

**Dr. Raghvendra Sahai**

## **RESEARCH INTERESTS**

- Stellar Evolution: High-resolution studies (imaging/spectroscopy) of dying Sun-like stars (red giants, pre-planetary and planetary nebulae), Young Stellar Objects, Massive Star-Formation Regions
- Astrophysical Jets, Circumstellar Dust
- Multiwavelength observations (radio, millimeter-wave, near-to-far IR, optical, UV & X-rays): Guest Observer on NASA's Great Observatories (Hubble Space Telescope, Chandra X-Ray Observatory, Spitzer Space Telescope, GALEX), Herschel, XMM-Newton, and leading ground-based telescopes (e.g., Keck I and II)
- High-resolution ground-based interferometry at radio and millimeter-wave wavelengths (e.g., using the National Radio Astronomy Observatory's Very Long Baseline Array [VLBA] and the Very Large Array [VLA], the Atacama Large Millimeter/submillimeter Array [ALMA], the Submillimeter Array [SMT], and the Combined Array for Research in Millimeter-wave Astronomy [CARMA])
- Developing pipelines for extraction and analysis of large data sets from astronomical archives (e.g., GALEX)
- Modeling of multiwavelength data (including continuum/line radiative transfer)
- Numerical simulations of (magneto)hydrodynamic stellar wind/jet interactions (supercomputing)
- High-contrast coronagraphic imaging (optical/near-infrared) from space to search for planetary and brown dwarf companions around nearby stars, Kuiper Belt and Oort Clouds analogs around nearby red giants, circumstellar disks
- UV Photometric & Spectroscopic SmallSat missions to study active accretion in young and dying stars, and the star-planet interaction in exoplanet systems

## **EDUCATION**

1985 Ph.D., California Institute of Technology  
1981 M.S. Astronomy, California Institute of Technology  
1978 M.S. Physics, Indian Institute of Technology, Kanpur, India

## **EMPLOYMENT**

2008-todate Principal Research Scientist, Jet Propulsion Laboratory  
2002-2008 Research Scientist (Senior A), Jet Propulsion Laboratory  
1995-2002 Research Scientist, Jet Propulsion Laboratory Laboratory  
1992-95 Senior Resident Research Associate at JPL, National Research Council

1990-92 Docent, University of Gothenburg, Sweden  
1986-90 Post-doctoral Research Associate, University of Gothenburg, Sweden  
1985-86 Post-doctoral Research Associate, University of Texas, Austin  
1984-85 Robert A. Welch Foundation Fellow, University of Texas, Austin

### **SERVICE AND PROFESSIONAL EXPERIENCE**

2022 Hubble Space Telescope Proposal Review Panel Cycle 30, Space Telescope Science Institute  
2021 JWST Cycle 1 Review Panel, Space Telescope Science Institute  
2021 MDEX Concept MAGIC Science Review, JPL  
2021-2022 ALMA Cycle 8 Suppl., Cycles 9,10 Distributed Proposal Review, Joint ALMA Observatory  
2018 2018 Hubble Mid-Cycle Review Panel, Space Telescope Science Institute  
2018 ALMA Cycle 6 Proposal Review Committee, Joint ALMA Observatory  
2017 ALMA Cycle 5 Proposal Review Committee, Joint ALMA Observatory  
2017 Hubble Fellow Selection Committee, Space Telescope Science Institute  
2017 Hubble Mid-Cycle Review Panel, Space Telescope Science Institute  
2017 Chalmers (Technical University) Academy Fellows Application Review, Knut & Alice Wallenberg Foundation's (KAW), Sweden  
2016 ULTRASAT STMC review, Design Session for UltraSat Instrument STMC 2016-11  
2016 Design Session for Sona Palomar Instrument 2016-07  
2016 Cycle 24 Hubble Space Telescope Mid-Cycle Proposals Review  
2016 SOFIA Time Allocation Committee  
2016 ALMA Cycle 4 Proposal Review Committee, Joint ALMA Observatory  
1985-todate Frequent Referee for papers submitted to Astrophysical Journal, Astronomical Journal, Astronomy and Astrophysics & Monthly Notices of the Royal Astronomical Society  
2015 Hubble Space Telescope Proposal Review Panel Cycle 23  
2015 Chandra Peer Proposal Review Panel Cycle 17  
2012-2013 Member, Scientific Organizing Committee, International Conference on "Asymmetric Planetary Nebulae VI"  
2012 Hubble Space Telescope Proposal Review Panel Cycle 20  
2011 NASA Astrophysics Data Analysis Program [ADAP] Review  
2010,2011 Herschel Observing Time Allocation Committee  
2005-08 JPL Group Supervisor Alternate, group 3262 "Origins of Stars and Planets"  
2008-09 Panel Member, National Optical Astronomy Observatory (NOAO), Telescope Allocation Committee

