

# Department of Physics and Materials Science



## SEMINAR

Connecting Star Formation, Feedback, and the ISM  
in Galaxy Disks

Dr. Matthew Orr

Rutgers University/Flatiron Institute

**Abstract:** Galaxies like the Milky Way have been forming stars at a consistent rate for billions of years, following the formation of their disks at intermediate redshift ( $z \sim 1-2$ ). In my colloquium, I will present a framework for the regulation of star formation and the general stability of gas disks in spiral galaxies. The interplay of star formation, stellar feedback (e.g., core-collapse supernovae), and gas turbulence is of central importance for understanding how galaxies regulate themselves, and how the empirical scaling relations seen by astronomers arise. I will showcase results from state of the art cosmological zoom-in simulations from the FIRE (Feedback in Realistic Environments) collaboration, comparing them with models of disk regulation and recent observational work. Together, these results paint a dynamic picture of the multiphase interstellar medium in galaxies, that is both self-regulating and constantly on the edge of gravitational fragmentation and collapse.

**Bio:** Dr. Orr is a Flatiron Research Fellow at the Center for Computational Astrophysics at the Flatiron Institute, and jointly appointed at Rutgers University (RU Physics), working closely with Dr. Blakesley Burkhart. His main work involves investigating emergent star formation laws on varying spatial scales in the Feedback in Realistic Environment (FIRE) simulations. This includes studying the dynamical states of the dust and gas in the simulations, and forward modeling observables like CO and C+.

At Caltech, he developed a strong commitment to service, across the institute, and through public outreach events. He held roles at the Institute as the Chair of the Graduate Dean's Advisory Committee, Chair of Strategic Communications & Publications on the Graduate Student Council, on the Graduate Title IX Advisory Board, and served as a graduate representative to Caltech's Board of Trustees on the Student Experience Committee. He has been involved with the Caltech Astro Outreach program, giving monthly public lectures and running more informal events through the Astro on Tap series.

## YOU ARE INVITED!

Friday Oct. 25<sup>th</sup>, 3 - 4 PM Manning Hall 201



Driven by doing.