Shea Garrison-Kimmel

Postdoctoral Scholar in Numerical Astrophysics

4754 Eagle Rock Blvd, Los Angeles, CA 90041

610-731-6378 | sheagk@gmail.com | sheagk.github.io

sheagk | sheagk | sheagk | Shea Garrison-Kimmel

Summary

I am currently a numerical astrophysicist: I use supercomputers to run simulations and analyze their outputs with Python. I enjoy exploring and visualizing multi-dimensional datasets, solving in-depth problems, presenting intricate ideas in an intuitive manner, and building data-driven arguments. I am seeking a career that encourages personal growth and professional development while tackling complex challenges to create products and ideas that have the potential to improve the lives of individuals or the world as a whole.

Skills & Tools: Python, Matplotlib, Numpy, Jupyter, LaTeX (expert); Pandas, C, Bash/CLI, MPI, OpenMP, git, hg, HTML, CSS (proficient)

Research Experience

Lead author of 9 papers over 8 years with 49 co-authorships (>2400 citations total). Presenter at >25 conferences and seminars.

Caltech — *Pasadena, CA*

Einstein Postdoctoral Fellow — *Aug. 2015 - present*

- Ran & analyzed simulations on 1000+ cores (using Python w/ NumPy, Matplotlib, Pandas, etc. in Unix) to test galaxy formation theory.
- Created & documented parallel (Python + C w/ OpenMP) movie-making routines, enabling a larger field-of-view in ∼1/10th the time.
- Co-developed public Python libraries to load simulation data and do common analyses (e.g., coordinate transforms & visualizations).
- Showed simulations within the model favored by very large-scale observations also yield realistic populations of tiny "dwarf" galaxies.
- Developed a framework to explain why galaxies exhibit a range of shapes by bootstrapping over dozens of simulated galaxies' properties.
- Built a controlled study (and public module for the C + MPI code Gizmo) to isolate the impact of the Milky Way galaxy on dark matter.
- Used Monte Carlo sampling (applied to gravity-only simulations) to constrain the allowed variance in galaxy formation efficiency.

University of California, Irvine — *Irvine, CA*

Graduate Student Researcher — *June 2010 - June 2015*

- Designed, built, and made public a suite of 36 state-of-the-art simulations, which have enabled >35 independent publications to date.
- Argued that the relative proximity of the Andromeda galaxy, our nearest neighbor, strongly modifies predictions for upcoming telescopes.
- Developed public Python libraries (irate) to initialize simulations and convert their unstructured binary and ASCII outputs to HDF5.
- Mentored four undergraduate students, ranging from rising sophomores to seniors, all of whom co-authored published manuscripts.

Teaching Experience

University of California, Irvine — *Irvine, CA*

Graduate Teaching Assistant: Introduction to Programming and Numerical Analysis — *Spring 2014*

- Held weekly lectures that used C to introduce algorithm design and numerical techniques, with a focus on solving differential equations.

Leadership & Committees

Hubble Space Telescope Allocation Committee, Panel member — *2019*

- Member of a nine-person panel that provided feedback on 40 proposals requesting time on HST, the foremost space-based telescope.

GalFRESCA Conference, Creator & Organizer — *2016, 2017, & 2018*

- Established and ran an annual conference on galaxy formation-related research, culminating in 56 attendees and 31 presenters in 2018

NASA Astrophysics Theory Program, Grant Review Panel Member — *2016 & 2017*

- Member of five-person panel responsible for distributing ∼$1 million/year. Evaluated eleven proposals in 2016 and nine in 2017.

UC Irvine Associated Graduate Students, Graduate Student Government Council & Committee Member — *2011 - 2014*

- Built survey to measure quality of student life and identify common stresses. Established recurring community-building events.

UC Irvine Academic Senate Council on Student Experience, Graduate student representative — *2013 - 2014*

- Member of the Academic Senate sub-committee that formally reviewed the impact of various campus divisions on student life.

Awards

2018 ***Simulating the Dark Matter Distribution in the Local Group***, awarded 30 million CPU hours at Los Alamos National Labs

2016 ***Galaxy Formation in The Local Group***, awarded 33 million CPU hours at NASA Advanced Supercomputer Division

2015 **Einstein Postdoctoral Fellowship**, awarded ∼$325,000 by NASA

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

2014 **Price Prize for Outstanding Graduate Students**, awarded by the Center for Cosmology and AstroParticle Physics at OSU

Education

University of California, Irvine — *Irvine, CA*

PhD & MS in Physics & Astronomy (Dissertation: *Galaxy Formation in the Local Group*) — *Dec. 2010 - June 2015*

Haverford College — *Haverford, PA*

BS – double major in Astronomy and Physics, with a concentration in Computer Science — *Aug. 2005 - May 2009*