- 2006-2007 Member, Scientific Organizing Committee, International Conference on “Asymmetric Planetary Nebulae IV”
- 2006 Hubble Space Telescope Proposal Review Panel Cycle 15
- 2005 Spitzer Space Telescope Proposal Review Panel Cycle 2
- 2005 JPL Research and Technology Development Proposal Review
- 2003,2004 Research Project Review for FAPESP (Sao Paulo State Funding Agency), Brazil
- 2002-2005 JPL Promotion Advisory Board Reviews
- 2002-2003 Associate Member, Scientific Organizing Committee, International Conference on “Asymmetric Planetary Nebulae III”
- 2002-2003 NHST/SUVO Science Working Group
- 2001 Hubble Space Telescope Proposal Review Panel Cycle 10
- 1997-todate Member, Science Team, ECLIPSE Proposal (MIDEX, DISCOVERY)
- 1996 Member, Science Team for CODEX/HST Instrument Proposal
- 1995-99 Associate Member, Science Team, Hubble Space Telescope Wide Field & Planetary Camera 2
- 1991,1992 Expert Member, Ph.D. dissertation committees, Chalmers University of Technology, Gothenburg, Sweden

#### **AWARDS**

*(the competitively-garnered funding listed below exceeds an average of \$400,000 per year)*

1. **Co-I** on NASA Minority University Research and Education Project Award (2015-20) to Cal State University (CSU), Los Angeles
2. 3 **PI** JPL Research & Technology Development Awards (2013,2014,2017)
3. 4 **PI** and 2 **co-I** XMM-Newton (ESA/NASA) GO program awards (2007-2017)
4. 30 **PI** and 9 **co-I** NASA Hubble Space Telescope GO program awards (1998-2021)
5. 1 **co-I** & **US PI** JWST Cycle 1 award (2021)
6. 2 **co-I** JWST Cycle 1 awards (2021)
7. 4 **PI** and 1 **co-I** SOFIA GO program awards (2011-2017)
8. 9 **PI** and 2 **co-I** NASA Chandra X-Ray Observatory GO program awards (2001-2015)
9. 3 **PI** and 1 **co-I** ESA/NASA Herschel Space Observatory GO program awards (2010-2012)
10. 3 **PI** and 5 **co-I** NASA Spitzer Space Telescope GO program awards (2004-2006)
11. 2 **PI** NASA Long Term Space Astrophysics 5-yr awards (1998-2003, 2005-2010)
12. 2 **PI** NASA GALEX GO program awards (2004, 2008)
13. 5 **PI** NASA Astrophysics Data Program 3-yr awards (2004-2007, 2010-2014, 2013-2016, 2017-2021)
14. 6 **co-I** NASA Astrophysics Data Program 3-yr award (2021)

#### **FUNDED PROPOSALS (last 4 years)**

1. (PI: NASA ADAP, 2021) Searching for Bloated Stars: A Study of the Early Evolution of Massive Stars
2. (co-PI & JPL-PI: NASA ADAP, 2021) Mass-loss rates in Galactic AGB stellar populations
3. (PI: NASA ADAP, 2017) An X-Ray and UV Study of a New Class of AGB stars with Actively-Accreting Binary Companions: fuvAGB Stars
4. (PI: NASA ADAP, 2017) Star-Formation in Free-Floating Evaporating Gaseous Globules
5. (PI: HST/ GO 16232) Investigating The Interstellar Bullet Engine IRAS05506+2414
6. (PI: HST/ GO 15892) Probing the Jet at the Heart of the Coldest Object in the Universe
7. (PI: HST/ GO 15209) High-Speed Bullet Ejections during the AGB to Planetary Nebula Transition: A Study of the Carbon Star V Hydrae
8. (PI: HST/ GO 15208) Star-Formation in Free-Floating Evaporating Gaseous Globules
9. (PI: SOFIA/ 06\_0049) Probing the Mass-Ejection Process Leading to the Formation of Young Planetary Nebulae
10. (PI: XMM-Newton 80247) Identifying the Elusive Companions in AGB Binaries with Active Accretion
11. (PI: SOFIA/ 05\_2016) Shocked and Scorched: A GREAT Investigation of [CII] and [OI] emission from free-floating Evaporating Gas Globules in Massive Star Formation Regions
12. (PI: HST/ GO 14713) Binarity and Accretion Activity in AGB Stars with Variable UV and X-Ray Emission
13. (PI: HST/ GO 14712) HST-COS Ultraviolet Spectroscopy of B[e] Supergiant Stars in the Magellanic Clouds
14. (co-I: HST/ GO 14563) Accretion to Outflow in Evolved Star Binaries: Disks in AGB, PPN and PN

