SACRAMENTO STATE

Department of Physics and Astronomy

SPRING 2026 Colloquium Series

"Exploring Student Graphical Reasoning with Eye-tracking Technology"

Braden Madden

Sac State Physics Major Senior Project Talk

This project applies the Dual Process Theory of Reasoning (DPToR) to testing and eye-tracking data to investigate students' graphical reasoning. DPToR describes how intuition, reasoning, and experience interact to solve problems. To study student problem solving, a series of question pairs were created based on the DPToR. The question pairs consist of two types of questions, screening and target. The screening question serves to demonstrate whether a student possesses an understanding of the physics concept. The target question presents the same physics concept in a novel context determining if the student possesses a mastery over the physics concept. Logistic regression analysis of student test data revealed that the relationship between the screening-target pairs was dependent on the students' gender. To investigate the cause of this, eye-trackers were used to record student problem solving processes during think-aloud interviews. Eye tracking technology gives further insight into how students solve problems that is difficult to attain through interviews alone. A methodology for conducting eye-tracking interviews was successfully developed, used to conduct 10 eye-tracking interviews, and is ready for further use.

***Tuesday, May 12, 2026**

4:00 – 5:20PM

MND1015

Open & Free to all students, faculty and public