Homological Mirror Symmetry with other geometric methods*, such as tropical and nonarchimedean geometry, which appears in various forms in the work of Arguz, Mak, Ruddat, Keel, Yu, Sheridan. . . ; and, in a different direction, the theory of constructible sheaves. “I gave a mini-course on the non-archimedean approach to mirror symmetry, and Sean Keel gave one on theta functions and cluster algebras. It was a great opportunity for us to discuss relations between the non-archimedean approach and the scattering-diagram approach, and we managed to [combine our ideas](#)” (Tony Yue Yu).

**Postdoc: Hülya Argüz (PhD 2016).** “Interacting with experts in mirror symmetry, both from the algebro-geometric and the symplectic side, enabled me to branch out. Many of my articles written later on address questions that hit my thoughts during the program. I also had the chance to engage in activities in neighbouring universities, and to give seminar talks [...] I felt visible, and at the end, I left campus armed with new knowledge, skills, and enthusiasm.”



Hülya Argüz

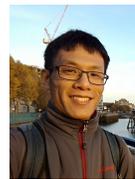
**Collaborators: Nicholas Sheridan (PhD 2012) and Sheel Ganatra (PhD 2012).** Sheridan: “During the IAS program, I learned about the Gamma conjectures in mirror symmetry; the collaboration leading to the paper [The Gamma and Strominger-Yau-Zaslow conjectures](#) (with Abouzaid, Ganatra, and Sheridan) was initiated by Hiroshi Iritani’s visit to the IAS. We are generalizing these results in ongoing work, and a side project has grown out of it which I plan to give to a PhD student.” Ganatra: “I studied the origin of interesting constants, such as zeta values, in mirror symmetry. With Abouzaid, Iritani, and Sheridan, we proposed the first geometric explanation of such phenomena. I have continuing conversations about pushing these techniques further.”

The program was largely structured around mini-courses and reading/working groups organized by participants. The reading groups seem to have made a particularly deep impact, including on graduate students:

- “I ran a seminar on symplectic methods in knot invariants. We had lots of involvement from graduate students and postdocs” (John Pardon).
- “I learned about mirror symmetry for K3 surfaces, through the reading group I helped run. This was important for my [paper](#) *Symplectic topology of K3 surfaces via mirror symmetry*” (Nick Sheridan).
- “Several graduate students were active in IAS reading groups (Sara Venkatesh, Umut Varolgunes, Baris Kartal). Subsequently, I began a collaboration with Venkatesh and Yuan Gao. I also organized, and learned quite a lot from, a reading group about the Gamma conjectures in mirror symmetry” (Sheel Ganatra).
- “Material I learned from the Hodge-to-de Rham working group has been very useful in my research” (Tony Yue Yu).

**Graduate student: Sara Venkatesh (PhD 2018).** “The IAS 2016-17 program gave me unique access to a large community of experts in Homological Mirror Symmetry. Joining this community sparked exciting connections between my thesis work and mirror symmetry, leading to a new avenue of problems I am still actively exploring, and it laid foundations for collaborations that I continue to maintain.”

**Collaborators: Cheuk-Yu Mak (PhD 2016) and Helge Ruddat (PhD 2008).** Mak: “The program at IAS was undoubtedly the most important period for my entire research career so far. I started a [collaboration](#) with Helge Ruddat [...] I met a lot of people in field, including Ivan Smith (who became my mentor at Cambridge, where we collaborated on a [project](#) using what I learnt in one of the IAS seminars) and Nick Sheridan (my current mentor).” Ruddat: “[The program] introduced me to Cheuk-Yu Mak, and to the idea that the mirror duals of the lines on the quintic should produce interesting lens spaces. Cheuk Yu and I began to work on this problem, which took two years to complete. I talked to Mohammed Tehrani and Mohammed Abouzaid about maximal degenerations from the symplectic perspective, and it informed my work with Cheuk Yu.”



Cheuk-Yu Mak



Helge Ruddat