### **HONORS**

1. NASA Exceptional Public Service Medal 2018
2. 2007 West Coast Alumni Leadership Award, Indian Institute of Technology, Kanpur
3. 1978 President's Gold Medal, Best Outgoing Undergraduate Student, Indian Institute of Technology, Kanpur, India

### **MENTORING & SUPERVISION**

- 10/21-todate Jessica Jelke (U. Washington, Seattle, WA), MSP program
- 01/22-04/22 Kaitlyn Shavelle (Columbia U., New York, NY), MSP program
- 06/21-12/21 Miranda Chang (UCLA, Los Angeles, CA), MSP Program
- 09/20-01/21 Cynthia Ibrahim (San Diego State University, San Diego, CA), MSP program
- 06/20-12/20 Amelia Whitworth (California Institute of Technology, Pasadena, CA), Caltech SURF & MSP program

06/20-09/20 Antonio Caceres (California Institute of Technology, Pasadena, CA), Caltech SURF

06/20-03/21 Rabia Husain (U. Texas, Austin, TX), MSP program

01/18-05/18 Cristilyn Cortez (Cal State University, San Bernardino, CA), MSP program

09/17-12/17 Alec Mangan (Iowa State University, Ames, IA), NASA UI program

01/17-06/17 Samantha Scibelli (Stony Brook University, NY), NASA UI program

06/16-08/16 Daniel McAndrew, Caltech, Caltech SURF program

05/16-08/16 Jonathan Barnes, Cal State University (CSU), Los Angeles, MUREP/MIRO program

02/16-06/15 Cristilyn Cortez (Cal State University, San Bernardino), SIRI program

08/15-12/15 Samantha Scibelli (Stony Brook University, NY), NASA UI program

02/15-08/15 Ryan McPeters (College of the Canyons, CA), SIRI and JPL Summer Internship program

06/15-08/15 Kelechi Ikegwu (North Carolina A & T State University), NASA MUREP program

01/15-06/15 Benjamin Stenger (Cal State University Fullerton, CA), Minority Scholar Programs in STEM

06/09-08/15 Elizabeth Toller (MIT, MA), Minority Scholar Programs in STEM

01/14-05/14 Galen Mack-Crane (Occidental College, Eagle Rock, CA), SIRI program

06/13-08/13 Matthew Young (CSU, Los Angeles), California-Arizona Minority Partnership for Astronomy Research and Education (CAMPARE)

01/13-05/13 Skyler Saleebyan (Glendale Community College, Glendale, CA), SIRI program

01/13-05/13 Stoyan Ivanova (Georgia Tech., GA), NASA/USRP Internship program

09/12-12/12 Alyx Stevens (U. Texas, Austin, TX), NASA/USRP Internship program

06/12-07/12 Jennifer Deeb (Bear Creek High School, Lakewood, CO), Cal State University Summer Teacher and Researchers Program

01/12-04/13 Jorge Munoz (Occidental College, Los Angeles, CA), SIRI & Caltech SURF program

09/11-04/14 Alexandra Gruson (Santa Monica Community College, Santa Monica, CA), SIRI program & JPL Research Apprentice program

09/11-12/11 Abigail Azari (Smith College, Northampton, MA), NASA/USRP Internship program

01/11-05/11 Adam Blake (Embry-Riddle Aeronautical University, Daytona Beach, FL), NASA/USRP Internship program

01/11-05/11 Nick Stantzos (Northern Arizona University, Flagstaff, AZ), NASA/USRP Internship program

08/09-11/09 Charlotte Blumenfeld (Columbia University, NY), USRP Internship program

06/09-09/09 Chris Chronopoulos (MIT, MA), Space Grant Student

06/09-09/09 Anna Rosen (University of California, Berkeley, CA), Minority Initiatives Internship Summer Student

