# APARNA VENKATESAN

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## EDUCATION

**Ph.D., 2000**, Astronomy and Astrophysics, The University of Chicago
*Thesis Topic*: Reionization Models and the Cosmic Microwave Background
*Thesis Advisor*: Dr. Angela V. Olinto
**M.S., 1994**, Astronomy and Astrophysics, The University of Chicago
**B.A., 1993**, Astronomy (with Distinction in All Subjects), Cornell University
*Advisor*: Dr. Steven Squyres

## RESEARCH INTERESTS

My scientific interests lie primarily in theoretical cosmology, including studies of the first stars and quasars, cosmological reionization, cosmic element synthesis, the microwave background, dark matter, and gravitational lensing. I have also worked in high-energy astrophysics (gamma-ray bursts and cosmic rays) and planetary astronomy as an undergraduate and graduate student. My current work ranges from the above cosmology topics to projects in the fields of dark stars and astrobiology.

## PROFESSIONAL APPOINTMENTS

• **Assistant Professor of Physics and Astronomy**, University of San Francisco, Fall 2006–present (on Parental Leave June–December 2007), conducting research on cosmology and the first stars, and co-creating two new astronomy and astrophysics minors at USF
• **Lecturer and Research Associate**, University of Colorado, Boulder, Jan.–July 2006
• **NSF Astronomy and Astrophysics Postdoctoral Fellow**, University of Colorado, Boulder, June 2002–Dec. 2005, performed research on the properties, formation epochs and cosmological feedback from the first stars, supernovae and quasars

• **Postdoctoral Research Associate**, University of Colorado, Boulder, 2000–2002 (Supervisor: Prof. J. Michael Shull), worked on projects in cosmology, reionization and first-light sources
• **Farr Fellow and Graduate Research Assistant**, The University of Chicago, 1993–2000 (Thesis Advisor: Prof. Angela Olinto), worked on projects in high-energy astrophysics and cosmology
• **Graduate Research Assistant**, Los Alamos National Laboratory, Summer 1994 (Supervisor: Dr. Richard Epstein), analyzed the statistics of data from the BATSE instrument on the *Compton Gamma-Ray Observatory* satellite
• **Undergraduate Research Assistant and Data Analyst**, Cornell University, 1990–1993 (Advisor: Prof. Steven Squyres), analyzed and processed the first three years of data from the Magellan Mission to Venus at Cornell University. Created unique database of images that was subsequently used widely by the planetary science research community, and by the Encyclopaedia Britannica

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## HONORS, AWARDS AND GRANTS

• PI on Cottrell College Science Award (Research Corporation), $45 K awarded for proposal titled "The Effects of Helium Reionization in the Early Universe", for PI and undergraduate research to be performed at USF, 2010–2012
• Received a $500 grant from the Travel Grants for Women Speakers Program administered by the American Physical Society to support the visit of a female colloquium speaker to USF's Department of Physics and Astronomy, July 2010
• Received a $1500 conference grant to attend and present research at the meeting "From First Light to Newborn Stars", Tucson, AZ, March 2010
• PI on American Astronomical Society Small Research Grant ($1500) for proposal titled "Multi-Wavelength Detections of the First Stars", 2006
• PI on National Science Foundation Astronomy and Astrophysics Postdoctoral Fellowship (award amount $185 K), University of Colorado, Boulder, 2002–2005
• Selected with full funding to be on the US delegation to the IUPAP International Conference on Women in Physics, UNESCO, Paris, 2002
• Awarded conference grants for attending 8 meetings, schools and workshops, 1996-2004
• Farr Fellowship, The University of Chicago, 1993–1997
• NASA Space Grant Fellowship, Cornell University, Summers of 1991 and 1992
• Graduation with distinction in all subjects, Cornell University, 1993
• Dean's List, Cornell University, 1990–1993
• International Students and Scholars' Scholarship, Cornell University, 1989–1993

**Internal Funding at USF:**
• Awarded $1000 faculty stipend from the USF College of Arts & Sciences Undergraduate Research Project Applications for creating new research project opportunities for undergraduate students, Summer 2009

