

# Computational Interactions between Algebra, Combinatorics, and Discrete Geometry



**February 10 - 14, 2025**

## Scientific Overview

Over the last half a century, Algebra, Combinatorics, and Discrete Geometry have undergone transformations due, in part, to the connections each of these areas have to other fields and the growth of computational approaches used in the study of theoretical mathematics. These areas are closely intertwined, with various algebraic, combinatorial, and geometric objects playing pivotal roles. These objects include monomial ideals, affine semigroup rings, Stanley-Reisner rings, Ehrhart rings, toric rings, Cox Rings, Chow Rings, Gröbner bases on the algebraic side; graphs, matroids, simplicial complexes, polytopes and polyhedral complexes, convex bodies, posets, lattices, arrangements of hyperplanes on the combinatorial and discrete geometry side.

As researchers continue to create new connections and build bridges between these areas, computational tools in the field have significantly evolved. The workshop's primary goal is to deepen the understanding of the interconnectedness between algebra, combinatorics, and discrete geometry, with a strong emphasis on the importance of computational tools. Furthermore, this workshop will serve as a systematic attempt to facilitate the collaboration between mathematicians in each of these areas who might not have the opportunity to regularly collaborate or who are interested in expanding their mathematical toolbox to include tools from each of the three main areas to their current work. It is our hope that by bringing together mathematicians with different approaches to their mathematics, there will be unexpected connections made.

## Participation

Additional information about this workshop including links to register and to apply for funding, can be found on the webpage listed below. Encouraging the careers of women and minority mathematicians and scientists is an important component of IPAM's mission, and we welcome their applications.

## Organizers

**Matthias Beck** (San Francisco State University), **Daniel Eman** (University of Hawaii at Manoa), **Selvi Kara** (Bryn Mawr College), **Andrés Vindas Meléndez** (Harvey Mudd College)

## Speakers

**Ayah Almousa** (University of South Carolina)  
**Silviana Amethyst** (University of Wisconsin - Eau Claire)  
**Sarah Brauner** (University of Quebec Montréal)  
**Anastasia Chavez** (Saint Mary's College of California)  
**Lauren Cranton Heller** (University of Nebraska-Lincoln)  
**Michael DiPasquale** (New Mexico State University)  
**Galen Dorpalen-Barry** (Texas A&M - Baylor College of Dentistry)  
**Laura Escobar** (Washington University in St. Louis)  
**Luis Ferroni** (Institute for Advanced Study, Princeton)  
**Martina Juhnke** (Universität Osnabrück)  
**Benjamin Nill** (Otto-von-Guericke-Universität Magdeburg)  
**Sonja Petrovic** (Illinois Institute of Technology)  
**Irem Portakal** (Max-Planck Institute for Mathematics in the Sciences)  
**Felipe Rincon** (Queen Mary University of London)  
**Akiyoshi Tsuchiya** (Toho University)



For more information, visit the program webpage:  
[www.ipam.ucla.edu/ACD2025](http://www.ipam.ucla.edu/ACD2025)