01/09-05/09 John Caleb Wherry (Austin Peay State University, Clarksville, TN), NASA/USRP Internship program

09/08-12/08 Rachael Ainsworth (U. Tennessee, Knoxville, TN), NASA/USRP Internship program

02/07-08/07 Gregory Villar (CSU, Pomona), Minority Initiatives Internship Summer Student (2008)

02/07-08/07 Mark Rubin (CSU, Northridge, CA), Academic Part Time, (2007)

- 02/07-08/07 Mark Rubin, Academic Part Time  
 2005-07 Dr. M. Stute, Caltech Postdoctoral Scholar at JPL
- 06/06-08/06 Krzysztof Findeisen (Cornell University, Ithaca, NY), Caltech Summer Research Undergraduate Fellow at JPL
- 2001-03 Dr. C-F. Lee, Postdoctoral Scholar, National Research Council (NRC)
- 2000-02 Dr. C. Sánchez Contreras, Caltech Postdoctoral Scholar at JPL  
 1999 D. Ionita-Ariton (Caltech, CA), Caltech Summer Research Undergraduate Fellow at JPL
- 1997-99 Dr. A. Dayal, Caltech Postdoctoral Scholar at JPL  
 1995 B. E. Sugerman, Honors Thesis “Models of Kinematic Structure in the Circumstellar Outflows of the AGB Carbon Stars V Hydra Using High-Resolution Spectroscopy of the  $4.6\ \mu\text{m}$  CO Lines”, Occidental College
- 1994 B. E. Sugerman (Occidental College, Eagle Rock, CA), Caltech Summer Research Undergraduate Fellow at JPL
- 1992 F. Larsson, Senior Undergraduate Research thesis “Time-variability in the rare  $^{29}\text{SiO}(v=0, J=2-1)$  maser in NML Tau, other Miras and Orion-KL”, University of Gothenburg, Sweden
- 1991-92 A. Nummelin, Senior Undergraduate Research thesis “Mass Loss from AGB Stars – The Circumstellar Envelope of the Carbon Star V Cygni”, Chalmers University of Technology, Sweden

### **TEACHING EXPERIENCE**

- 1990-1992 Advanced Undergraduate Course in “Astronomical Techniques”, Chalmers University of Technology and University of Gothenburg, Sweden
- 1988-1992 Advanced Undergraduate Course in “Stars and Stellar Atmospheres”, Chalmers University of Technology and University of Gothenburg, Sweden

### **PROFESSIONAL SOCIETIES**

- 1 American Astronomical Society
- 2 International Astronomical Union
- 3 European Astronomical Society (founding member)

### **PUBLIC OUTREACH**

- 2004-2005 Lecturer at “SPECTRA” Summer Workshops for Physics High-School Teachers at University of La Verne, La Verne, CA 91750
- 1999-2003 Public Talks, e.g. “A Window to the Beginning of Time - The Hubble Space Telescope”, 11/20/03 at Explorers Club
- 1995-98 JPL Annual Open House Wide Field Planetary Camera 2 Booth

