

CURRICULUM VITÆ– Peter Rankin McCullough

May 6, 2012

- Name and Address:** Peter R. McCullough
Space Telescope Science Institute
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410 338 5068 work, 443 823 0447 cell
- Education:** 1993 Ph.D. (Astronomy), University of California, Berkeley
1989 M.A. (Astronomy), University of California, Berkeley
1986 B.Sc. (Physics, highest honors), U. of North Carolina, Chapel Hill
- Memberships¹:** AAS, ASP, IAU, IDA, MDV-SEIA
- Professional Experience:**
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|----------------|---|
| 2011 - present | Associate Astronomer, Space Telescope Science Institute |
| 2002 - 2010 | Scientist, Space Telescope Science Institute |
| 1995 - 2002 | Assistant Professor, Astronomy, UI Urbana-Champaign IL |
| 1993 - 1995 | Postdoctoral (Hubble) Fellow, UIUC |
| 1989 - 93 | Research Assistant, Carl Heiles, UC Berkeley CA |
| 1987 - 89 | Research Assistant, Charles Townes, UC Berkeley CA |
| 1985 | Intern, NRAO Very Large Array, NM |
| 1984 | Intern, Weyerhaeuser Technical Center |
- Honors and Awards:**
- | | |
|-------------|--|
| 2009 | JWST Group Achievement for Prelim. Design Review & Non-Advocate Review |
| 2008 | STScI Group Achievement for WFC3 Thermal Vacuum Tests |
| 2007 | STScI award: JWST/NIRSPEC detector testing |
| 1999 - 2003 | <u>NSF CAREER Award</u> |
| 1999 | UIUC Campus Award for Innovation in Undergraduate Instruction
Using Educational Technologies, Honorable Mention |
| 1998 - 2003 | <u>Research Corp. Cottrell Scholar</u> |
| 1996 - 1998 | <u>Alfred P. Sloan Research Fellow</u> |
| 1993 - 1995 | <u>NASA (STScI) Hubble Fellow</u> |
| 1987 - 90 | NASA Graduate Student Researcher Program |
| 1986 - 87 | E.C. Anthony Fellowship |
| 1986 | Outstanding Senior in Physics |
| 1984 | Phi Beta Kappa |
| 1983 - 86 | N.C. Fellow, leadership development |
| 1982 - 86 | <u>J.M. Morehead Scholar</u> , merit scholarship |
| 1982 - 86 | National Merit Scholar |

¹ American Astronomical Society, Astronomical Society of the Pacific, International Astronomical Union, International Dark Sky Association, MD-DC-VA Solar Energy Industries Association

Oral Presentations of past couple years:

1. "Spectra of Transiting Extrasolar Planets: Past, Present, and Future"
 - a) Penn State, January 27, 2012
 - b) Vanderbilt, January 31, 2012
2. "Characterization of Transiting Extrasolar Planets with Spitzer and Hubble"
 - a) Princeton, Dec 7, 2010
 - b) NASA Ames, Dec 9, 2010
3. "The XO Constellation: Transiting Extrasolar Planets - their Discovery and Characterization" 2009-2010
 - a) Rochester Institute of Technology, NY
 - b) University of Louisville, KY
 - c) Boston University, MA
 - d) Harvard/SAO/CfA, Cambridge, MA
 - e) Belmont Hill High School, Belmont, MA (modified for outreach)
 - f) Centre d'Etudes Nuclaires (CEA), Saclay, France
 - g) Institute d'Astrophysique (IAP), Paris, France
4. "You too can (help) discover an Exoplanet" 2010
Amateur Telescope Makers of Boston, at Harvard, Cambridge MA
5. "Reliable and Affordable Wireless Delivery of Fusion Power to your Home, or ... Why I have Solar Panels and you will too" 2009-2011
 - a) Sustainable Belmont, Belmont MA
 - b) Rochester Institute of Technology, NY
 - c) Cable TV program, Belmont MA
 - d) Louisville, KY
 - e) Boston University, MA
 - f) Princeton, NJ
 - g) Mountain View, CA
 - h) College Station, PA
 - i) Nashville, TN

Non-exoplanet Research Experience:

Orion's Proplyds, 1991-95: According to a SPIE review of literature by Liu in 2006, the first and the most-cited astronomical paper of all those using laser-guided adaptive optics was mine on Orion's proplyds (#6). Contemporaneously with HST images by O'Dell et al., we showed the proplyds in the nebula's core were dusty-disk enshrouded newly-formed stars, measured the mass loss rates from them, and explained their much fainter, outer bow shocks as interactions with the wind of the massive star Theta-1C. The Starfire Optical Range provided the observatory, with its 1.5-m telescope and laser-guided adaptive optics system. My contribution was everything else proposal, observing, data analysis, interpretation, and publication.