• Awarded funds from the USF College of Arts and Sciences Faculty Development Fund (FDF) as follows, 2006–present:
$1050, Research Collaboration Travel to University of Colorado, Boulder, Fall 2006
$425, Scholarly Travel within India to visit and speak at the Inter-University Centre for Astronomy and Astrophysics, Pune, INDIA, Fall 2006
$385.03, Research Collaboration Travel to University of Colorado, Boulder, Fall 2008
$1644, Research Assistant funds for 2 summer students on project titled *Cosmic Reionization of Hydrogen and Helium*, Spring 2009
$1590, Conference Travel to attend/speak at summer meeting of American Astronomical Society, Pasadena, CA, *The Escape of Helium-Ionizing Radiation from Early Galaxies*, Spring 2009
$1538, Conference Travel to attend/speak at winter meeting of American Astronomical Society, Seattle, WA, *Feedback from the First Stars and Quasars in the Early Universe*, Fall 2009
$771, Research/Equipment funds (to purchase scanner and printer) for project *The Effects of Helium Reionization in the Early Universe*, Fall 2010
$1100, *Research/Equipment: Publications Costs for Journal Articles in Astrophysics*, Spring 2011
$893, Conference Travel to present research results at the 2011 Santa Fe Cosmology Summer Workshop, Summer 2011

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## RESEARCH PUBLICATIONS IN REFEREED JOURNALS

• P. Scott, **A. Venkatesan**, E. Roebber, P. Gondolo, E. Pierpaoli & G. Holder 2011, *Impacts of Dark Stars on Reionization and Signatures in the Cosmic Microwave Background*, The Astrophysical Journal (Ap.J.), 742, 129
• **A. Venkatesan** & A. J. Benson 2011, *X-rays and hard UV radiation From the First Galaxies: Ionization Bubbles and 21 cm Observations*, Monthly Notices of the Royal Astronomical Society (MNRAS), 417, 2264–2275
• J. M. Shull & **A. Venkatesan** 2008, *Constraints on First-Light Ionizing Sources from Optical Depth of the Cosmic Microwave Background*, Ap.J., 685, 1–7
• **A. Venkatesan** 2006, *A Cosmic Milestone: Constraints from Metal-poor Halo Stars on the Cosmological Reionization Epoch*, Ap.J. Letters, 641, L81–L84
• **A. Venkatesan**, B. B. Nath & J. M. Shull 2006, *The Radiative Transport of Dust in Primordial Galaxies and Second-Generation Star Formation*, Ap.J. 640, 31–40
• J. Tumlinson, **A. Venkatesan** & J. M. Shull 2004, *Nucleosynthesis, Reionization, and the Mass Function of the First Stars*, Ap.J., 612, 602–614
• **A. Venkatesan**, R. Schneider & A. Ferrara 2004, *Early Enrichment of Quasars by First Stars*, MNRAS Letters, 349, L43–L48
• **A. Venkatesan** & J. W. Truran 2003, *The Ionizing Efficiency of the First Stars*, Ap.J. Letters,

594, L1–L4
• K. Wada & **A. Venkatesan** 2003, *Feedback From the First Supernovae in Protogalaxies: The Fate of the Generated Metals*, Ap.J., 591, 38–42
• **A. Venkatesan**, J. Tumlinson, & J. M. Shull 2003, *Evolving Spectra of Pop III Stars: Consequences for Cosmological Reionization*, Ap.J., 584, 621–632
• J. Tumlinson, J. M. Shull, & **A. Venkatesan** 2003, *Cosmological Effects of the First Stars: Evolving Spectra of Population III*, Ap.J., 584, 608–620
• **A. Venkatesan** 2002, *Mutual Constraints Between Reionization Models and Parameter Extraction From Cosmic Microwave Background Data*, Ap.J., 572, 15–24
• **A. Venkatesan**, M. L. Giroux, & J. M. Shull 2001, *Heating and Ionization of the Intergalactic Medium by an Early X-Ray Background*, Ap.J., 563, 1–8
• **A. Venkatesan** 2000, *The Optical Depth to Reionization as a Probe of Cosmological and Astrophysical Parameters*, Ap.J., 537, 55–64
• **A. Venkatesan** 2000, *The Optical Depth to Reionization as a Probe of Cosmological and Astrophysical Parameters*, Ph.D. Thesis, The University of Chicago
• **A. Venkatesan**, A. V. Olinto & J. W. Truran 1999, *Neutron Stars and Black Holes as MACHOs*, Ap.J., 516, 863–871
• **A. Venkatesan**, M. C. Miller & A. V. Olinto 1997, *Constraints on the Production of Ultra-High-Energy Cosmic Rays by Isolated Neutron Stars*, Ap.J., 484, 323–328

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## PUBLICATIONS IN PREPARATION

• **A. Venkatesan** 2011, *Topic: On the Necessity of the First Metal-Free Stars in the Universe*, article requested by Scientific American, in preparation