### **PEER-REVIEWED PUBLICATIONS**

1. "CN abundance variations in the shell of IRC +10216", Wootten, A., Lichten, S. M., **Sahai, R.**, & Wannier, P. G. 1982, ApJ, 257, 151
2. "SiS in circumstellar shells" **Sahai, R.**, Wootten, A., & Clegg, R. E. S. 1984, ApJ, 284, 144
3. "CO 4.6 micron emission lines from the IRC +10216 inner envelope", **Sahai, R.** & Wannier, P. G. 1985, ApJ, 299, 424
4. "Mass loss from giant and supergiant stars", Wannier, P. G., & **Sahai, R.** 1986, ApJ, 311, 335
5. "A hot, low mass-loss rate inner envelope in IRC + 10216", **Sahai, R.** 1987, ApJ, 318, 809
6. "Abundances in red giant stars - Carbon and oxygen isotopes in carbon-rich molecular envelopes", Wannier, P. G., & **Sahai, R.** 1987, ApJ, 319, 367
7. "Discovery of very high velocity outflow in V Hydra - Wind from an accretion disk in a binary?" **Sahai, R.** & Wannier, P. G. 1988, A&A, 201, L9
8. "The centimeter radio continuum from IRC+10216 and other late-type stars with mass-loss envelopes", **Sahai, R.**, Claussen, M. J., & Masson, C. R. 1989, A&A, 220, 92
9. "SiO and CO emission from carbon stars with silicate features and southern IRAS sources", Deguchi, S., Nakada, Y., & **Sahai, R.** 1990, A&A, 230, 339
10. "Mass loss from red giant stars. II - Carbon stars", Wannier, P. G., **Sahai, R.**, Andersson, B.-G., & Johnson, H. R. 1990, ApJ, 358, 251
11. "CO in the bipolar planetary nebula NGC 3132", **Sahai, R.**, Wootten, A., Clegg, R. E. S. 1990, A&A 234, L1
12. "A new self-consistent model of circumstellar CO emission for deriving mass-loss rates in red giants. I - The carbon-rich star U Camelopardalis", **Sahai, R.** 1990, ApJ, 362, 652
13. "The bipolar planetary nebula IC 4406 - CO, optical and dust emission", **Sahai, R.**, Wootten, A., Schwarz, H. E., & Clegg, R. E. S. 1991, A&A, 251, 560
14. "Discovery of a Fast Bipolar Mass-Outflow from the Prototype S-star  $\pi^1$  Gru", **Sahai, R.**, 1992, A&A, 253, L33
15. "A survey of circumstellar CO emission from a sample of IRAS point sources", Nyman, L.-A., Booth, R.S., Carlstrom, U., Habing, H.J., Heske, A., **Sahai, R.**, Stark, R., van der Veen, W.E.C.J. & Winnberg, A. 1992, A&A Suppl.Ser., 93, 121
16. "SEST CO observations of galaxies in the Grus Quartet - NGC 7582 and NGC 7552", Claussen, M. J., & **Sahai, R.** 1992, AJ, 103, 1134
17. "SO and SO<sub>2</sub> in Mass-Loss Envelopes of Red Giants - Probes of Non-Equilibrium Circumstellar Chemistry and Mass-Loss Rates", **Sahai, R.** and Wannier, P.G. 1992, Ap.J., 394, 320
18. "Interferometric Observations of Non-Maser SiO Emission from Circumstellar Envelopes of AGB Stars: Acceleration Regions and SiO Depletion", **Sahai, R.** and Bieging, J.H. 1993, AJ, 105, 595
19. "A search for SiO, OH, CO and HCN radio emission from silicate-carbon stars", Little-Marenin, I. R., **Sahai, R.**, Wannier, P. G., Benson, P. J., Gaylard, M., & Omont, A. 1994, A&A, 281, 451

