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Education:

Summer 1998 Ph.D., Physics, University of Wisconsin, Madison (McCammon)
December 1994 M.S., Physics, University of Wisconsin, Madison
Spring 1990 B.S., Physics, Massachusetts Institute of Technology

Experience:

2009–present Senior Scientist
2008–2009 Research Scientist – Planetary Science Institute

- Created software to process comet observations recorded by *GALEX*, a NASA UV spectro-imaging space telescope
- Trained 3 students in the operation of the McMath-Pierce solar telescope for observations of Io and the plasma torus
- Principle Investigator on 2 successful NASA proposals: *GALEX* Observations of Comet 8P/Tuttle (\$47k in 2008) and *GALEX* Observations of Comet Machholz (\$35k in 2008)
- Principle Investigator and primary author of 8 NASA proposals (3 pending approval)

2004–2007 Research Scientist–University of Washington, Seattle (Harris)

- Principle investigator on two successful NASA proposals: Spectroscopic Separation of the Local Interstellar Medium and Heliospheric Components of the Soft X-ray Background (\$33k in 2007) and Observations of Bright Comets (\$22.5k in 2005)
- Co-investigator on successful NASA proposal: Io and the Plasma Torus: Conditions at the Time of *New Horizons* Encounter (2-3 months of support per year 2008-2010)
- Analyzed image data collected by large-format science-grade CCDs and microchannel plate detectors. Worked independently, leveraging efforts by designing software to interface with existing processing systems. Advanced scientific understanding of photochemical and gas-phase chemical processes in comets
- Coordinated several multi-week, multi-telescope observing runs. Teams consisted of up to a dozen students and scientists from several institutions. Especially adept at conveying complexity of our unusual plans to telescope administrative staff, making sure all our scientific goals were met while administrative procedures were respected
- Technical advisor in development of the Spatial Heterodyne Spectrometer (SHS), a new spectroscopic technique similar to Michelson interferometry, but with fixed gratings replacing the movable mirrors. Supported graduate students as they developed and deployed 3 SHSs during multi-telescope observing runs

- Technical advisor in development of the HYdrogen Polarimetric Explorer (HYPE), a sounding rocket experiment using SHS technology to observe hydrogen on Jupiter and in interplanetary space
- Co-taught ESS 102 *Space and Space Travel* (enrollment, 150 undergraduates). Responsible for lecture content, homework assignments, two quizzes, and oversight of 3 TAs for 1/2 of the fall 2006 academic quarter
- Coached 10 graduate students and post-docs in preparation of scientific presentations

2002–2004 National Research Council Fellow–NASA Goddard Space Flight Center (Oliversen)

- Created robust software for the automatic reduction of >3000 high-resolution spectra of Io, Jupiter's innermost large moon. Worked in IDL, a 4th generation programming language popular with astronomers. Created an object-oriented non-linear least-squares curve-fitting routine and a database in preparation for machine and human-guided learning
- Supervised undergraduate summer research student in creation of web-accessible database of Io observations
- Encouraged a love of science in a *Teach for America* 6th grade teacher enrolled in NASA summer program. Helped develop a thematically integrated curriculum and several lesson plans for her inner-city Washington DC classroom
- Continue to advise summer research students remotely via email and phone

2001–2002 Assistant Scientist, University of Wisconsin–Madison (Harris)

- Analyzed image and spectroscopic data collected by science-grade CCDs. Worked with Fabry-Pérot spectrometer data with variable calibration problems. Verified models of gas outflow in comet Hale-Bopp. Presented results at scientific meetings, published results in the premier scientific journal of my field
- Improved the input optics of the Stellar Spectrograph at the McMath-Pierce Solar Telescope Facility using engineering and machining skills I learned as a graduate student. Documented instrument setup procedures. Helped undergraduate researchers and a professional engineer improve the physical structure of the Hale-Bopp Fabry-Pérot and the Io Torus Imager
- Conducted ground-based astronomical observations of comets and Jupiter's moons. Used the MOSAIC multi-CCD large-format imager on the newly re-commissioned WIYN 0.9 m telescope. On the McMath-Pierce Solar Telescope, used the improved Hale-Bopp Fabry-Pérot, Io Torus Imager, the Stellar Spectrograph, and the first of several prototype SHS instruments

Spring 2000 Lecturer, Department of Astronomy, University of Wisconsin–Madison

- Taught Astronomy 104: *Our Exploration of the Solar System*. Responsible for syllabus, lectures, web-based lecture notes (<http://wisp.physics.wisc.edu/astro104>), homework, exams, projects, honors section, and oversight of one TA (Text: *Universe*, Kaufmann & Freedman, 5th ed)

1998–2001 Research Associate, University of Wisconsin–Madison (Scherb/Roesler/Harris)

- Calibrated WHAM, a newly commissioned, remotely operated telescope and Fabry-Pérot spectrometer to verify surprising results coming from observations of [O I] 6300 Å emission from comet Hale-Bopp. Presented results and scientific meetings, published results in the premier scientific journal of my field
- Programmed instrument control and data collection system. Interfaced micro-controller based gas pressure controller system built by one of our professional engineers to an off-the-shelf CCD data acquisition system. The system was originally implemented on a Pentium in Windows 3.1. Ported to a newer machine and then to Windows 98 in 2007
- Supervised two high school summer interns as they reduced Fabry-Pérot images and spectra of comet Hyakutake
- Mentored senior thesis student Andrew Steffl as he analyzed images of Io recorded by the ADOPT Adoptive Optics system at the 100 inch Hooker telescope on Mt. Wilson
- Network administrator, system administrator. Purchased, installed, and configured network hardware. Maintained and upgraded DEC Ultrix, DIGITAL UNIX, and Red Hat LINUX operating systems. Maintained network backups for cluster of 5 UNIX workstations and one PC using AMANDA, SAMBA and a DAT drive

1995–1998 Ph.D. Thesis Student, University of Wisconsin–Madison (McCammon/Sanders)

- Wrote 285 page Ph.D. Thesis: *The Study of the Interstellar Diffuse X-ray Background Between 150 eV and 280 eV with the Diffuse X-ray Spectrometer (DXS)*. Presented results at scientific meeting, helped write paper publishing results
- Inherited several thousand lines of C code and KSH scripts used for telemetry processing and data reduction of DXS, an attached Space Shuttle payload of opportunity that flew in 1993 on STS 54. Figured out what code was doing without help of original designers and completed reduction and analysis tasks
- Made physical measurements of DXS using a laser in order to track down problems with the post-flight calibration. Modified computer model of instrument function, implemented in FORTRAN
- Computer system manager for a cluster of 5 workstations with a variety of UNIX flavors (DEC Ultrix, DEC OSF, Slackware LINUX). Cluster included 12 semi-autonomous X-terminals, several PCs, Macs, various printers, a VMS workstation, and a PDP-11 connected via a serial line. Cross-compiled SSH tools to X-terminal environment when the Internet started to get too hostile for TELNET

1991–1995 Graduate Research Assistant, University of Wisconsin–Madison (McCammon)

- Team member for payload testing, integration, and launch of the X-ray Quantum Calorimeter (XQC), a sounding rocket payload that demonstrated the feasibility of a calorimetric X-ray detection technology capable of unprecedented sensitivity and spectroscopic resolving power in the soft X-ray (below 1 keV). Team included more than two dozen scientists, engineers and students from the University of Wisconsin and NASA

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