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## WHITE PAPERS FOR ASTRO2010 (THE ASTRONOMY AND ASTROPHYSICS DECADAL SURVEY)

• J. Cooke at al. 2009 (19 authors, alphabetical), *First Light Sources at the End of the Dark Ages: Direct Observations of Population III Stars, Proto-Galaxies, and Supernovae During the Reionization Epoch*, Astro2010: The Astronomy and Astrophysics Decadal Survey, Science White Papers, no. 53, paper available at: **http://xxx.lanl.gov/abs/0902.4602**
• A. Cooray et al. 2009 (48 authors, alphabetical), *A New Era in Extragalactic Background Light Measurements: The Cosmic History of Accretion, Nucleosynthesis and Reionization*, Astro2010:

The Astronomy and Astrophysics Decadal Survey, Science White Papers, no. 54, paper available at: **http://xxx.lanl.gov/abs/0902.2372**

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## CONFERENCE PROCEEDINGS AND PRESENTATIONS

• **A. Venkatesan** & A. J. Benson 2011, *Feedback from X-rays and Hard Ionizing Radiation from the First Galaxies*, BAAS, **231.03**

• **A. Venkatesan** & L. J. Rothschild 2009, *From Dark to Life: The Creation of the Biogenic Elements in the Early Universe*, BAAS, **305.02**

• **A. Venkatesan** 2008, *Microwave Background constraints on the efficiency of high-redshift star formation*, Meeting: Cosmology in Northern California 2008 (KIPAC, Stanford University), talk online at: http://kipac-prod.stanford.edu/collab/seminars/special/080418/Venkatesan/view

• **A. Venkatesan** 2006, *Constraints from Metal-Poor Halo Stars on the Cosmological Reionization Epoch*, online proceedings of The First Stars and Evolution of the Early Universe INT Program 06-2a (University of Washington, Seattle), at:
http://www.int.washington.edu/talks/WorkShops/int_06_2a/

• **A. Venkatesan** 2006, *Detecting the transition from Pop III to Pop II stars*, New Astronomy Reviews, 50, 108

• **A. Venkatesan** 2004, *Observational Signatures of the First Stars*, KITP Program: Galaxy-Intergalactic Medium Interactions, Kavli Institute for Theoretical Physics, University of California, Santa Barbara

• **A. Venkatesan** 2004, *The Ionizing Efficiency and Mass Function of the First Stars*, BAAS, **34.08**

• **A. Venkatesan** 2004, *The Night Sky and Native American Worldviews*, BAAS, **96.04**

• **A. Venkatesan** 2003, *The Duration of Metal-Free Star Formation And Associated Consequences*, "First Stars II" meeting, Penn State University, talk online at:
http://www.astro.psu.edu/users/DELETE/tabel/II/program.html

• **A. Venkatesan** 2002, *Reionization and Metal Enrichment by the First Stars*, KITP Program: The New Cosmology Confronts Observation: The Cosmic Microwave Background, Dark Matter, Dark Energy, and Brane Worlds, Kavli Institute for Theoretical Physics, University of California, Santa Barbara

• J. Tumlinson, J. M. Shull, & **A. Venkatesan** 2002, *Cosmological Reionization by the First Stars: Evolving Spectra of Population III*, ASP Conference Proceedings, v. 267, p. 433 (ASP: San Francisco)

• **A. Venkatesan** 2002, *Constraints on the Primordial Power Spectrum From the Reionization Epoch*, BAAS, **86.05**

• J. Tumlinson, **A. Venkatesan** & J. M. Shull 2001, *Cosmological Reionization by the First Stars: Evolving Spectra of Population III*, BAAS, **16.03**

• **A. Venkatesan** & J. W. Truran 2001, *Observational Signatures of the First Stars*, in proceedings

of "Cosmic Evolution", p. 335 (World Scientific), eds. E. Vangioni-Flam, R. Ferlet and M. Lemoine, Paris, November 13-17, 2000, astro-ph/0101338

• **A. Venkatesan**, J. M. Shull & M. L. Giroux 2001, *The Impact of an Early X-ray Background on the Intergalactic Medium*, BAAS, **58.03**

• **A. Venkatesan** 1999, *Reionization as a Probe of Cosmology and Early Astrophysics*, BAAS, **55.06**

• **A. Venkatesan**, E. Gates & A. V. Olinto 1998, *MACHOs: Hidden Hunks in the Halo?*, 19th Texas Symposium on Relativistic Astrophysics and Cosmology, Paris, France, Eds.: J. Paul, T. Montmerle, and E. Aubourg (CEA Saclay)