Southern H-Alpha Sky Survey Atlas, SHASSA, 1990-2002: With fellow graduate student Bill Reach, I pioneered very-wide-field, very sensitive H-alpha imagery with fast lenses and CCDs that grew into Gaustad et al.s SHASSA (#18, ADS lists 175 citations). I assisted Wayne Rosing (later, founder of

LCO-GT) who constructed the hardware. I contributed to software, calibration, data analysis, scientific interpretation, and publications. With SHASSA we discovered a number of low-surface phenomena in the interstellar medium (#10, 14, 16, 17, 19, 21), and as intended from the outset, it provides a template for decontamination of the free-free emission of the cosmic microwave background observed by COBE, WMAP, and Planck (#12, my invited review). Princeton's Ed Jenkins wrote of SHASSA in 2001, "I think this survey will be of enormous benefit to astronomers ... the entire survey is stunning."

Instrumentation Experience:

Space hardware, 2002-2012: I have provided scientific guidance to teams of engineers, mostly at GSFC and contractors, on HST WFC3 and JWST NIRCam; more details are in my Research Statement.

Robotic Telescopes, 1995-2012: The XO Project requires very robust autonomous operation of commercial-off-the-shelf technology, of lenses, CCDs, telescope mounts, weather sensors, with a lot of software and ingenious system integration to make it all work (#23). Calibration of XO's accomplishment is that Horne (2003)¹ listed 23 similar programs, nearly all of which (and others subsequently) tried and failed to discover TEPs. The XO Project grew out of two of my earlier projects: 1) SHASSA, mentioned above, and 2) I invented a teaching tool, called "Stardial," an autonomous drift-scanning CCD camera that deposited its images in real time to the Web for a decade (#11).

Adaptive Optics, 1991-1998: In addition to the Orion proplyd project (above), I also conceived of the polychromatic laser beacon to solve a fundamental problem for laser-guided adaptive optics the need for a natural star in the feedback system and its associated limitations (#7). Such a polychromatic laser beacon has subsequently been demonstrated, and yet is an impractical solution for astronomy, although it may find application in ballistic missile defense, for steadying a laser that, to be useful, must be pointed ahead of an orbiting target. I assisted in design and construction of the University of Illinois Rayeigh-beacon Adaptive Optics system (Thompson, P.I.). I gained experience working on the optics (large static optics, deformable mirrors, and room-temperature and cryogenically-cooled optics), electronics, and both high-speed small-format CCD cameras, and optical and near-IR science arrays.

Infrared and Radio Interferometry, 1987-1993: I assisted Charlie Townes (P.I.) on the 10 μm heterodyne interferometer (#1,#2). That included experience in optics, CO₂ lasers, high voltage, choppers, lockins, PZTs, delays lines, spectrum analyzers, and cryogenic infrared detector systems. As P.I. of a project to measure the baryonic density of the universe with the 327 MHz line of deuterium in absorption, I observed two extremely bright radio sources with the NRAO VLA for 40-hours; I advanced the theory for noise in the domain where Michelson and Intensity interferometers overlap (#4).

University Teaching Experience:

1. UIUC ASTR 100 "Introduction to Astronomy," 250 students, 5 semesters
2. UIUC ASTR 122 "Stars and Galaxies," 100-200 students, 2 semesters
3. UIUC ASTR 210 "Introduction to Astronomy, Advanced" 50 students, 1 semester

¹Or see <http://star-www.st-and.ac.uk/~kdh1/transits/table.html>

4. UIUC ASTR 314 “Astronomical Techniques and Instrumentation ,” 10-20 students, 3 semesters
5. UIUC ASTR 403 “Observational Astronomy,” 3-4 students, 3 semesters, core course in graduate curriculum
6. UCB ASTR 9 “SETI,” 8 students, 1 semester, Seminar to permit grad-student to define curriculum and solo as professor.

