Nathaniel Roth

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Research Interests

I develop and perform radiative transfer calculations to connect models of astrophysical phenomena such as tidal disruption events and active galactic nuclei to observations.

Education

University of California, Berkeley — **Berkeley, CA**
Ph.D. Candidate in Physics — *2009 – Present*
Expected Date of Completion: May 2016
Advisor: Daniel Kasen

Yale University — **New Haven, CT**
B.S. in Physics — *2005–2009*
Graduated *summa cum laude*

Honors and Awards (Individual)

2015: Berkeley Distinguished Graduate Fellow (University Award).

2010–2013: Department of Energy Office of Science Graduate Fellowship (National Award).

2009-2010: Frederick and Edith Ehrman Fellowship (UC Berkeley Physics Department Award).

2009: Howard L. Schultz Prize. (Yale University Physics Department Award).

2008: Phi Beta Kappa (National Award).

2007: Benjamin F. Barge Prize (Yale University Mathematics Department Award).

Group Awards

2013: APS Award for Improving Undergraduate Physics Education, as a member of the Compass Project at UC Berkeley (National Award).

Publications

- Four first-author research publications (three reviewed, one submitted for review).
- One additional co-authored research paper.
- One first-authored online column on physics education.

- Please see publication details below.

Research Talks

2016/01: Kissimee, Florida; Dissertation Talk at the 227th meeting of the American Astronomical Society: "Radiatve transfer Models of Tidal Disruption Events: What Sets their Emission Line Strengths and Total Optical Flux."

2015/12: University of Maryland; Astronomy seminar: "The X-ray through Optical Fluxes of Tidal Disruption Events."

2015/12: Columbia University; Astronomy seminar: "The X-ray through Optical Fluxes of Tidal Disruption Events."

2015/11: Harvard-Smithsonian Center for Astrophysics; Small-xcale phenomena seminar: "Radiatve transfer Models of Tidal Disruption Events: What Sets their Emission Line Strengths and Total Optical Flux."

2015/11: California Institute of Technology; TAPIR seminar: "The X-ray through Optical Fluxes of Tidal Disruption Events."

2015/11: The Hebrew University of Jerusalem; Jerusalem Tidal Disruption Workshop: "Modeling the Opptical Emission from TDEs."

2015/10: University of California, Berkeley; Palomar Transient Factory Theory Network Meeting: "Tidal Disruption Events."

2014/12: Harvard-Smithsonian Center for Astrophysics; ITC Luncheon Seminar: "Modeling the optical/UV Emission from Tidal Disruption Events."

2014/10: University of California, Berkeley; Berkeley Fluids Seminar: "Astrophysical radiation-hydrodynamics using Monte Carlo Radiative Transfer."

2014/10: University of California, Berkeley; Astronomy Department Lunch Talk: "Radiative transfer studies of tidal disruption events."

2011/10: The College of Charleston; AGN winds in Charleston: "Anisotropic Dust-Driven Winds Simulated Using Monte Carlo Radiative Transport."

Poster Presentations

2015/01: Seattle, Washington; 225th Meeting of the American Astronomical Society: "Modeling the Optical/UV Emission from Tidal Disruption Events."

2015/01: Seattle, Washington; 225th Meeting of the American Astronomical Society: "A Community of Educators: Professional Development for Graduate Students within the Berkeley Compass Project."

2012/09: UC Berkeley; Star Formation and the Interstellar Medium: Thirty-Five Years Later: "The Dynamics of Ultra-Compact HII regions."

2012/08: Brookhaven National Laboratory; Department of Energy Office of Science Gradu-

ate Fellowship Program Annual Research Meeting: "Radiative Transfer Study of Outflows from Clumpy, Dusty Gas Surrounding Super-massive Black Holes."

2012/01: Austin, Texas; 219th Meeting of the American Astronomical Society: "Dust-Driven Winds from Accreting Super-massive Black Holes Simulated Using Monte Carlo Radiative Transfer."

2011/08: Oak Ridge National Laboratory; Department of Energy Office of Science Graduate Fellowship Program Annual Research Meeting: "A study of Active Galactic Nucleus Feedback Using Monte Carlo Radiative Transfer."

Teaching Experience

2009: Graduate Student Instructor: Physics for Scientists and Engineers.

2010: Graduate Student Instructor: Introductory Physics.

Referee Service

2012/04: Referred one article for *Monthly Notices of the Royal Astronomical Society*.

Physics Education Outreach

2011/08: Instructor for the Berkeley Compass Project Summer Program.

2010/09 – present: Web co-administrator for the Berkeley Compass Project.

Physics Education Publications

2013: Nathaniel Roth, Punit Gandhi, Joel Corbo and Gloria Lee. The Compass Project: Charting a new Course in Physics Education. 2013, Points of View column in Physics Today Online. <http://scitation.aip.org/content/aip/magazine/physicstoday/news/10.1063/PT.4.0003>
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2013: Dimitri Dounas-Fraser, Jacob Lynn, Anna M. Zaniewski, and Nathaniel Roth. Learning About Non-Newtonian Fluids in a Student-Driven Classroom. 2013, The Physics Teacher, Volume 51, Issue 1, page 32.

Grants

2010–2013: Department of Energy Office of Science Graduate Fellowship (National Award; $105k).

2015: UC Berkeley Graduate Assembly Travel Grant (Campus Award; $1500).

Research Publications

- Nathaniel Roth, Daniel Kasen, James Guillochon, and Enrico Ramirez-Ruiz. The X-ray through Optical Fluxes and Line Strengths of Tidal Disruption Events. 2015,

arXiv:1510.08454, submitted to The Astrophysical Journal

- Nathaniel Roth and Daniel Kasen. Monte Carlo Radiation-Hydrodynamics With Implicit Methods. 2015, The Astrophysical Journal Supplement, Volume 217, Issue 1, article id. 9.
- Nathaniel Roth, Steven W. Stahler, and Eric Keto. The Dynamics of Ultra-Compact HII Regions. 2014, Monthly Notices of the Royal Astronomical Society, Volume 438, Issue 2, page 1335.
- Nathaniel Roth, Daniel Kasen, Philip F. Hopkins, and Eliot Quataert. Three-dimensional Radiative Transfer Calculations of Radiation Feedback from Massive Black Holes: Outflow of Mass from the Dusty Torus. 2012, The Astrophysical Journal. Volume 759, Issue 1, Article id. 3
- Richard Easther, Hal Finkel, and Nathaniel Roth. PSpectRe: a pseudo-spectral code for (P)reheating. 2010, Journal of Cosmology and Astroparticle Physics, Issue 10, id. 025.)