

## STEPHEN CHARLES UNWIN

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### Summary:

Several years experience as proposal manager and capture lead on small and medium-scale JPL mission proposals to NASA. Line and project management experience. Comfortable spanning the interface between science and engineering, management at all project levels, problem-solving, and trading science, engineering, and programmatic requirements. Broad practical experience as a developer and user of scientific hardware and software as practical end-to-end systems. Twenty years experience in both laboratory and remote astronomical facility environments. Over twenty-five years experience in technical and management roles in mission science teams, proposal teams, and mission concept teams.

### Objective:

To use my broad experience in science, engineering, and management in a role where I can use my cross-disciplinary experience. I am interested in early concept development, and in playing a leading role in mission proposals. I have Program-level experience and would like to continue contributing in scientific and programmatic policy making, investment, and advocacy. I can contribute best where my broad-based problem-solving skills can be exercised.

### Major Positions and experience:

- 2020-2023 Vice President, American Astronomical Society
- 2019 Capture Lead, NASA Astrophysics Small Explorer (SMEX) Proposal
- 2017-2018 Proposal Manager, NASA MIDEX Step 2 Concept Study Report (SPHEREx) – Assembled and submitted the 1100-page SPHEREx Concept Study Report; Mission selected for flight Feb 2019.
- 2017-2020 Training Lead, JPL Innovation Foundry (Section 154)
- 2017-2019 Study Lead, NASA Astrophysics Probe Study: Cosmic Dawn Intensity Mapper (CDIM)
- 2015-2016 Proposal Manager, NASA MIDEX Proposal (SPHEREx) – Assembled and submitted a new SPHEREx proposal in less than 2 months
- 2015-2016 Proposal Manager, NASA SMEX Phase A mission concept study (SPHEREx Phase A) Coordinated the efforts of science, engineering, management, costing, and writing teams to develop the 1000-page Concept Study Report for NASA SMD
- 2015 Proposal Manager, NASA Earth Ventures Mission-2 proposal, JPL (WaCM) – radar study of ocean winds and currents
- 2013-2014 Capture Lead & Proposal Manager, NASA SMEX Mission Concept (SPHEREx) – all-sky optical-near-IR spectroscopic survey mission
- 2012 Proposal Manager, NASA SALMON-2 Mission of Opportunity proposal, JPL (ZODIAC-II) - Balloon experiment for high-contrast imaging
- 2011-2012 Proposal Manager, NASA Earth Ventures Instrument-1 2011 proposal (MEM) – Methane Emissions Mapper