Supervisory Experience:

1. 2011–, Veselin Kostov, JHU PhD candidate, passed General Board Orals, PhD topic is Circumbinary planets with Kepler Mission data
2. 2010–, Nicolas Crouzet, postdoctoral researcher, XO and HST
3. 2005–, Doug Long, XO research instrument analyst
4. 2004–, XO Project’s Extended Team of advanced citizen scientists: Vanmunster, Bissinger, Howell, Gary, Fleenor, Foote, Garcia, Masi, Mallia, Poleski, Gregorio, Richardson.
5. 2007-2009, Pavel Machalek, PhD JHU, 1st postdoc on Kepler mission, now in private industry modeling climate
6. 2006-2008, Christopher Burke, postdoctoral researcher, 2nd postdoc at Harvard with Charbonneau, now on Kepler mission
7. 2006-7, PI-designee for QE experiments, with Figer, Regan, Bergeron, and Lindsay.
8. 2007, Radek Poleski, summer intern, PhD 2011 Warsaw, now the Columbus Prize postdoctoral fellow, Ohio State
9. 2006, Brett Rimes, summer intern, now in private industry
10. 2003-5, Jeff Stys, data analyst, now in commanding team at STScI
11. 2003-4, Scott Fleming, summer intern (twice), PhD 2011 U. Florida, 1st postdoc at Penn State
12. 2003, Knute Ray, engineer at STScI
13. 1995-2002, U. Illinois undergraduate students, 1-2 years: Chad Bender (now PhD astrophysics), Dan Logan (now PhD astrophysics), Jim Waldemer, Jim Pulokas, Troy Klyber, and Dan Bullock.
14. 1996-2001, U. Illinois M.S. and PhD candidates, 1-3 years each, Ray Chen, Ian O’Dwyer, Patrick Hentges, Sam Crawford, Jie Zou, and Lawrence Tan.
15. 1994-1996, U. Illinois engineer, 2 years, Tao Wang

Service during STScI employment:

1. 2011- , Founding member of STScI Sustainability Council
2. 2005-2009, Founder and organizer, Meridian Speeches, distinguished lecture series, STScI
3. 2009, SOC for May Symposium, The Search for Life in the Universe, STScI

4. 2008, Giacconi Fellow Selection Committee, STScI
5. 2007, Participated as co-I in ATLAST, a large space telescope study by Marc Postman (P.I.)
6. 2007, Participated in study of large space telescopes organized by STScI Director, Steve Beckwith
7. 2007, Transit Archive Working Group, advisory panel to NASA Michelson Science Center
8. 2007, European M-class mission proposal (not selected), pro bono advisor to Jean Schneider
9. 2005, SOC for May Symposium on Extrasolar Planets, STScI
10. 2005, Prepared 2 of 12 science cases for the Stockman et al Science Assessment Team (JWST) report to NASA.
11. 2004, Drafted 1 of 2 highlighted science cases for STScI Director's presentation to congressional committee reviewing HST SM4-restoration or cancellation.
12. 2004-5, NIRCcam Science Team meetings, Arizona

Additional Services: Referee and Review Panels (dates redacted; one or more instances each):

1. Funding: US NSF Small Business Innovative Research
2. Funding: US NASA Origins of Solar Systems
3. Funding: US NASA APRA, Astronomy and Physics Research and Analysis
4. Funding: US NASA SAT, Strategic Astrophysics Technology
5. Telescope time: Keck
6. Referee for Journals: ApJ, AJ, A&A, MNRAS, PASP
7. Technical Reviewer: Imaging Through Turbulence, Roggeman, M. C, and Welsh, B. 1996, CRC Press, 320 pp.

Observing Programs since 2004 (P. I. listed first):

PRM = PI: 37 HST orbits, 48 SST hours, 33 ground-based nights.
 PRM = co-I: 302 HST orbits, 360 SST hours, 18 ground-based nights.

19. "The First Glimpse into a Super-Earth Atmosphere" HST GO 12251
Berta, Z. et al. 2010, 12 orbits.
18. "Time-variable Polarization of Glints from Earth's Ocean"
McCullough, P. R., & Janes, K. 2009, Lowell 1.8-m/PRISM, 11 nights
17. "Asteroseismology of Extrasolar Planet HD 17156" HST GO 11945
Gilliland, R., **McCullough, P. R.**, & Nelan, E. 2009, 175 orbits.
16. "Dynamic atmosphere of the eccentric and massive planet XO-3b" SST GO 600028
Machalek, P. et al. 2009, (Warm) IRAC, 2-bands, 160 hours.
15. "The Parallax of the Planet Host Star XO-3" HST GO 11706 and 12321
Johns-Krull, et al. 2008, Cycles 17 & 18, FGS astrometry, 11 orbits.

