

## CURRICULUM VITAE JACK O. BURNS

### PERSONAL INFORMATION

- Current Positions:** Professor, Department of Astrophysical and Planetary Sciences  
University of Colorado (CU) Boulder  
and  
Vice President Emeritus for Academic Affairs & Research  
University of Colorado System
- Telephone & E-mail:** Home (303) 465-3753  
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Web : <https://www.colorado.edu/faculty/burns/>
- Birth Date:** January 2, 1953 (Ayer, Massachusetts)
- Marital Status:** Married Cathleen S. Burns, Ph.D., C.P.A., November 8, 1980 (formerly  
Associate Dean of the CU Leeds School of Business).  
Father of adult twins Bryan and Caitlin, March 8, 1985 (2008 graduates of CU).
- Education:** B.S. in Astrophysics, University of Massachusetts, 1974  
M.A. in Astronomy, Indiana University, 1976  
Ph.D. in Astronomy, Indiana University, 1979  
Certificate, MLE Program (Higher Ed. Leadership), Harvard University, 1998

### PROFESSIONAL EXPERIENCE

#### ADMINISTRATION:

##### **Director and Principal Investigator**

University of Colorado Boulder

- Director of the NASA-funded *Network for Exploration and Space* (NESS), 2017-2022. NESS is a center of excellence for the study of Space Science from the Moon. NESS is funded by a five-year, \$4 million NASA Cooperative Agreement. NESS consists of a network of six major research universities, two NASA centers, and two aerospace industry partners dedicated to research on Low Frequency Astrophysics & Cosmology, Radio Heliophysics, Exoplanetary Space Weather, and Surface Telerobotics. Details are available at: <http://www.colorado.edu/ness/>.
- Principal Investigator of the *Dark Ages Polarimeter Pathfinder* (DAPPER) 21-cm cosmology mission concept, an \$80 million project currently funded by NASA for instrument development in Phase A/B. The spacecraft will orbit the Moon and take data only above the radio-quiet, ionosphere-free lunar farside.
- Director of the NASA-funded *Lunar University Network for Astrophysics Research*

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(LUNAR), 2009-2015. LUNAR was funded by a five-year, \$6.5 million NASA Cooperative Agreement from the NASA Lunar Science Institute.

### *Accomplishments for LUNAR included:*

- 62 peer-reviewed publications; 220 conference publications, conference presentations, and abstracts.
- Over 50 Co-investigators and collaborators across the U.S. and internationally contributed to research, student training, and public outreach.
- 45 high school, undergraduate, graduate students and postdoctoral fellows from 10 different institutions participated in research and student training.
- Constructed Lunar Simulation Laboratory at Colorado to mimic thermal, radiation, and surface properties on the Moon to test rover and telescope component technologies.
- Designed and built next generation lunar laser ranging (LLR) retroreflector corner cubes to fly on international and NASA lunar landers; operated most advanced LLR ground-based facility in the world using the 3.5-m telescope at Apache Point, NM.
- Developed detailed space mission concepts for (1) Dark Ages Radio Explorer (DARE), and (2) an Earth-Moon L2-Farside mission involving the crewed Orion spacecraft and teleoperation of a lander/rover on the lunar farside.

### **Vice President Emeritus for Academic Affairs & Research**

University of Colorado System

2006 – present

Assist CU-Boulder administration with fundraising for projects including the \$100 million CCAT submillimeter telescope in the Atacama plains of Chile. Provide advice to President's office on federal funding agencies, particularly NASA, NSF, and DOE. Provide advice to CU-Boulder administration on potential industry collaborations and partnerships.

### **Vice President for Academic Affairs & Research**

University of Colorado System

2001 – 2005

The University of Colorado (CU) System consists of four campuses located in Boulder, Denver, Health Sciences Center (Denver), and Colorado Springs with a combined population of 52,000 students and 3700 faculty. The University is a member of the AAU, had new awards of over \$600 million in 2005 in grants and contracts, and has a \$2.2 billion annual operating budget. CU had the 6<sup>th</sup> largest expenditure of federal grants among public universities in FY 2007 and the 2<sup>nd</sup> fastest rate of growth in federal funding among its AAU peers from 2001-05.