• **A. Venkatesan**, talks at the annual *Great Lakes Cosmology Workshops*, 1996-1999

• **A. Venkatesan**, M. C. Miller & A. V. Olinto 1997, *High Energy Cosmic Rays From Neutron Stars*, BAPS, **B7.07**

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## OTHER PUBLICATIONS

• **A. Venkatesan**, Review/essay on "The Jesuit Guide to (Almost) Everything: A Spiritual Guide to Real Life" by James Martin, S. J., to appear in *Conversations on Jesuit Higher Education* magazine, Fall 2011

• **A. Venkatesan** & C. M. Urry 2002, *The Status of Women in Physics - What, Why and How to Change*, STATUS (a publication of the AAS Committee on the Status of Women in Astronomy), June 2002 issue. Also to be printed in the Fall issue of the CSWP Gazette, and the APS Forum on Physics and Society newsletter.

• S. Tobias, C. M. Urry & **A. Venkatesan** 2002, *Physics: For Women, the Last Frontier*, Science, 296, 1201. Also reprinted in the Journal of Science Education and Technology.

• C. M. Urry et al. 2002, *Women in Physics in the United States*, proceedings of the IUPAP 2002 International Conference on Women in Physics.

## SELECTED PRESENTATIONS SINCE 2000

*Talks Related to Research:* All invited talks below are marked with **(I)**.

– Talk at the San Mateo County Astronomical Society, San Mateo, CA, Dec. 2011 **(I)**
– Seminar, Arizona State University, Tempe, AZ, October 2011 **(I)**
– Talk at the 2011 Santa Fe Cosmology Summer Workshop, Santa Fe, NM, July 2011
– Seminar, The University of Chicago, Chicago, IL, April 2011 **(I)**
– Talk at the American Astronomical Society Meeting, Seattle, WA, January 2011
– Talk for the Peninsula Astronomical Society, Mountain View, CA, Sept. 2010 **(I)**
– Talk at the meeting "From First Light to Newborn Stars", Tucson, AZ, March 2010
– Colloquium, University of San Francisco, San Francisco, CA, February 2010
– Talk for the San Francisco Amateur Astronomers, San Francisco, CA, February 2010 **(I)**
– Talk at the American Astronomical Society Meeting, Pasadena, CA, June 2009 **(this received media attention; see below)**
– Talk at the Cosmology in Northern California meeting, KIPAC/Stanford University, April 2008
– Colloquium in *What Physicists Do* series, Sonoma State University, Sonoma, CA, 2007 **(I)**
– Colloquium, Inter-University Center for Astronomy and Astrophysics, Pune, India, 2007 **(I)**
– Colloquium, University of California, Berkeley, CA, 2006 **(I)**
– Colloquium, San Jose State University, San Jose, CA, 2006 **(I)**
– Talk at First Stars Conference, University of Washington, Seattle, WA, 2006 **(I)**
– Colloquium, University of Michigan, Ann Arbor, MI, 2005 **(I)**
– Talk at workshop on *Probing Early Structure Formation with Mass, Light and Chemistry*, University of Minnesota, Minneapolis, MN, 2005 **(I)**
– Colloquium, Indian Institute of Science, Bangalore, India, 2005 **(I)**
– Seminar, Raman Research Institute, Bangalore, India, 2005 **(I)**
– Seminar, University of California, San Diego, CA, 2005 **(I)**
– Plenary Talk, *First Light Detection* workshop, University of California, Irvine, CA, 2005 **(I)**
– Seminar, University of Chicago, Chicago, IL, 2005 **(I)**
– Colloquium, University of Colorado, Boulder, CO, 2004 **(I)**
– Review talk, Workshop on "Chemical Enrichment of the Early Universe", Santa Fe, NM, 2004 **(I)**
– Talk at the American Astronomical Society Meeting, Denver, CO, 2004 **(this received media attention; see below)**
– Colloquium, Space Telescope Science Institute, Baltimore, MD, 2004 **(I)**
– Lecture in "Key Concepts of Science" series, Portland State University and Science Integration Institute, Portland, OR, 2003 **(I)**
– Talk at "First Stars II" meeting, Penn State University, College Station, PA, 2003
– Seminar, Caltech, Pasadena, CA, 2003
– Colloquium, Arcetri Astrophysical Observatory, Florence, Italy, 2002 **(I)**
– Talk at the American Astronomical Society Meeting, Albuquerque, NM, 2002

– Colloquium (ORNL Physics Division), Oak Ridge National Lab, Oak Ridge, TN, 2002 **(I)**
– Colloquium, The University of Chicago, Chicago, IL, 2002 **(I)**
– Talk at the American Astronomical Society Meeting, Pasadena, CA, 2001
– Talk at the symposium "Cosmic Evolution", Institut d'Astrophysique de Paris, Paris, France, 2000

*Talks on broader science topics, and topics related to the representation of women and minorities in science:* All invited talks below are marked with **(I)**.

