Michael K. McCourt

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

Skills and Technical Proficiencies

Modeling

- Specialize in building simple but predictive "toy" models for complex systems, focusing only on the most salient features.
- Applied modeling to diverse research topics, ranging from the largest structures in the universe to earth-mass gas clouds around black holes.
- Skilled in rapidly translating ideas into equations and vice-versa.

Programming

Proficient in C, Ruby, Mathematica, Lisp, Shell Scripts. Experience with Python, including scipy and numpy.

- Implemented significant changes (e.g. plasma physics) to Athena, a high-performance scientific code running on supercomputers.
- Wrote software for scientific studies, including:
  - Statistical data fitting using Markov Chain Monte Carlo simulations;
  - Calculation of gravitational torques to identify unstable orbits in disks of stars;
  - Integrating 1-dimensional models of massive galaxies
- Created open-source tools for simplifying daily scientific tasks, including:
  - "gnuplot-mode," a package for editing plots, downloaded by nearly 3,000 scientists to date;
  - "bibslurp," a tool for automatically making bibliographies from the standard NASA database, adopted by 150+ scientists

Communication

- Invited speaker to 19 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 for five academic journals, including *Nature Letters*

Experience and Education

- Authored 10 peer-reviewed scientific papers cited nearly 200 times
- Conducted self-directed research in 9 different areas

ITC Fellow, Harvard University — Sept 2014—present
- Recipient of prestigious independent research fellowship.

PhD Student, Astrophysics, UC Berkeley. (*PhD awarded May 2014*) — Aug 2008—Aug 2014
- Recipient of both department awards for outstanding graduate student research.

MA, Astrophysics, UC Berkeley — May 2010

BS, Physics, Stanford University — May 2008
- Concentration in theoretical physics.

Key Research Accomplishments

Much of my research has focused on galaxy clusters, which are the largest and most recent structures to form in the universe. For more detailed information and visuals, please visit my website: astro.berkeley.edu/~mkmcc/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. (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.)