14. "Survey of XO-2 for an Earth-sized Planet"
Burke, C. J. & **McCullough, P. R.**, 2008, Lowell 1.8-m, 10 nights; WIYN 3.5-m, 8 nights.
13. "The Spitzer Exoplanetary Atmosphere Survey" SST IRAC
Harrington, J. et al. 2008, 200 hours.
12. "Thermal Inversion in the atmosphere of XO-3b" SST DD 525
McCullough, P. R., Burke, Burrows, Hora, Johns-Krull, & Machalek 2008, IRAC, 4-bands, 12 hours.
11. "Secondary Eclipses of XO Planets" SST GO 40780
McCullough, P. R., Burke, Valenti, Janes, Hora, Johns-Krull & Long 2007, Cycle 5, IRAC, 4-bands, 24 hours.
10. "Extrasolar Planet XO-2b" HST GO 11228
McCullough, P. R., Burke, Gilliland, Valenti & Nelan 2007, Cycle 16, NICMOS Grism and FGS astrometry, 21 orbits.
9. "Thermal Emission from Exoplanet XO-1b" SST GO 30879
McCullough, P. R., Valenti, Stys, Gilliland, Hora, Janes, & Johns-Krull 2006, Cycle 4, IRAC, 4-bands, 12 hours.
8. "Exoplanet XO-1b: light curve and parallax" HST/DD GO 10998
McCullough, P. R., Gilliland, Valenti, Janes, Hora, Burke, Johns-Krull, Nelan, & Stys 2006, Cycle 15, NICMOS Grism and FGS astrometry, 16 orbits.
7. "More XO Planets, Transiting Hot Jupiters"
McCullough, P. R., Burke, Valenti, Johns-Krull, Janes, & Long 2007B, HET 11-m spectroscopy, 25 hours of queue.
6. "Finding Additional XO Planets, Transiting Hot Jupiters"
McCullough, P. R., Burke, Valenti, Johns-Krull, & Janes 2007A, HET 11-m spectroscopy, 30 hours of queue.
5. "Finding Transiting Hot Jupiter XO-2b"
McCullough, P. R., Valenti, Stys, Burke, Janes & Johns-Krull 2006B, HET 11-m spectroscopy, 26 hours of queue.
4. "Mass Determination of a Jovian-sized Stellar Companion"
McCullough, P. R., Valenti, Stys, & Janes 2006A, HET 11-m spectroscopy, 24 hours of queue.
3. "Transiting Hot Jupiters, XO Candidates"
McCullough, P. R., Valenti, Stys, Janes, & Fleming 2005B, HET 11-m spectroscopy, 24 hours of queue.
2. "Transiting Hot Jupiters, XO Candidates"
McCullough, P. R., Valenti, Stys, Janes, & Fleming 2004B, KPNO 4-m spectroscopy, 4 nights.
1. "The HST survey of the Orion Nebula Cluster"
Robberto, M. et al. 2004, HST Cycle 13, GO 10246, 104 orbits HST, 4 nights CTIO 4-m.

Grant Support^a of PRM^b at Current Employer:

FUNDING AGENCY	PROJECT TITLE	AWARD AMOUNT	CUMULATIVE SUBTOTAL	PROJECT PERIOD
NASA	HST GO 12251: "The First Glimpse into a Super-Earth Atmosphere"	\$ XX,XXX ^b	\$ XXXXk	2010-2012
NASA	STScI DDRF: "The XO Constellation..."	\$ XX,XXX ^c	\$	2010-2011
NASA	Origins: "XO Project: Detection and Characterization of Transiting Extrasolar Planets"	\$ XXX,XXX	\$	2010-2014
NASA	LSI: "Scientific and Exploration Potential of the Lunar Poles"	\$ XX,XXX ^b	\$	2009-2012
NASA	HST GO 11945: "Asteroeismology of Extrasolar Planet HD 17156"	\$ XX,XXX ^b	\$	2009-2011
NASA	SST GO 600028: "Dynamic atmosphere of the eccentric and massive planet XO-3b"	\$ XX,XXX ^b	\$	2009-2012
NASA	SST DD 525: "Thermal Inversion in the atmosphere of XO-3b"	\$ XX,XXX	\$	2009-2011
NASA	HST GO 11228: "Extrasolar Planet XO-2b"	\$ XXX,XXX	\$	2007-2009
NASA	SST GO 40780: "Secondary Eclipses of XO Planets"	\$ XX,XXX ^d	\$	2007-2009
NASA	SST GO 30879: "Thermal Emission from Exoplanet XO-1b"	\$ XX,XXX ^d	\$	2007-2009
NASA	HST/DD GO 10998: "Exoplanet XO-1b: light curve and parallax"	\$ XX,XXX	\$	2007-2009
NASA	STScI DDRF: "XO Constellation" (Hardware Upgrade+DA)	\$ XXX,XXX ^c	\$	2006-2008
NASA	Origins: "The XO Planet Finding System"	\$ XXX,XXX	\$	2006-2009
NASA	STScI DDRF: "DA support"	\$ XX,XXX ^c	\$	2006-2007
NASA	Origins: "A Photometric Search for Jovian Planets Transiting Very Bright Stars"	\$ XXX,XXX	\$	2003-2006

^a Grants competitively awarded at current employer; unredacted table and similar data for previous employers available upon request. (NSF funding is not available to STScI.)

^b P.I. is PRM except where noted by this footnote, in which case only the subset managed by PRM is listed.

^c DDRF = STScI Director's Discretionary Research Funds; STScI internal peer-review.

^d Split 60:40 between STScI and CfA (to support co-I at CfA).

Refereed Publication List

Summary: 44 papers; 14 sole-author or first author; 15 second author; 15 other.

44. *Exoplanet XO-2b observed with HST NICMOS* Crouzet, N., **McCullough**, P. R., Burke, C. & Long, D. 2012, ApJ, submitted
43. *The Flat Transmission Spectrum of the Super-Earth GJ1214b from Wide Field Camera 3 on the Hubble Space Telescope* Berta Z. K., et al. 2012, ApJ, 747, article 35
42. *Precise Estimates of the Physical Parameters for the Exoplanet System HD-17156 Enabled by HST FGS Transit and Asteroseismic Observations* Nutzman, P., Gilliland, R. L., **McCullough**, P. R., Charbonneau, D., Christensen-Dalsgaard, J., Kjeldsen, H., Nelan, E. P., Brown, T. M., & Holman, M. J. 2011, ApJ, 726, article 3
41. *Asteroseismology of the Transiting Exoplanet Host HD 17156 with HST FGS* Gilliland, R. L., **McCullough**, P. R., Nelan, E. P., Brown, T. M., Charbonneau, D., Nutzman, P., Christensen-Dalsgaard, J., & Kjeldsen, H. 2011, ApJ, 726, article 2
40. *NICMOS Observations of the Transiting Hot Jupiter XO-1b* Burke, C. J., **McCullough**, P. R., Bergeron, L. E., Long, D., Gilliland, R. L., Nelan, E. P., Johns-Krull, C. M., Valenti, J. A., & Janes, K. A. 2010, ApJ, 719, 1796
39. *The XO Planetary Survey Project - Astrophysical False Positives* Poleski, R., **McCullough**, P. R., Valenti, J. A., Burke, C. J., Machalek, P., & Janes, K. 2010, ApJS, 189, 134
38. *NICMOS Observations of the Transiting Hot Jupiter XO-1b* Burke, C. J., **McCullough**, P. R., Bergeron, E., Long, D., Gilliland, R. L., Nelan, E. P., Johns-Krull, C. M., Valenti, J. A., & Janes, K. A. 2010, 719, 1796
37. *Probing the Terminator Region Atmosphere of the Hot-Jupiter XO-1b with Transmission Spectroscopy* Tinetti, G., Deroo, P., Swain, M. R., Griffith, C. A., Vasisht, G., Brown, L. R., Burke, C., & **McCullough**, P. 2010, ApJ, 712, L139
36. *Thermal Emission and Tidal Heating of the Heavy and Eccentric Planet XO-3b* Machalek, P., Greene, T., **McCullough**, P. R., Burrows, A., Burke, C. J., Hora, J. L., Johns-Krull, C. M., & Deming, D. L. 2010, ApJ, 711, 111
35. *Detection of Thermal Emission of XO-2b: Evidence for a Weak Temperature Inversion* Machalek, P., **McCullough**, P. R., Burrows, A., Burke, C. J., Hora, J. L., & Johns-Krull, C. M. 2009, ApJ, 701, 514
34. *Photometric Detection of a Transit of HD 80606b* Garcia-Melendo, E., & **McCullough**, P. R. 2009, ApJ, 698, 558
33. *XO-5b: A Transiting Jupiter-sized Planet with a 4 day Period* Burke, C. J., **McCullough**, P. R., Valenti, J. A., Long, D., Johns-Krull, C. M., Machalek, P., Janes, K. A., Taylor, B., Fleenor, M. L., Foote, C. N., Gary, B. L., Garcia-Melendo, E., Gregorio, J., & Vanmunster, T. 2008, ApJ, 686, 1331
32. *Thermal Emission of Exoplanet XO-1b* Machalek, P., **McCullough**, P. R., Burke, C. J., Valenti, J. A., Burrows, A., & Hora, J. L. 2008, ApJ, 684, 1427
31. *The Transit Light Curve Project. IX. Evidence for a Smaller Radius of the Exoplanet XO-3b* Winn, J. N., Holman, M. J., Torres, G., **McCullough**, P., Johns-Krull, C., Latham,