The Vice President for Academic Affairs & Research during Burns' tenure was the chief academic and chief research officer for the CU System. He reported directly to the President and worked collaboratively with the Vice President for Budget & Finance and the University Counsel on managing the university-wide budget, strategic planning, and government relations. He coordinated closely with campus Chancellors, Vice Chancellors, and Deans on the development and review of undergraduate academic programs and graduate/professional programs. In addition, Burns provided leadership in the University's efforts to promote teaching, research, creative work, technology transfer and public service within the four-campus System. The Vice

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President was responsible for providing leadership to the University's planning for and use of technology to enhance learning, research, service, and administrative support.

The Vice President played a key role in developing and communicating the strategic goals and initiatives of the university to a wide range of communities including faculty and students, industry CEOs, state legislators, the Governor's office and Cabinet, and Congressional representatives. Burns worked closely with faculty and student governance, was a regular speaker at local, state, and national functions, frequently participated in print and electronic media interviews, provided testimony to legislative committees, and helped coordinate initiatives with members of the Governor's cabinet (e.g., biotechnology, nanotechnology, and aerospace).

### *Selected Accomplishments include:*

- Transformed the CU System's Technology Transfer program into a highly successful office for faculty innovation and corporate partnerships. Nearly \$100 million in revenue was generated from 2003-2005. Also, 25 new spin-off companies were formed and over 150 new technology licenses were issued during the last two years of Burns' tenure. CU was #9 in the nation in licensing revenue in FY07, rising from #50 only 5 years earlier.
- Created a first-of-its-kind academic network composed of 19 of the nation's premier research universities in support of a bid to operate the Los Alamos National Laboratory (LANL). Served as President of the Network LLC and Executive Vice President of the Los Alamos Alliance, a partnership between Lockheed Martin and the University of Texas System, from June through December, 2005. The university network was engaged to support enhanced peer review, research collaborations, K-20 educational outreach, and technology transfer at LANL.
- Successfully lobbied state and federal officials for CU priorities as a member of the President's governmental affairs team. Successes included \$202 million in state bonds and over \$50 million in federal funds for construction of the \$2.5 billion research, education, and clinical facilities at the new CU Fitzsimons Health Sciences campus.
- Managed multi-campus initiatives including the Executive MBA program, Genomics and Biotechnology initiative, President's Teaching Scholars Program, Teaching With Technology initiative, Diversity Advisory Committee, and Institutional Research. Exerted national leadership as Chair of the National Forum for System Chief Academic Officers, and as a member of Executive Committees for NASULGC Council on Academic Affairs and the NASULGC Council on Research Policy & Graduate Education. Served as CU's lead to the AAU for Academic Affairs and for Research.

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### Vice Provost for Research

University of Missouri - Columbia  
1997 – 2001

The University of Missouri - Columbia (MU) is a research-extensive institution, the flagship of a four-campus system (Columbia, Kansas City, St. Louis, and Rolla), a land-grant university, and a member of the AAU. It had a student population of 23,000 and a faculty of over 1600 during Burns' tenure. There are 12 Colleges and Schools including Agriculture & Natural Resources, Arts & Science, Business, Education, Engineering, Human Environmental Sciences, Journalism, Law, Medicine, Nursing, Health Professions, and Veterinary Medicine. The total expenditures for research and sponsored instruction in 2000/2001 exceeded \$220M and the total grant awards were over \$450 million. The MU campus budget for FY2001 was \$1.1 billion.

The Vice Provost is the campus chief research and technology development officer, a member of Provost's staff, assists in the development and evaluation of academic programs, and is responsible for leadership and administration of the research missions of the university's 12 colleges and 7 research centers. Burns' responsibilities included administration of the Office of Sponsored Programs, technology transfer, compliance with federal regulations on human subject and animal research, federal research relations, and representation of MU's research initiatives at national institutes, centers, and foundations. The Vice Provost assisted the Provost with faculty development, yearly evaluations of Deans of Colleges/Schools, faculty promotion and tenure decisions, faculty recruitment and retention, and academic budget planning.

The Vice Provost provided leadership and direct line management for 7 major research centers including the Missouri University Research Reactor (largest university-operated nuclear reactor in the nation), the Dalton Cardiovascular Research Center, the Molecular Biology Program, the interdisciplinary Life Sciences Center, the Missouri Resource Assessment Project, the four-campus UM Bioinformatics Center, and the Museum of Art & Archeology. Over 350 research scientists, engineers, and artists reported to the Vice Provost via these centers. The annual operating budget of the Office of Research was \$30 million in FY01.

