Benjamin A. Cook

60 Garden St. MS 10, Cambridge, MA 02138 • (603) 313-2888

bcook@cfa.harvard.edu • www.cfa.harvard.edu/∼bcook

Profile

Computational astrophysicist specializing in machine learning and high-performance computing. Leader of 12-person organizing team for national conference on science communication, and award-winning teacher. Seeking summer internship and eventual employment in data science, quantitative analysis, or software development.

Education

Harvard University — Cambridge, MA

Ph.D. Astronomy and Astrophysics — Expected 2019

Secondary Field: Computational Science and Engineering

Awards: National Science Foundation Graduate Research Fellow, Certificate of Teaching Excellence (2x)

Relevant Coursework: Stochastic Methods for Data Analysis, Inference and Optimization; Advanced Machine Learning; Data Science; Noise and Data Analysis in Astrophysics

Princeton University — Princeton, NJ

A.B. Astrophysical Sciences, with High Honors — 2014

Awards: Magna cum laude, Sigma Xi Research Honor Society, American Astronomical Society Chambliss Medal for Outstanding Research Poster

Relevant Technical Experience

Harvard University — Cambridge, MA

Ph.D. thesis — 2016 – present

- Developed Bayesian inference framework for analyzing galaxy images with nested sampling and MCMC
- Accelerated simulation code by 16x with GPU-acceleration
- Apply models to archived Hubble Space Telescope data and lead public code distribution via GitHub

Master's thesis — 2014 – 2016

- Built post-processing pipeline for large (> 10TB) dataset from cosmological simulation of galaxies
- Discovered important consequence of galaxy collisional histories using results from post-processing pipeline
- Published results in 1st-author scientific journal article and presented work at 4 international scientific meetings

Graduate course final project (*Machine Learning*) — Spring 2016

- Designed reinforcement learning model (Q-learner) to autonomously play *Flappy Bird*-inspired computer game
- Model surpassed human abilities after 50 games of training

Graduate course final project (*Data Science*) — Fall 2015

- Scraped baseball reference websites to compile pitcher-batter matchup database
- Developed collaborative filtering models with team of 4 to predict pitcher-batter match-up success rates

Leadership Experience

ComSciCon National Workshop — Cambridge, MA

National Leadership Team — 2016 – present

- Advise in organizational transition to 501(c)(3) non-profit status, and raise funds for national workshop

Chair, Local Organizing Committee — 2015 – present

- Supervise 12-person team to organize national STEM communication and outreach workshop
- Balance $80k annual budget and coordinate venue, lodging, travel, and catering for 90 students and 30 panelists
- Direct review process for over 1000 applications each year

Banneker Institute — Cambridge, MA

Mentor / Instructor — 2016 – present

- Instruct undergraduate students of color in summer astronomy program
- Advise on graduate school application process and edit application materials

West End House Boys and Girls Club — Boston, MA

Homework Buddy 2017 – Present

- Tutor local elementary student weekly in reading and math

Harvard University Cambridge, MA

Graduate Teaching Fellow 2015, 2016

- Guided weekly review and homework sessions for groups of 15+ students and led occasional lectures
- Supervised group observational labs and graded problem sets and exams
- Twice awarded Certificate of Teaching Excellence by Bok Center for Teaching and Learning

Princeton University Ticketing Princeton, NJ

Ticketing Manager 2011 – 2014

- First student employee ever promoted to position of Ticketing Manager
- Supervised team of 12+ employees, coordinated shift schedules, and wrote weekly staff guides
- Compiled weekly updates and quarterly business reports for upper management
- Created and implemented improved training procedures for new employees

Skills and Interests

Machine Learning and Statistics: Bayesian inference, Markov chain Monte Carlo (MCMC), collaborative filtering, classification, regression, clustering, reinforcement learning

Programming and Computation: Python, GPU-acceleration with CUDA, C, Java, JavaScript, HTML/CSS, Linux, Git, Make, Google Apps Script

Interests: Baking (esp. French macarons and breads), running half-marathons, and DMing D&D campaigns

Publications and Presentations

Selected Publications (5 total, 2 first author)

- **Cook, B.A.**, Conroy, C., Pillepich, A., et al. 2016, *ApJ*, 833, 158. [arXiv:1610.00014]
- **Cook, B.A.**, Williams, P.K.G., and Berger, E. 2014, *ApJ*, 785, 10 [arXiv:1310.6758]

Technical Tutorials

- .Astronomy 9 – Cape Town, South Africa November 2017

  Tutorial: GPU-acceleration with Python

Public Talks (1 of 2)

- New Hampshire Astronomical Society Meeting – Manchester, NH May 2016

  Growing Galaxies in a Computer with the Illustris Simulated Universe

Selected Conference Presentations (4 total)

- On the Origin (and Evolution) of Baryonic Galaxy Halos – Galapagos Islands, Ecuador March 2017

  The Information Content of Stellar Halos: Accretion Histories and Stellar Population Gradients in Quiescent Illustris Galaxies