20. “A systematic study of IRAS selected proto-planetary nebula candidates. II. OH and CO observations”, 1994, Hu, J. Y., Te Lintel Hekkert, P., Slijkhuis, F., Baas, F., **Sahai, R.**, & Wood, P. R. 1994, A&A Suppl. Ser., 103, 301
21. “Multiple Outflows in the Bipolar Planetary Nebula M1-16: A Molecular Line Study”, **Sahai, R.**, Wootten, A., Schwarz, H.E., Wild, W. 1994, ApJ, 428, 237
22. “Circumstellar CO emission in S Stars. I. Mass-loss with little or no dust”, **Sahai, R.** and Liechti, S. 1995, A&A, 293, 198
23. “Hubble Space Telescope Observations of the SN 1987A Triple Ring Nebula” Burrows, C. J., Krist, J., Hester, J.J., **Sahai, R.** et al. 1995, ApJ, 452, 680
24. “The Boomerang Nebula: The Coldest Region of the Universe?” **Sahai, R.**, Nyman, L-Å. 1997, ApJ, 487, L155
25. “The shock structure in the protoplanetary nebula M1-92: imaging of atomic and H<sub>2</sub> line emission”, Bujarrabal, V., Alcolea, J., **Sahai, R.**, Zamorano, J., Zijlstra, A. A. 1998, A&A, 331, 361
26. “Imaging of the Egg Nebula (CRL 2688) with WFPC2/HST: A History of AGB/Post-AGB Mass Loss”, **Sahai, R.**, Trauger, J.T., Watson, A.M., Stapelfeldt, K.R. et al. 1998, ApJ, 493, 301
27. “The Structure of the Prototype Bipolar Protoplanetary Nebula CRL 2688 (Egg Nebula): Broadband, Polarimetric, and H<sub>2</sub> Line Imaging with NICMOS on the Hubble Space Telescope”, **Sahai, R.**, Hines, D. C., Kastner, J. H., Weintraub, D. A., Trauger, J. T., Rieke, M. J., Thompson, R. I., Schneider, G. 1998, ApJ, 492, L163
28. “Multipolar Bubbles and Jets in Low-Excitation Planetary Nebulae: Toward a New Understanding of the Formation and Shaping of Planetary Nebulae”, **Sahai, R.**, Trauger, J. T. 1998, AJ, 116, 1357
29. “Saturn’s hydrogen aurora: Wide field and planetary camera 2 imaging from the Hubble Space Telescope” Trauger, J.T., Griffiths, R.E., Hester, J.J., Hoessel, J. G., Holtzman, J.A., Krist, J.E., Mould, J.R., **Sahai, R.**, Scowen, P.A., Stapelfeldt, K.R., Watson, A.M., JGR, 103, 20237
30. “Discovery of a Remarkable Point-Symmetric Proto-Planetary Nebula: Hubble Space Telescope Imaging of IRAS 04296+3429”, **Sahai, R.** 1999, ApJ, 524, L125
31. “Asteroid Trails in Hubble Space Telescope WFPC2 Images: First Results”, Evans R. W., Stapelfeldt K. R., Peters D. P., Trauger J. T., Padgett D. L., Ballester G. E., Burrows C. J., Clarke, J. T., Crisp, D., Gallagher, J. S., Griffiths, R. E., Grillmair, C., Hester, J. J., Hoessel, J. G., Holtzmann, J., Krist, J., McMaster, M., Meadows, V., Mould, J. R., Ostrander, E., **Sahai, R.**, Scowen, P. A., Watson, A. M., Westphal, J., Icarus 131, 261
32. “A Highly Collimated Bipolar Outflow in a Proto-planetary Nebula: Hubble Space Telescope Imaging of HEN 401”, **Sahai, R.**, Bujarrabal, V., Zijlstra A. 1999, ApJ, 518, L115
33. “The “Water-Fountain Nebula” IRAS 16342-3814: Hubble Space Telescope/Very Large Array Study of a Bipolar Protoplanetary Nebula”, **Sahai, R.**, Te Lintel Hekkert, P., Morris, M., Zijlstra, A., Likkell, L. 1999, ApJ, 514, L115



34. “Unraveling the Structure of Aspherical Proto-Planetary Nebulae. I. Hubble Space Telescope Imaging and Hydroxyl Maser Line Observations of Roberts 22”, **Sahai, R.**, Zijlstra, A., Bujarrabal, V., Te Lintel Hekkert, P. 1999, AJ, 117, 1408
35. “The Etched Hourglass Nebula MYCN 18. I. HUBBLE SPACE TELESCOPE Observations”, **Sahai, R.**, Dayal, A., Watson, A.M., Trauger, J.T., et al. 1999, AJ, 118, 468
36. “The Etched Hourglass Nebula MYCN 18. II. A Spatio-kinematic Model”, Dayal, A., **Sahai, R.**, Watson, A.M., Trauger, J.T. et al. 2000, AJ, 119, 315
37. “Pinpointing the Position of the Post-Asymptotic Giant Branch Star at the Core of RAFGL 2688 Using Polarimetric Imaging with NICMOS”, Weintraub, D.A., Kastner, J.H., Hines, D.C., **Sahai, R.** 2000, ApJ, 531, 401
38. “He2-113: A Multipolar Planetary Nebula with Rings around a Cool Wolf-Rayet Star”, **Sahai, R.**, Nyman, L-Å., Wootten, A. 2000, ApJ, 543, 880
39. “The Starfish Twins: Two Young Planetary Nebulae with Extreme Multipolar Morphology”, **Sahai, R.** 2000, ApJ, 537, L43
40. “Discovery of a Symmetrical Highly-Collimated Bipolar Jet in He2-90”, **Sahai, R.**, & Nyman, L-Å. 2000, ApJ, 538, L145
41. “The structure and momentum of multiple collimated outflows in the protoplanetary nebula Frosty Leo”, **Sahai, R.**, Bujarrabal, V., Castro-Carrizo, A., Zijlstra, A. 2000, A&A, 360, L9
42. “A 2000 km s<sup>-1</sup> pristine post-AGB wind in the protoplanetary nebula He 3-1475”, Sánchez Contreras, C. and **Sahai, R.** 2001, ApJ, 55, L173
43. “Proper Motions in the Knotty, Bipolar Jet in Henize 2-90”, **Sahai, R.**, Brillant, S., Livio, M., Grebel, E.K., Brandner, W., Tingay, S. & Nyman, L-Å. 2002, ApJ, 573, L123
44. “Physical Structure of the Proto-Planetary Nebula CRL 618. I. Optical Long-Slit Spectroscopy and Imaging”, Sánchez Contreras, C., **Sahai, R.** & Gil de Paz, A. 2002, ApJ, 578, 269
45. “HST observations of the protoplanetary nebula OH 231.8+4.2: The structure of the jets and shocks”, Bujarrabal, V., Alcolea, J., Sánchez Contreras, C., & **Sahai, R.** 2002, A&A, 389, 271
46. “An Icy, Bipolar Pre-Planetary Nebula with Knotty Jets: IRAS22036+5306”, **Sahai, R.**, Zijlstra, A., Sánchez Contreras, C., & Morris, M. 2003, ApJ, 586, L81
47. “Shaping Proto-Planetary and Young Planetary Nebulae with Collimated Fast Winds”, Lee, C-F. & **Sahai, R.** 2003, ApJ, 586, 319
48. “A collimated, high-speed outflow from the dying star V Hydrae”, **Sahai, R.**, Morris, M., Knapp, G. R., Young, K., Barnbaum, C. 2003, Nature, 426, 261
49. “X-Ray Emission from the Preplanetary Nebula He3-1475”, **Sahai, R.**, Kastner, J.H., Morris, M., Frank, A., Blackman, E.G. 2003, ApJ, 599, L87
50. “Magnetohydrodynamic Models of the Knotty, Collimated Jet in He2-90”, Lee, C-F. & **Sahai, R.** 2004, ApJ, 606, 483
51. “Physical Structure of the Protoplanetary Nebula CRL 618. II. Interferometric Mapping of Millimeter-Wavelength HCN J = 1-0, HCO+ J = 1-0, and Continuum Emission”, Sánchez Contreras, C. and **Sahai, R.** 2004, ApJ, 602, 960