#### *Selected Accomplishments include:*

- Increased MU research awards by an unprecedented 132% from 1997 to 2001.
- Increased licensing and royalty returns to the University by 151% from 1999 to 2001.
- Created the MU Center for the Humanities and Arts.
- Facilitated the "Mission Enhancement" plan to distribute nearly 100 new faculty positions over select academic areas of excellence throughout MU.
- Developed a new strategic plan and funding approach for the MU Museum of Art & Archeology.
- Facilitated interdisciplinary projects such as planning for a Comprehensive Cancer Center and the establishment of the Donald Danforth Plant Science Center with an endowment of \$160 million.
- Coordinated federal relations effort for the campus and participated in lobbying that resulted in over \$150 million in new targeted federal funding for MU.

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### **Associate Dean**

College of Arts & Sciences  
New Mexico State University  
1996 - 1997

New Mexico State University is a research-extensive university, a land grant and NASA space grant university, and a designated Hispanic-serving institution. The College of Arts & Sciences had a total budget of over \$65M, including \$40M in multiyear grant funding, 23 academic departments, and 350 faculty in 1996/97.

Burns' primary responsibilities as Associate Dean included working closely with the Dean in the operation of the Dean's office; enhancement of academic programs in the College; participating in the evaluation of departments and faculty; making recommendations regarding tenure and promotion decisions; preparation of the College budget; participating in the planning and development of new graduate programs; coordinating the allocation of building space in the College; coordinating the development of the College computing & networking infrastructure; coordinating the planning of new College buildings; supervising fund-raising activities and development for the College; oversight of sponsored research and college research centers.

#### *Selected Accomplishments include:*

- Co-founded and chaired the Southwest Regional Space Task Force which has led to the establishment of Spaceport America in southern New Mexico.
- Secured funding from U.S. Department of Education (Title VI) and the Ford Foundation for a NAFTA and border issues policy center.
- Negotiated a partnership with IBM to acquire a 14-node parallel supercomputer for science and engineering research.
- Negotiated MOUs with the Los Alamos and Sandia National Laboratories, the Air Force's Phillips Laboratory, and the White Sands Missile Range for collaborative research programs.

### **Department Head**

Department of Astronomy  
New Mexico State University  
1989 - 1996

Primary responsibilities included leadership in establishing strategic goals for the department; recruiting new faculty and graduate students; mentoring junior faculty; evaluating faculty performance; budgeting; motivating interdisciplinary research with other departments in Arts & Sciences and in other Colleges; developing class schedules and teaching loads; maintaining and upgrading building, observatory, and computer equipment; coordinating public outreach programs; coordinating publicity for departmental programs and research; and, meeting with State Legislators /Congressional Representatives.

#### *Accomplishments include:*

- Construction and supervision of operations of the \$50 million Apache Point Observatory in southern New Mexico, a partnership with Princeton, U. Chicago, Johns Hopkins, U. Colorado, and U. Washington.
- Increased department extramural funding by 4500% from 1989 to 1996.

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- National Research Council ranked the NMSU Astronomy Department as the second most improved in the nation in 1994.
- Helped raise \$1 million for the Clyde Tombaugh postdoctoral scholars fund.

### **Institute Director**

Institute for Astrophysics  
Department of Physics and Astronomy  
University of New Mexico  
Albuquerque, NM  
1985 - 1989

Primary responsibilities included coordinating astrophysics research activities; organizing professional meetings and seminars; fundraising; establishing goals for Institute in conjunction with Physics and Astronomy Department; recruiting faculty and graduate students; staffing research observatory; maintaining and upgrading computer workstations; and, meeting with State Legislative Committees and Congressional Representatives.

**TEACHING:** Taught numerous courses in astronomy, physics, space science, and science public policy at the undergraduate and graduate levels, consistently receiving excellent student evaluations; created numerous courses, including several involving participation from other faculty in the sciences, the humanities, and engineering; developed a new curriculum for the graduate astronomy program at NMSU; and, developed a new approach to teaching introductory astronomy based on the underlying physical concepts rather than the traditional survey course; developed new classes on Space Science & Space Policy and Introduction to Space Astronomy & Exploration at U. Colorado; supervised Ph.D. dissertation research for 15 students, M.S. theses for 2 students, and 11 postdoctoral fellows.

