Shea Garrison-Kimmel

Postdoctoral Scholar in Numerical Astrophysics

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Summary

I am a numerical astrophysicist: I use simulations to understand how galaxies form, and to uncover what galaxies can reveal about the universe. As an astrophysicist, I wear many hats: I am a scientist, a programmer, a writer, a teacher, a public speaker, an advocate, a mentor, and a modeler. I am thrilled at the chance to apply these talents to a new field, particularly one that pose fresh challenges that I can tackle in an evolving environment. I am therefore seeking a career that will leverage my current abilities in a supportive culture while demanding my continual growth.

Skills

Languages Python, Bash, C

Tools NumPy, Matplotlib, Pandas, Jupyter, MayaVi, LaTeX, PBS/Slurm, Mercurial, Git, HTML, CSS, OpenMP, MPI

Expertise Numerical simulations, Data analysis, 2D and 3D visualization, Public speaking, Academic writing, Physics

Research Experience

Einstein Postdoctoral Fellow & Postdoctoral Scholar — *Pasadena, CA*

Caltech — *Aug. 2015 - present*

- Initialized, ran, and analyzed next-gen hydrodynamic simulations of galaxy formation
- Created the highest-resolution and most physically complete simulation of a galaxy like our own, the Milky Way, ever performed
- Published five first-author papers and collaborated on an additional 27 *N*th author publications
- Developed visualization and analysis tools, such as parallel imaging software, for broad use in the collaboration

Education

Ph.D. & M.S. in Physics & Astronomy — *Irvine, CA*

University of California, Irvine — *Dec. 2010 - June 2015*

- Published four first-author papers and collaborated on 12 additional *N*th author publications
- Created and made publicly-available ∼35 simulated realizations of the local universe, enabling nearly 40 independent papers thus far
- Served as primary mentor to four undergraduate student research projects, all of which resulted in published manuscripts

B.S. – double major in Astronomy and Physics, with a concentration in Computer Science — *Haverford, PA*

Haverford College — *Aug. 2005 - May 2009*

- Graduated with a 3.57 GPA and Honors in Astronomy
- Served as a tutor in the Physics Clinic as a junior and senior, providing homework help to younger students
- Studied analytic descriptions of the Earth's response to a gravitational wave as a senior thesis

Fellowships & Awards

Funding

2015 **Einstein Postdoctoral Fellowship**, NASA

2015 **Chancellor's Club Dissertation Fellowship**, University of California, Irvine

2014 **Price Prize for Outstanding Graduate Students**, the Ohio State University

2009 **Chancellor's Club Recruitment Fellowship**, University of California, Irvine

2009 **Summer Research Fellowship**, University of California, Irvine

Computing time (PI-ed awards)

2017 ***Simulating the Dark Matter distribution in the Local Group***, 30 million CPU hours at LANL HPC

2017 ***Galaxy Formation in The Local Group (Augmentation)***, 15 million CPU hours at NASA NAS

2017 ***Galaxy Formation in the Local Group with State of the Art Hydrodynamics***, XSEDE startup at TACC & PSC

2016 ***The Local Group: Galaxy Formation in the Nearby Universe***, 18 million CPU hours at NASA NAS

Leadership & Committees

Creator & Organizer – GalFRESCA Conference — *Pasadena, CA*

Caltech — *2016, 2017 & 2018*

- Established, planned and executed three GalFRESCA (Galaxy FoRmation and Evolution in Southern California) conferences, which gathered the extensive galaxy formation community in southern California
- Doubled GalFRESCA's attendance over the three years, culminating in 56 attendees and 31 presenters over two days in 2018
- Passed on tools to administer the conference to future organizers, ensuring its long-term survival

Grant Review Panel Member — *Annapolis, MD*

NASA Astrophysics Theory Program — *2016 & 2017*

- Two-year member of a five-person peer-review panel that evaluated and rated eleven proposals in 2016 and nine in 2017
- Duties included creating summaries of proposals, facilitating and taking notes on discussion, and distributing approximately $1 million

TAPIR Seminar Organizing Committee Member — *Pasadena, CA*

Caltech Astronomy Department — *2016 - 2018*

- Organized, scheduled and hosted guest speakers for weekly department-wide seminars

Council on Student Experience Member — *Irvine, CA*

UC Irvine Academic Senate — *2013 - 2014*

- One of two graduate student representatives to the campus-wide Academic Senate sub-committee on student affairs, which interfaced with various campus divisions (e.g. Parking, Housing, and the Office of the Chancellor) to formally review their impact on student life

Graduate Student Government Council & Committee Member — *Irvine, CA*

UC Irvine Associated Graduate Students — *2011 - 2014*

- Elected Member of the 2013 - 2014 Legislative Council from the School of Physical Sciences
- Volunteer to Internal Committee from 2012 - 2014. Spearheaded survey to identify aspects of student life needing improvement
- Volunteer to Social Committee from 2011 - 2014. Helped established traditions of graduate student socials including monthly karaoke nights and quarterly semi-formals

Presentations & Teaching

Recent Invited Presentations

Apr. 2019	**Astronomy on Tap – *What isn't dark matter?***, Der Wolfskopf	*Pasadena, CA*
Apr. 2019	**SLAC Cosmology Seminar – *Dark matter and galaxy formation in the Local Group***, Stanford University	*Palo Alto, CA*
Jan. 2019	**Lunch Talk – *Near-field cosmology with Local Group dwarf galaxies***, Carnegie Observatories	*Pasadena, CA*
Oct. 2018	**TAP Colloquium – *Near-field cosmology with Local Group dwarf galaxies***, University of Arizona	*Tucson, AZ*
May 2018	**Astro Lunch – *ELVIS on FIRE: tackling small-scale problems with baryonic physics***, UC Santa Barbara	*Santa Barbara, CA*
Mar. 2018	**Astrophysics Distinguished Seminar Series – *Probing the Universe via the Local Group***, LANL	*Los Alamos, NM*
Mar. 2018	**Physics Colloquium – *Probing the Universe via the Local Group***, Cal State LA	*Los Angeles, CA*
May 2017	**The Galaxy-Halo Connection – *The depletion of dark matter subhalos by Milky Way-like galaxies***, KITP	*Santa Barbara, CA*

Selected Teaching

Teaching Assistant: Introduction to Programming and Numerical Analysis — *Irvine, CA*

University of California, Irvine — *Spring 2014*

- Led weekly tutorials that introduced algorithm design and numerical techniques using C to sophomore and junior students
- Trained students with no coding experience to numerically solve differential equations and build, e.g., a three-body integrator
- Evaluations exceeded historical averages, with comments indicating my support was crucial in developing their skills

Laboratory and Recitation Instructor — *Irvine, CA*

University of California, Irvine — *Fall 2009 - Spring 2010*

- Taught and graded lab sessions in statistics and classical physics for pre-med students and majors in physics or engineering
- Led discussion sections that provided hands-on exposure to solving problems alongside the main lectures