



Department of Physics and Astronomy

FALL 2025 Colloquium Series

Physics Majors Senior Project Talks

Sac State Physics Majors

Testing SPH Galaxy Feedback Models Through TORUS Synthetic Observations and Comparison with THINGS

- **Justin Alejandro**

To better understand galaxy formation beyond the limits of direct observation, we generate computational simulations of known galaxies. Using the Smoothed Particle Hydrodynamics (SPH) code GASOLINE together with the radiative transfer code TORUS, we model galaxy evolution and produce synthetic observations that replicate how these systems would appear from Earth. The simulated galaxy data from GASOLINE is reformatted and processed through TORUS, allowing us to track how radiation propagates through the system and enabling direct comparison with a galaxy's actual observed data. To ensure observational realism, we apply image smoothing to match the noise characteristics of THINGS datasets. Through this pipeline, we examine how different feedback configurations in the simulations influence observable properties and evaluate which models best align or misalign with the feedback effects seen in real galaxies.

Measuring the Thermal Conductivity of PLA with the 3 ω Method

- **Desmond Wallace**

PLA (polylactic acid) is a popular and accessible 3D printing material, which makes it useful for rapid prototyping and making custom parts. However, the thermal properties of PLA are not well documented below room temperature. Of special interest is the thermal conductivity, which is an important factor in deciding whether a material is suitable for use in cryogenic applications. In this project, we measured the thermal conductivity of PLA by modifying a wire-based 3 ω method to fit cylindrical samples. These thermal conductivity measurements were performed across a range of temperatures, from 300 K (room temperature) down to 4 K.

Thursday, Dec. 4, 2025

4:00 - 5:20PM

MND1015

Open & Free to all students, faculty and public