- 2004–2015 Deputy Program Scientist, Exoplanet Exploration Program, JPL. Provide programmatic support to JPL Program Manager and NASA Program Scientist. Development of roadmaps, planning for science advisory meetings, preparing reports and presentations, briefings to NASA HQ etc. Co-hosted a community workshop in 2008 to solicit community input to planet-finding science roadmap.
- 2006–2011 Deputy Director, JPL Center for Exoplanet Science (Center of Excellence). Organize and host exoplanet seminar series. Support Director with proposal reviews, budget and reporting; managed a small focused grants program.
- 2010 Proposal Manager, NASA Explorer 2011 mission proposal, JPL (ELEKTRA) – Near-IR exoplanet transit mission.
- 2010 Proposal Manager, NASA APRA 2010 sub-orbital mission proposal, JPL (ZODIAC) – Balloon experiment for high-contrast imaging
- 1996–2010 Deputy Project Scientist, Space Interferometry Mission, JPL. Managed the Science Working Group, 1996–2000, and NASA-selected Science Team, 2000–2006. Hosted proposal and technical workshops. Served as LOC Chair for major astrometry conference in Dana Point, 1999. Serve as the principal interface between Project and science community through telecons, workshops, and special sessions at AAS meetings. Development, negotiation, and documentation of science requirements and science scheduling and data rights policies. Participate actively in a wide range of engineering design tradeoffs affecting science. Manage science study tasks supporting these design trades. Status and progress reporting to JPL management, SIM Science Team, and NASA HQ.
- 2004–2007 Deputy Project Scientist, Terrestrial Planet Finder Interferometer Project, JPL. Continue to manage external advisory TPF Interferometer Science Working Group; coordinate science-based trade studies supporting instrument designs, at JPL and through science contracts with academia. LOC Chair for major science conference on TPF, San Diego, 2004
- 2001–2008 Section Staff, Interferometry and Large Optical Systems Section (383), JPL
- 2002–2004 Deputy Project Scientist, Terrestrial Planet Finder, JPL. Managed an external advisory Science Working Group; coordinate science-based trade studies supporting instrument designs
- 1996–2002 Scientist, Interferometry Center of Excellence, (additional duty), JPL. Present lectures on interferometry at JPL and external. Served as science coordinator for interferometry instruments
- 1994–1996 Project Manager and Scientist, Fast Digital Acquisition System, Caltech. Developed project using state-of-the art commercial high-speed tape recorder for radio astronomy: digital baseband recording for detection and detailed studies of pulsars. Served as principal in all major project roles (except the development of a custom fast digitizer): hardware procurement, construction, software integration, testing, deployment at the Parkes Telescope (Australia), and observing.
- 1991–1993 Caltech High Resolution Microwave Survey (SETI) Scientist. Modified the Owens Valley Radio Astronomy Observatory 40-m radio telescope control system to develop a rapid-scanning mode in support of planned SETI observations. The NASA SETI Project was canceled in 1993.
- 1984–1995 Manager of the VLBI Correlator, Member of the Professional Staff, Caltech. Managed and coordinated continuing engineering and software development the Very Long Baseline Interferometry (VLBI) Correlator systems (models Mk II and Block II) for processing of data recorded at radio telescopes - system is used for radio astronomy, geodesy, and spacecraft navigation support. Line and project management responsibility for operating and maintenance budget, and staffing for operations. Responsible for scientific integrity of the instrument, verified by periodic maintenance and testing.

- 1979–1984 Research Fellow and Staff Scientist in Radio Astronomy, Caltech. My research at Caltech focused mainly on understanding the processes in the nuclei of active galaxies which result in the ejection of oppositely directed pairs of relativistic jets. The principal tool for studying these time variable phenomena on timescales of months to years is VLBI. I was a key player in Caltech’s leadership in this field in the 1980s, as observations improved, and I helped develop software to render the data as images for scientific analysis. The study of ‘superluminal’ (relativistic) jets in the nuclei of active galaxies provided insights into the inner workings of quasars. My interest in the techniques and observations, as well as science, led to my becoming manager of the VLBI Correlator in 1984.

#### **Other recent tasks at JPL (2017-2019):**

- Several A-Team concepts for Earth Ventures Instruments proposals
- Analysis of R&TD proposals for 7x APST Chief Scientist
- Attend national advisory committee meetings and report to JPL on discussions and findings (NASA, National Academy of Sciences)
- Analysis of database of proposal debriefs for trends in weaknesses for the Innovation Foundry
- Community interface to JPL for the American Astronomical Society, for membership, conference, and science policy issues

#### **Affiliations:**

- Vice President, American Astronomical Society, 2020-2023
- American Astronomical Society, Agent to Pasadena astronomers, 2016-
- Councilor (member of Board of Directors), American Astronomical Society (AAS), 2014-17
- Committee on Public Policy of the American Astronomical Society, 2016-17
- Member of the US National Committee of the International Astronomical Union, 2017-19
- Member, Division on Dynamical Astronomy of the American Astronomical Society, 1998-
- Member, Division for Planetary Science of the American Astronomical Society, 2013-
- Full Member, International Scientific Radio Union, Commission J (Radio Astronomy), 1985-
- Full Member, International Astronomical Union, 1985-
- Fellow, Royal Astronomical Society, 1979-
- Full Member, American Astronomical Society, 1980-

#### **Awards:**

- JPL Discovery Awards 2017 and 2018
- JPL Voyager Award 2017
- JPL Mariner Award 2011
- NASA Group Achievement Award, 2011 and 1993
- JPL Explorer Award 2009
- JPL Level-B Leadership Bonus Awards, 2000 and 2007
- JPL Team Bonus Awards, 2005, 2009 (two), 2011 (two)
- Clare College, University of Cambridge, England: academic awards in 1973, 1974, 1975, 1976

