# Benjamin A. Cook

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## Profile

Computational astrophysicist with experience in big data and machine learning. Lead organizer of national conference on science communication. Accomplished teacher with passion for outreach and improving science literacy.

## Education

**Harvard University**, Cambridge, MA — 2014 – Present

Ph.D. (*In progress*) Astronomy and Astrophysics — Expected June 2019

Secondary Field: Computational Science and Engineering

M.A. (2016) Astronomy and Astrophysics

**Princeton University**, Princeton, NJ — 2010 – 2014

A.B. (2014) Astrophysical Sciences – **Magna cum laude**

## Selected Awards and Honors

Certificate of Teaching Excellence – Derek Bok Center for Teaching and Learning — 2016

Graduate Research Fellowship – National Science Foundation — 2014 – Present

## Recent Computational Projects

Ph.D. Thesis (Harvard University) — Fall 2016 – present

Topic: *Bayesian modeling of pixel distributions in galaxy images*
Create Bayesian modeling pipeline for galaxy images, using Markov-Chain Monte Carlo and implemented in parallel Python. Apply to Hubble Space Telescope images and lead public code distribution via GitHub.

Research Exam Project (Harvard University) — Fall 2014 – Summer 2016

Topic: *Analysis of large datasets from hydrodynamical simulations*
Built post-processing pipeline for large ($>$ 10TB) output dataset from cosmological simulation of galaxies

Course Final Project (*Machine Learning*, Harvard University) — Spring 2016

Topic: *Autonomous video game playing with reinforcement learning*
Developed a reinforcement learning (Q-learner) algorithm to autonomously play *Flappy Bird*-inspired video game. After 50 games played, the optimal model out-performed human abilities.

Course Final Project (*Data Science*, Harvard University) — Fall 2015

Topic: *Applying machine learning models to sports statistics*
Scraped baseball reference websites to compile pitcher-batter matchup database. Implemented collaborative filtering models to predict (unsuccessfully) pitcher-batter success rates.

## Technical Skills

*Machine Learning and Statistics:* Collaborative Filtering, Classification, Regression, Clustering, Dimensionality Reduction, Reinforcement Learning, Markov-Chain Monte Carlo, Bayesian inference

*Software and Programming Languages:* Python (numpy, scipy, scikit-learn, matplotlib, pandas, multiprocessing), C, Java, Wolfram (Mathematica), Linux, Git, Make, SLURM cluster manager, Microsoft Excel

*Electronic Presentation:* LaTeX, Jupyter (iPython) notebook, Microsoft Powerpoint, HTML

*Selected Coursework:* Data Science, Machine Learning, Noise and Data Analysis in Astrophysics

## Selected Professional Activities

ComSciCon National Workshop — 2014 – Present

*Leadership workshop series for graduate student leaders in STEM communication and outreach*
Chair, Local Organizing Committee (2015+); National Leadership Team (2016+)

Mentor/Instructor – Banneker Institute — Summer 2016

*Astronomy summer program for undergraduate students of color and underrepresented backgrounds*

Author/Peer-Editor – Astrobites — 2014 – 2016

*Grad student-run astronomy blog summarizing research articles for general public*