Michael K. McCourt

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github.com/mkmcc arxiv.org/a/mccourt_m_1

Skills and Technical Proficiencies

Modeling

- I specialize in building simple but predictive models for complex systems, identifying and highlighting the most salient features. *My goal is to make difficult problems easy.*
- Expertise in translating ideas rapidly into equations (or code) and vice-versa.

Programming

- Proficient in C, Ruby, Mathematica, Lisp, Shell Scripts, and Python, including scipy and numpy.
- Proficient in high-performance computing (utilizing some of the nation's fastest supercomputers), and in statistical data fitting using genetic algorithms and Markov Chain Monte Carlo simulations.
- Created popular open-source tools for simplifying daily scientific tasks, including:
  - "gnuplot-mode," a package for editing plots, downloaded by more than 8,000 scientists to date, and
  - "bibslurp," a tool for automatically making bibliographies from the standard NASA database, adopted by 750+ scientists

Communication and Collaboration

- Invited speaker to 26 conferences and seminars
- Regularly complimented on the clarity of my reasoning and writing; one proposal for supercomputer time was selected by the granting agency as their published example of a well-written application
- Selected as a referee (expert reviewer) for five academic journals, including *Nature Letters*
- Initiating new collaborations among scientists

Management Experience

- Raised over $2 million in funding and supercomputer time to run a small research group
- Conducted an international job search and hired a postdoctoral research scholar
- Currently mentoring two undergraduate students and three graduate students on multi-year projects
- Organized and taught a fluid dynamics "bootcamp" at UCSB after recognizing it was needed

Experience and Education

- Authored 23 peer-reviewed scientific papers cited nearly 400 times (research index quotient in the 95th percentile for astrophysics)
- Conducted self-directed research on 10 different topics over 11 years

KITP Fellow, UC Santa Barbara *(awarded for 2019-2020)*
Hubble Fellow, NASA Sept 2016—present
ITC Fellow, Harvard University Sept 2014—July 2015

- Recipient of prestigious independent research fellowships.

Graduate Student Researcher, UC Berkeley. Aug 2008—Aug 2014

- Recipient of both department awards for outstanding graduate student research.

PhD, Astrophysics, UC Berkeley May 2014
MA, Astrophysics, UC Berkeley May 2010
BS, Physics, Stanford University (concentration in theoretical physics) June 2008

Last updated: September 7, 2017
current version: github.com/mkmcc/resume

Key Research Accomplishments

Most of my academic research has focused on galaxy clusters, which are the largest and most recent structures to form in the universe. For more information and visuals, visit my website: mkmcc.github.io/research

- Showed that clouds of cold gas can condense like rain in the hot atmospheres of galaxy clusters; this process fuels the growth of galaxies in clusters and determines the maximum mass of galaxies in the universe. My research overturned a paradigm about thermal instability which had been in place for more than 20 years. (read more here.)
- Discovered that gas in galaxy clusters may be vigorously "boiling," contrary to what had been found in previous studies. This result influences how x-ray telescopes infer the masses of clusters, which are then used to determine quantities such as the age of the universe. (read more here.)
- Showed that the unexplained range of temperatures inside galaxy clusters is in fact determined by variations in their formation histories. (read more here.)
- Showed that clouds of cold gas in the center of the Milky Way Galaxy may survive longer than had previously been thought. Outlined a method for using these clouds to study the unknown physics of gas falling into the super-massive black hole in our galactic center. (read more here.)
- Showed that the bizarre and unexpected orbits of Pluto-like objects in our Solar System may indicate the presence of a second Kuiper belt — this is a prediction which should be tested soon! (read more here).
- Showed that the cold gas recently discovered in the outskirts of galaxies is in fact a "fog" of tiny, dispersed chunks of gas rather than a contiguous, solid object. Discovered a new hydrodynamic instability which explains why this should be the case, simultaneously explaining a number of observational puzzles in studies of galaxies.