PHYSICS COLLOQUIUM:
Strong lensing by galaxies as a probe of cosmic structure

Dr. Anna Nierenberg
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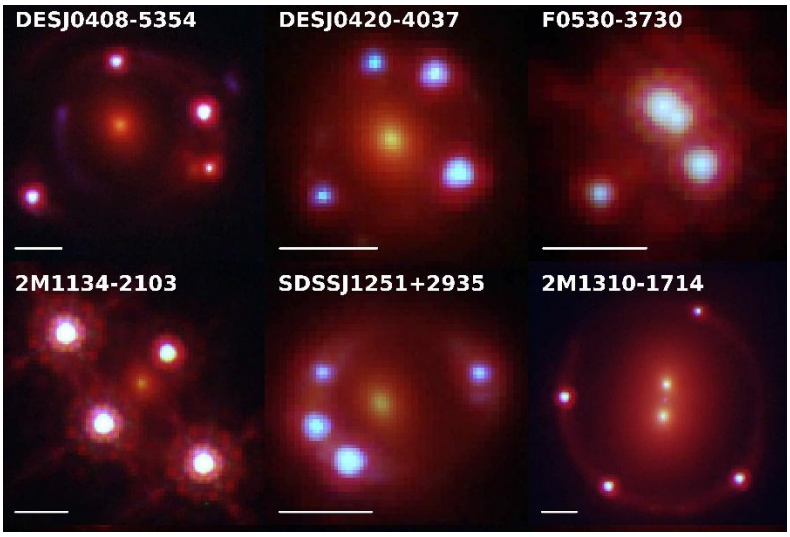
Date:
9/18/2026

Time:
10:30 AM – 11:50 AM

Location:
SSB 130

About The Speaker:

Dr. Nierenberg received her Bachelor's Degree in Physics from UCLA and her PhD in Physics from UC Santa Barbara in 2014. She was a CCAPP postdoctoral fellow at Ohio State, a Chancellor's Fellow at UC Irvine, and a NASA Postdoctoral Program Fellow at JPL before joining the faculty at UC Merced in 2020. In her free time she enjoys hiking in Yosemite.



Abstract:

Understanding the nature of dark matter is one of the major goals of modern physics. A key prediction of all dark matter models is that galaxies exist in extended dark matter halos. The abundance and density profiles of these halos depends directly on the physics of the candidate dark matter model. Strong gravitational lensing enables a direct measurement of these properties for halos at cosmological distances, without requiring halos to contain any baryons at all and thus provides a unique and powerful way to probe the nature of dark matter. I will present our recent results using strongly lensed quasar narrow-line and warm dust emission to constrain the density profiles and mass function of dark matter halos and to provide some of the strongest constraints to date on warm-dark matter, self-interacting dark matter, and fuzzy dark matter models. I will conclude by discussing future prospects for strong gravitational lensing in the era of upcoming large surveys and the next generation of 30 meter class telescopes.

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