#### **Review Panels and Committees:**

- Membership Committee of the American Astronomical Society (AAS), 2018-19
- Chair, AAS Task Force on Meetings, 2015-2016.
- NASA proposal review panel scientist, 1992, 1994, 1998, 1999, 2011, 2012, 2013, 2015, 2016, 2017

- Brouwer Award Committee Chair, Division on Dynamical Astronomy of the AAS, 2010
- Division Chair, Division on Dynamical Astronomy of the AAS, 2006–2007
- NSF Management Review Committee of Arecibo Observatory, 2007
- NAIC / Arecibo Users Committee, 2000–2003. Committee Chair, 2003
- National Science Foundation proposal reviewer, 2000–2005
- AAS / Division on Dynamical Astronomy, Committee member 2000–2002
- National Radio Astronomy Observatory Users Committee, 1992–95. Committee Chair, 1995
- Proposal Referee, U.S. VLBI Network, 1990–92

### **Education:**

1979 PhD degree in Radio Astronomy. University of Cambridge, England. Thesis: “Distribution and Kinematics of HI in M31”. Thesis supervisor: Dr. J.E. Baldwin

1979 Master of Arts degree. Clare College, University of Cambridge, England

1976 BA with Honors (First Class), in Physics and Theoretical Physics, Clare College, Cambridge

### **Conferences:**

I have chaired numerous workshops, working group meetings, and conferences. I convened, set the agendas, and led, more than 25 mission (SIM) Science Team meetings. I served as the principal organizer for several conferences:

- Chair of LOC and SOC for 3-day Capture Lead Workshop, Oxnard, Nov 2018
- “On the Shoulders of Giants”, AAS Meeting, Boston, 2014 (SOC & LOC Chair)
- “Exploring Strange New Worlds”, Exoplanet Program, Flagstaff, 2011 (SOC and LOC member)
- NASA Astrophysics Mission Concepts Studies–Pre-Proposal Workshop, Pasadena, 2007
- AAS Division on Dynamical Astronomy Annual Meeting, Halifax, Canada, June 2006 (Program Chair, responsible for the scientific program; also served as Chair of the Division)
- “Dust Disks and the Formation and Evolution of Habitable Planets”, San Diego, 2004 (LOC Chair; and edited online proceedings)
- “Working on the Fringe”, Exoplanet Program, Dana Point 1999 (LOC Chair; and editor, hardcopy conference publication for Proceedings of ASP)

### **Research publications:**

In addition to the above responsibilities, I have maintained an active astronomical research program, with over 40 papers published in refereed scientific journals since 1978. The following major papers are representative. Full list available upon request.

- Cooray, A., et al. (63 co-authors) 2019, “CDIM: Cosmic Dawn Intensity Mapper Final Report”, arXiv:1903.03144C
- Doré, O., et al. (63 co-authors) 2018, “Science Impacts of the SPHEREx All-Sky Optical to Near-Infrared Spectral Survey II: Report of a Community Workshop on the Scientific Synergies Between the SPHEREx Survey and Other Astronomy Observatories”, arXiv:1805.05489D
- Doré, O., et al. (67 co-authors) 2016, “Science Impacts of the SPHEREx All-Sky Optical to Near-Infrared Spectral Survey: Report of a Community Workshop Examining Extragalactic, Galactic, Stellar and Planetary Science”, arXiv:1606.07039
- Spangelo, S.C., Katti, R.M., Unwin, S.C., & Bock, J.J. 2015, “All-sky survey mission observing scenario strategy”, JATIS, 10.1117/1.JATIS.1.3.037001
- Stapelfeldt, K.R., et al. 2015. “Exo-C: a probe-scale space observatory for direct imaging and spectroscopy of extrasolar planetary systems”, SPIE, 10.1117/12.2191720.
- Makarov, V.V. & Unwin, S.C. 2015. “Radial velocities and binarity of southern SIM grid stars”,

MNRAS, 446, 2055.