– Benjamin Dean Lecture, California Academy of Sciences, San Francisco, CA, 2006 **(I)**
– Talk on "The Night Sky and Native American Worldviews" at the American Astronomical Society Meeting, Denver, CO, 2004
– Talk on "Women in Astronomy: Successes and Challenges", sponsored by the LEAP program, University of Colorado, Boulder, CO, 2003 **(I)**
– Panelist at CSWA report and discussion of the IUPAP 2002 International Conference on Women in Physics, American Astronomical Society Meeting, Albuquerque, NM, 2002 **(I)**
– Colloquium (ORNL Committee for Women, Association for Women in Science, and Women in Science), Oak Ridge National Lab, Oak Ridge, TN, 2002 **(I)**
– Speaker on the First Stars as part of the "Origins" theme at the Second Annual Science Integration Conference, Portland, OR, 2001 **(I)**

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## MEDIA APPEARANCES

*Science-related*:
• **June 2009, Research profiled by Space.com, picked up by Yahoo News and other news sites:** Interviewed by writer Andrea Thompson at Space.com on early results from an astrobiology collaboration with Dr. Lynn Rothschild (NASA-Ames). The feature article, titled "*Could Life Be 12 Billion Years Old?*", is online at:
**http://www.space.com/scienceastronomy/090617-aas-bio-elements.html**
• **2006, Featured in "Chasing Hubble's Shadows":** This book by science writer Jeff Kanipe includes multiple quotes from me on the masses and formation epochs of the first stars in the universe.
• **May/June 2004, Research profiled in US and international news:** My research on the first stars' mass function with Jason Tumlinson and Mike Shull was featured in more than two dozen US and international news publications, wires and online publications (e.g., Sky and Telescope, The Washington Times, Sciencedaily.com, Spaceref.com, et alia.). This also appeared in several regional and national newspapers in India, and was otherwise reprinted in multiple languages.

*Other:*
• **Winter 2011:** Advertisement for USF that aired on television sports channels during USF Bas-

ketball Games. Translated into 10 languages. Video on Youtube at:
http://www.youtube.com/watch?v=Kg3cwzlZxK4
• **July 1, 2002:** Featured in article *An Indian Star in Astrophysics* in Madras Musings, a Chennai-based fortnightly magazine (Chennai, India).
• **March 8, 2002:** Featured in the *Talk of the Town* column in the national newspaper The Hindu (Chennai, India).
• **March 8, 2002:** Featured in *Women in Physics* on International Women's Day in the daily newspaper The Midday (Mumbai, India).

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## TEACHING AND OUTREACH EXPERIENCE

### (A) USF EXPERIENCE:

**Assistant Professor of Physics and Astronomy**, Fall 2006–present

• Contributed to a strong expansion of the undergraduate astronomy program at USF by co-creating (with Prof. Horacio Camblong) two new minors in astronomy and astrophysics at USF. Taught multiple courses and labs covering topics in astronomy and astrophysics, as well as general physics and modern physics
• Created and introduced several new courses on astronomy and astrophysics (detailed below), 2007–present
• Participated in the USF iPad study (Summer through Fall 2010 ) on the teaching and research effectiveness of the iPad in higher education. Used the iPad in lectures as an interactive teaching/learning tool and student discussion activities, and explored its use in research-related remote telescope observing. Also used it in the training night(s) of USF's astronomy courses' observation TAs through interactive sky maps and night sky atlases. Contributed to a USF-based iPad wiki and gave a presentation on my findings on its use for astronomy teaching and research
• Regular talks and speaking engagements for professional and public audiences, amateur astronomy societies/clubs and science museums in San Francisco and the Bay Area, 2006–present
• Presentations on astronomy topics several times a year in the pre-K and elementary school system in San Francisco, 2006–present