- D. W., Shporer, A., Mazeh, T., Garcia-Melendo, E., Foote, C., Esquerdo, G., & Everett, M. 2008, ApJ, 683, 1076
30. *Quantum Efficiency and Quantum Yield of an HgCdTe Infrared Sensor Array* **McCullough**, P. R., Regan, M., Bergeron, L., & Lindsay, K. 2008, PASP, 120, 759
29. *Detecting ‘Temperate’ Jupiters: the prospects of searching for transiting gas giants in Habitable Zones* Fleming, S. W., Kane, S. R., **McCullough**, P. R., & Chromey, F. R. 2008, MNRAS, 386, 1503
28. *XO-3b: A Massive Planet in an Eccentric Orbit Transiting an F5 V Star* Johns-Krull, C. M., **McCullough**, P. R., Burke, C. J., Valenti, J. A., Janes, K. A., Heasley, J. N., Prato, L., Bissinger, R., Fleenor, M., Foote, C. N., Garcia-Melendo, E., Gary, B. L., Howell, P. J., Mallia, F., Masi, G., & Vanmunster, T. 2008, ApJ, 677, 657
27. *XO-2b: Transiting Hot Jupiter in a Metal-rich Common Proper Motion Binary* Burke, C. J., **McCullough**, P. R., Valenti, J. A., Johns-Krull, C. M., Janes, K. A., Heasley, J. N., Summers, F. J., Stys, J. E., Bissinger, R., Fleenor, M. L., Foote, C. N., Garcia-Melendo, E., Gary, B. L., Howell, P. J., Mallia, F., Masi, G., Taylor, B., & Vanmunster, T. 2007, ApJ, 671, 2115
26. *A Transiting Planet of a Sun-like Star* **McCullough**, P. R., Stys, J. E., Valenti, J. A., Johns-Krull, C. M., Janes, K. A., Heasley, J. N., Bye, B. A., Dodd, C., Fleming, S. W., Pinnick, A., Bissinger, R., Gary, B. L., Howell, P. J., & Vanmunster, T. 2006, ApJ, 648, 1228
25. *The N2K Consortium. III. Short-Period Planets Orbiting HD 149143 and HD 109749* Fischer, D. A., Laughlin, G., Marcy, G. W., Butler, R. P., Vogt, S. S., Johnson, J. A., Henry, G. W., McCarthy, C., Ammons, M., Robinson, S., Strader, J., Valenti, J. A., **McCullough**, P. R., Charbonneau, D., Haislip, J., Knutson, H. A., Reichart, D. E., McGee, P., Monard, B., Wright, J. T., Ida, S., Sato, B., & Minniti, D. 2006, ApJ, 637, 1094
24. *The Multitude of Molecular Hydrogen Knots in the Helix Nebula* Meixner, M., **McCullough**, P., Hartman, J., Son, M., & Speck, A. 2005, AJ, 130, 1784
23. *The XO Project: Searching for Transiting Extrasolar Planet Candidates* **McCullough**, P. R., Stys, J. E., Valenti, J. A., Fleming, S. W., Janes, K. A., & Heasley, J. N. 2005, PASP, 117, 783
22. *Unraveling the Helix Nebula: Its Structure and Knots* O’Dell, C. R., **McCullough**, P. R., & Meixner, M. 2004, AJ, 128, 2339
21. *Discovery of an Old, Nearby, and Overlooked Supernova Remnant Centered on the Southern Constellation Antlia Pneumatica* **McCullough**, P. R., Fields, B. D., & Pavlidou, V. 2002, ApJ, 576, L41
20. *An Alternative to Spinning Dust for the Microwave Emission of LPH 201.663+1.643: An Ultracompact H II Region* **McCullough**, P. R., & Chen, R. R. 2002, ApJ, 566, L45
19. *Large-Scale Extended Emission around the Helix Nebula: Dust, Molecules, Atoms, and Ions* Speck, A. K., Meixner, M., Fong, D., **McCullough**, P. R., Moser, D. E., & Ueta, T. 2002, AJ, 123, 346
18. *A Robotic Wide-Angle H α Survey of the Southern Sky* Gaustad, J. E., **McCullough**, P. R., Rosing, W., & Van Buren, D. 2001, PASP, 113, 1326
17. *A Straight and Narrow Ionized Filament* **McCullough**, P. R., & Benjamin, R. A. 2001, AJ, 122, 1500