52. “The Companion to the Central Mira Star of the Protoplanetary Nebula OH 231.8+4.2”, Sánchez Contreras, C., Gil de Paz, A., & **Sahai, R.** 2004, ApJ, 616, 519
53. “The kinematics of water masers in the stellar molecular outflow source, IRAS 19134+2131”, Imai, H., Morris, M., **Sahai, R.**, Hachisuka, K., Azzollini F., J. R. 2004, A&A, 420, 265
54. “Sculpting a Pre-planetary Nebula with a Precessing Jet: IRAS 16342-3814”, **Sahai, R.**, Le Mignant, D., Sánchez Contreras, C., Campbell, R. D., Chaffee, F. H. 2005, ApJ, 622, L53.
55. “A Starfish Preplanetary Nebula: IRAS 19024+0044”, **Sahai, R.**, Sánchez Contreras, C., Morris, M. 2005, ApJ, 620, 948
56. “The disrupted molecular envelope of Frosty Leo”, Castro-Carrizo, A., Bujarrabal, V., Sánchez Contreras, C., **Sahai, R.**, Alcolea, J. 2005, A&A, 431, 979
57. “The dark lane of the planetary nebula NGC 6302”, Matsuura, M., Zijlstra, A. A., Molster, F. J., Waters, L. B. F. M., Nomura, H., **Sahai, R.**, & Hoare, M. G. 2005, MNRAS, 359, 383
58. “First Evidence of a Precessing Jet Excavating a Protostellar Envelope”, Ybarra, J. E., Barsony, M., Haisch, K. E., Jr., Jarrett, T. H., **Sahai, R.**, & Weinberger, A. J. 2006, ApJ, 647, L159
59. “Radio continuum monitoring of the extreme carbon star IRC+10216” Menten, K. M., Reid, M. J., Krügel, E., Claussen, M. J., & **Sahai, R.** 2006, A&A, 453, 301
60. “The Dust Envelope of the Pre-Planetary Nebula IRAS 19475+3119”, Sarkar, G. & **Sahai, R.** 2006, ApJ, 644, 1171
61. “A Study of H<sub>2</sub> Emission in the Bipolar Proto-Planetary Nebula IRAS 17150-3224”, Hrivnak, B.J., Kelly, D.M., Su, K.Y.L., Kwok, S., **Sahai, R.** 2006, ApJ, 650, 237
62. “A Spitzer IRS Spectral Atlas of Luminous 8 micron Sources in the Large Magellanic Cloud”, Buchanan, C.L., Kastner, J.H., Forrest, W.J., Hrivnak, B.J., **Sahai, R.**, Egan, M., Frank, A., and Barnbaum, C. 2006, AJ, 132, 1890
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2. **Sahai, R.** 2017, “BINARY INTERACTIONS, HIGH-SPEED OUTFLOWS AND DUSTY DISKS DURING THE AGB-TO-PN TRANSITION”, *Asymmetric Planetary Nebulae VII*, conference Dec. 2–8, 2017, Hong Kong
3. **Sahai, R.** 2017, “Shocked and Scorched: Free-floating Evaporating Gaseous Globules (frEGGS)”, University of New Mexico –AstroSeminar
4. **Sahai, R.** 2017, “Binarity and Accretion Activity in AGB stars: Evidence from Variable X-Ray and UV Emission”, *COASTARS 2017*, Gothenburg, Sweden, 12-16 Jun 2017
5. **Sahai, R.** 2017, “Free-floating Evaporating Gaseous Globules (frEGGS)”, UC Davis Physics–Cosmology Seminar, UC Davis, CA
6. **Sahai, R.** 2016, “Observing Planetary Nebulae with JWST ”, Workshop for Planetary Nebulae Observations, conference held at Lorentz Center, Leiden, 25-29 Jan 2016
7. **Sahai, R.** 2015, “Variable X-Ray and UV Emission from AGB Stars: Accretion Activity associated with Binarity”, *11th Pacific Rim Conference on Stellar Astrophysics*, conference held in Hong Kong, Dec 14-17, 2015
8. **Sahai, R.** 2014, “The Coldest Object in the Universe: Probing the Mass Distribution of the Ultra-Cold Outflow and Dusty Disk in the Bomerang Nebula”, *Revolution in Astronomy with ALMA - The 3rd Year*, conference held in Tokyo, Japan, Dec 8-14, 2014
9. **Sahai, R.** 2013, “From AGB Stars to Aspherical Planetary Nebulae – An Observational Perspective”, in *Asymmetric Planetary Nebulae VI*, conference held Nov. 4–8, 2013, Riviera Maya, Mexico
10. **Sahai, R.** 2012, ”The Extraordinary Deaths of Ordinary Stars”, in *Radio Stars and Their Lives in the Galaxy*, Oct. 3–5, 2012, Westford, Massachusetts USA