**Courses taught at USF:** Led lectures and/or laboratory sections for the physics and astronomy courses listed below. Designed course material and syllabi, including course research projects, traditional blackboard and PowerPoint lecture presentations, as well as more modern aids to effective teaching, e.g., in-class clicker questions, interactive lecture tutorials, simulations, video clips and data-based movies, iPad presentations, and student-centered discussions and activities. When teaching Physics 120 or 121, I also managed a team of several lab TAs and a team of $\sim$ a dozen observation TAs. **Courses/labs I developed and introduced to USF's curriculum are listed**

**in bold.**

Physics 110 lecture course (General Physics I – Mechanics): Fall 2006, Fall 2011
Physics 110 labs (2): Fall 2006
Physics 120 lecture course (Astronomy: Earth to the Cosmos): Spring 2007, Spring 2008, Spring 2009, Fall 2009
Physics 120 lab (1): Spring 2011
**Physics 121 lecture course (Planetary Astronomy):** Spring 2008, Fall 2008, Spring 2010, Fall 2010
**Physics 121 labs (2):** Spring 2011
**Physics 195 lecture and labs (First-Year Seminar: The Extreme Universe): Fall 2011**
Physics 240 (Modern Physics): Fall 2008
**Physics 343 (Astrophysics: Stellar Structure and Evolution):** Spring 2007, Spring 2009, Spring 2011
Physics 350 (Physics Colloquium): Spring 2010, Fall 2010

## (B) PRE-USF TEACHING/OUTREACH EXPERIENCE:

• **Lecturer**, University of Colorado, Boulder, Jan.–July 2006, taught introductory astronomy course on stars and galaxies with 200 students
• **Instructor**, University of Colorado Upward Bound Programs, Boulder, CO, Summers 2002, 2003 and 2005, Astronomy Course, taught and mentored Native American high school students as part of a college preparation program
• Associate member of the Science Integration Institute (SII), a nonprofit organization based in Portland, OR, dedicated to helping people use the scientific process and its insights to be an integral part of their daily lives
• Volunteer judge and moderator for the 2003 Native American Science Bowl, Colorado Springs, CO
• **Volunteer**, Sommers-Bausch Observatory public open house, CU-Boulder, 2000–2002
• **Instructor**, The Adler Planetarium, Chicago, IL, July 1999, Adult Course Program: Dark Matter and Cosmology
• **Consultant and Tutor**, University of Chicago, 1998-1999, for internet-based astronomy outreach work with high school students in Idaho
• **Teaching Assistant**, The University of Chicago, Fall Quarters of 1995, 1996 and 1997, Natural Sciences 101: The Origin and Evolution of the Universe
• **Volunteer Assistant**, Center for Astrophysical Research in Antarctica (CARA) at The University of Chicago, 1996–1997, for outreach courses designed for local high school students
• **Teaching Assistant**, Cornell University, 1992, for introductory undergraduate courses on planetary science - led recitation sections and graded assignments

## SERVICE

*Please note: Internal service at USF at the University, College or Department level(s) are not listed here.*

### Professional Service

• Regular talks for professional and public audiences in the Bay Area and the U.S. on the first sources of light
• Referee for the top peer-reviewed astrophysical journals
• Panel member for national granting agencies' proposal reviews, 2003–present
• Co-organizer of scientific meetings, including "The IGM/Galaxy Connection: The Distribution of Baryons at $z = 0$" (University of Colorado, Boulder, 2002), and two sessions at the 2004 summer AAS meeting in Denver, CO – "Detecting the First Stars and AGN" and "Teaching Astronomy to Impact Students Worldviews"

### Community Service

• Regular talks and speaking engagements for amateur astronomy societies/clubs and science museums in San Francisco and the Bay Area, 2006–present
• Regular presentations on astronomy topics and outreach in the pre-K and elementary school system in San Francisco, 2006–present
• Annual participation in USF Thanksgiving Food Drive, 2006–present; volunteered with my family for food delivery in Nov. 2010
• Participant and fundraiser, San Francisco Kidney Walk (National Kidney Foundation), May 2010 and May 2011
• Participant, Awareness Walk on World Kidney Day (March 10), Chennai, India, March 2011
• Glide Grocery Bag Giveaway, San Francisco, Dec. 2009
• Volunteer work for library at San Francisco Public Montessori school, 2009–present
• Consultant for a play, *The Kepler Project*, on the life and work of Johannes Kepler by San Francisco playwright Nina Wise, 2006–2008. Recent performances at:
Vimeo: http://vimeo.com/18543194
Youtube: http://www.youtube.com/watch?v=bghB-ONomsI