16. *The 5-degree Diameter Ionized Halo of the Planetary Nebula Abell 36* **McCullough**, P. R., Bender, C., Gaustad, J. E., Rosing, W., & Van Buren, D. 2001, AJ, 121, 1578
15. *Modified Strömgren Sphere* **McCullough**, P. R. 2000, PASP, 112, 1542
14. *A robotic wide-angle H-alpha survey of the southern sky* Gaustad, J. E., Rosing, W., **McCullough**, P., & van Buren, D. 2000, Kinematika i Fizika Nebesnykh Tel Supplement, 3, 136
13. *Atmospheric gravity wave signatures in the infrared hydroxyl OH airglow* Frey, H. U., Mende, S. B., Arens, J. F., **McCullough**, P. R., & Swenson, G. R. 2000, Geophys. Res. Lett., 27, 41
12. *Implications of H-alpha observations for studies of the Cosmic Microwave Background* **McCullough**, P., Gaustad, J. E., Rosing, W., & van Buren, D. 1999, invited review, Sloan Summit on Microwave Foregrounds, ASP, San Francisco, 181, 253
11. *Stardial: an Autonomous Astronomical Camera on the World Wide Web* **McCullough**, P., & Thakkar, U. 1997, PASP, 109, 1264
10. *A Correlation Between Balmer HII Emission and Infrared Cirrus* **McCullough**, P. R. 1997, AJ, 113, 2186
9. *An Upper Limit on the Contribution of Galactic Free-Free Emission to the Cosmic Microwave Background near the North Celestial Pole* Gaustad, J. E., **McCullough**, P. R., & van Buren, D. 1996, PASP, 108, 351
8. *A Comparison of Diffuse Ionized and Neutral Hydrogen Away from the Galactic Plane: H-alpha-emitting H I Clouds* Reynolds, R. J., Tufte, S. L., Kung, D. T., **McCullough**, P. R., & Heiles, C. 1995, ApJ, 448, 715
7. *The polychromatic artificial sodium star: a new concept for correcting the atmospheric tilt.* Foy, R., Migus, A., Biraben, F., Grynberg, G., **McCullough**, P. R., & Tallon, M. 1995, A&AS, 111, 569
6. *Photoevaporating stellar envelopes observed with Rayleigh beacon adaptive optics* **McCullough**, P. R., Fugate, R. Q., Christou, J. C., Ellerbroek, B. L., Higgins, C. H., Spinhirne, J. M., Cleis, R. A., & Moroney, J. F. 1995, ApJ, 438, 394
5. *Radio observations of D I and fractionation* Heiles, C., **McCullough**, P. R., & Glassgold, A. E. 1993, ApJS, 89, 271
4. *Interferometry of CYG A and CAS A - Source noise at 327 MHz* **McCullough**, P. R. 1993, AJ, 106, 797
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