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2. “Shocked and Scorched: A GREAT Investigation of [CII] and [OI] emission from free-floating Evaporating Gas Globules in Massive Star Formation Regions”, **Sahai, R.**, Morris, M., Claussen, M., Bisbas, T., & Patel, N. 2018, 42nd COSPAR Scientific Assembly, 42, E1.18-12-18
3. “A Study of High Speed Outflows and Dusty Disks During the AGB to PN Transition”, Half a Decade of ALMA: **Sahai, R.**, Vlemmings, W., & Nyman, L. 2016, Cosmic Dawns Transformed, Sep 20-23, 2016
4. “The Coldest Object in the Universe: Probing the Mass Distribution of the Ultra-Cold Outflow and Dusty Disk in the Boomerang Nebula”, **Sahai, R.**, Vlemmings, W., & Nyman, L. 2015, Revolution in Astronomy with ALMA: The Third Year, 2015, ASP Conference Series Vol. 499, 327 (San Francisco: Astronomical Society of the Pacific)

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#### SELECTED PRESS RELEASES AT AMERICAN ASTRONOMICAL SOCIETY MEETINGS

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2. “Probing Collimated Jets and Dusty Waists in Dying Stars with Keck LGSAO”, **R. Sahai** et al., 2006 Jan 10, 207th AAS Meeting
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4. “A Very Young, Fast, Bipolar Outflow at the center of the Red Rectangle”, **R. Sahai** & C. Sánchez Contreras, 2003 May 27, 202nd AAS Meeting
5. “High-Resolution Mapping of Molecular Gas in the Frosty Leo Nebula”, **R. Sahai**, C. Sánchez-Contreras, V. Bujarrabal, A. Castro-Carrizo, 2001 Jun 4, 198th AAS Meeting
6. “HUBBLE FINDS AN ASTONISHING VARIETY OF BEAUTIFUL SHROUDS AROUND DYING STARS”, **R. Sahai** & J. T. Trauger, 1998 Jan 14, 189th AAS Meeting