

## **PIs : Kevin McFarland and Aran Garcia-Bellido**

On April 3, 2025, the University of Rochester's Department of Physics and Astronomy hosted the annual CMS Masterclass, offering a full day immersive experience in particle physics for 23 high school students from Canandaigua Academy and York High School. Led by Professor Aran Garcia-Bellido and supported by graduate students Giulia Bulugean, Laurel Carpenter, and Octavio Pacheco, the event introduced students to the fundamentals of particle physics and the Large Hadron Collider (LHC). The day began with a lecture on the CMS experiment at CERN and an overview of how to analyze real CMS data to identify key events involving W, Z, and Higgs bosons.

Students engaged directly in scientific inquiry through hands-on data analysis and small group collaboration. Lab tours provided additional enrichment, including visits to faculty labs focused on nanophysics and quantum computing, as well as a demonstration of a dry-ice cloud chamber to observe beta radiation. With guidance from researchers and lab staff, students developed a deeper understanding of how experimental and theoretical physics intersect.

The day concluded with a live videoconference connecting students to physicists at Fermilab and peers from a Brazilian high school. This international exchange allowed students to present their findings, discuss their analytical approaches, and reflect on the collaborative nature of global scientific research. Coordinated by outreach administrator Constance Jones and supported by teachers Paul Sedita and Peter Apps, the 2025 CMS Masterclass offered students a unique and inspiring entry point into the world of high-energy physics, strengthening our commitment to educational outreach and scientific literacy.