- Unwin, S.C. et al. 2015. “Probe-Scale Mission Concepts for Direct Imaging and Spectroscopy of Nearby Exoplanet Systems”, AAS 225, id.259.
- Revalski, M., et al. 2014 “Investigating the Variability of Active Galactic Nuclei Using Combined Multi-quarter Kepler Data”, ApJ, 785, 60
- Wehrle, A., Wiita, P., Unwin S., et al. 2013, “Kepler Photometry of Four Radio-loud Active Galactic Nuclei in 2010-2012”, ApJ, 773, 89
- Unwin, S.C., et al. (16 co-authors), 2012, “Coronagraphic Imaging of Debris Disk From a High Altitude Balloon Platform”, SPIE, 8442, 0GU
- Bryden, G. et al. 2011, “Zodiac II: Debris Disk Science from a Balloon”, SPIE, 8151, 50
- Davidson, J.M. & Unwin, S.C. 2009, “SIM Lite Astrometric Observatory: from Earth-like Planets to Dark Matter”, JPL Publication 400-1360 2/2009
- Lawson, P.R., Traub, W.A. & Unwin, S.C. 2009, “Exoplanet Community Report”, JPL Publication 09-3 3/2009
- Unwin, S.C., et al. (35 co-authors) 2008, “Taking the Measure of the Universe: Precision Astrometry with SIM PlanetQuest”, PASP, 120, 38
- Catanzarite, J., Shao, M., Tanner, A., Unwin, S., & Yu, J. 2006, “Astrometric Detection of Terrestrial Planets in the Habitable Zones of Nearby Stars with SIM PlanetQuest”, PASP, 118, 1322
- Unwin, S.C. 2005, “Precision Astrometry with the Space Interferometry Mission–PlanetQuest”, Astrometry in the Age of the Next Generation of Large Telescopes, ASP Conference Series, 338, 37.
- Meadows, V.S., Dumas, C., Unwin, S.C., & Crisp, D. 2003 “Planetary Science and the Terrestrial Planet Finder Mission”, AAS/DPS 35.1810.
- Jones, D.L., Wehrle, A.E., Unwin, S.C., Meier, D.L., & Piner, B.G., 2003, “Location of the Nonthermal Optical Emission from Jets in AGN”, New Astronomy Reviews, 47, 681.
- Piner, B.G., Unwin, S.C., Wehrle, A.E., Zook, A.C., Urry, C.M., & Gilmore, D.M. 2002, “Speed and Orientation of the Parsec-Scale Jet in 3C 279”, ApJ, 588, 716.
- Unwin, S.C. 2002, “Space Interferometry Mission Science Operations”, Proc. SPIE, 4852, 172.
- Unwin, S.C. and Stachnik, R. (eds.) 2000, “Working on the Fringe: Optical and IR Interferometry from ground and Space”, ASP Conference Series, vol. 194, pp. 1-485.
- Jenet, F.A., Anderson, S.B., Kaspi, V.M., Prince, T.A., & Unwin, S.C. 1998, “Radio Pulse Properties of the Millisecond Pulsar PSR J0437-4715”, ApJ, 498, 365.
- Unwin, S.C., Wehrle, A.E., Urry, C.M., Gilmore, D.M., Barton, E.J., Kjerulf, B.C., Zensus, J.A., & Rabaca, C.R. 1994, “Inverse-Compton X-ray Emission from the Superluminal Quasar 3C 345”, ApJ, 432, 103.
- Unwin, S.C. & Wehrle, A.E. 1992, “Kinematics of the pc-scale Jet in 3C 345”, ApJ, 398, 74.
- Unwin, S.C. 1983, “Neutral Hydrogen in the Andromeda Nebula”, MNRAS, 205, 773.
- Unwin, S.C., Readhead, A.C.S., Wilkinson, & P.N., Ewing, M.S. 1978, “Phase Stability in the Drifting Subpulse Pattern of PSR 0809+74”, MNRAS 182, 711.