Professor  
Department of Astrophysical & Planetary Sciences, University of Colorado - Boulder  
2001 - present

Professor  
Department of Physics & Astronomy  
University of Missouri - Columbia  
1997 - 2001

Professor  
Department of Astronomy  
New Mexico State University  
1989 - 1997

Associate Professor  
Department of Physics & Astronomy  
University of New Mexico  
1984 - 1989

Assistant Professor of Physics & Astronomy

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University of New Mexico  
1980 - 1984

Graduate Teaching Assistant  
Indiana University  
1975 – 1977

**SERVICE:** Served on Presidential Transition Landing Team for NASA in 2016/17, providing leadership on issues involving earth and space science.

**Served as Chair of the Science Committee for the NASA Advisory Council during the G. W. Bush Administration.**

Served on numerous national committees for organizations such as the National Association of State Universities & Land-Grant Colleges, Association of American Universities (AAU), American Association for the Advancement of Science, American Astronomical Society, American Physical Society, and the International Astronomical Union; frequently asked to chair research and funding panels for NASA and the National Science Foundation; refereed extensively for major science journals including *Nature*, *Science*, and the *Astrophysical Journal*; served on users' committee for the National Radio Astronomy Observatory; co-founder and chair of the Southwest Regional Space Task Force; served on Faculty Senate at Univ. of New Mexico; served on numerous NMSU A&S College committees including Strategic Planning Committee; conducted teaching workshops and outreach programs for minority public school teachers in New Mexico; and, lectured in public school program for New Mexico Academy of Sciences and public schools throughout Missouri and Colorado.

## PUBLIC SERVICE ON BOARDS AND COUNCILS:

Astrophysical Research Consortium (Apache Point Observatory), Board of Governors, 1989-1996.

Southwest Regional Space Task Force, 1992-1997 (Chair, 1995-97).

Missouri Innovation Center, Board of Directors, 1998 - 2001.

Missouri Arthritis Rehabilitation & Training Center, Board of Directors, Chair, 1998- 2001.

Oak Ridge Associated Universities, Council, 1997 - 2001.

Council on Research Policy & Graduate Education, National Association of Land Grant & State Colleges, 1997 - 2005 (Executive Committee 2001 - 2005).

Heartland Research Administrators Consortium (Founder & member), 1998 - 2001.

NASA *Astro-E* satellite proposal review panel, Chair, 1999.

Missouri Foundation for Medical Research, Board of Directors, 1998 - 2001.

Employment Committee, American Astronomical Society, 1998 - 2003.

Nominating Committee, American Physical Society, Astrophysics Division, 1999 - 2002.

Council on Academic Affairs, NASULGC, 2002 – 2005 (Executive Committee, 2003-2005).

National Forum for System Chief Academic Officers, 2002 – 2005 (Chair, 2003 - 2004).

University Licensing Equity Holding Inc., Chair of the Board, 2002 - 2005.

Governor's Colorado Biotechnology Council, 2002 – 2004.

Council on Academic Affairs, Association of American Universities, 2002 – 2005.

Mentor for ACE Fellow, Dr. Lorna Moore, 2003/04.

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National Center for Women and IT, Board of Directors, 2004 – 2009.  
Colorado Science Forum, 2005 – 2007 (founding Board of Directors).  
Electorate Nominating Committee, Section on General Interest in Science & Engineering,  
American Association for the Advancement of Science (AAAS), 2006 – 2008.  
Committee on Astronomy & Public Policy, American Astronomical Society, 1999 – present  
(Chair, 2006 – 2009, 2011 - 2014).  
Constellation-X Facility Science Team, 2008.  
**Executive Committee, NASA Lunar Science Institute, 2009 – 2013.**  
**NASA Advisory Council (reports directly to NASA Administrator), 2008 – 2009.**  
**NASA Advisory Council Science Committee, 2008 – 2010 (Chair 2008-2009).**  
Board of Directors, CCAT Observatory, Inc., 2009 – 2016 (Chair 2010 – 2015).  
**Senior Vice President, American Astronomical Society, 2014 – 2017.**  
**Executive Committee, NASA Solar System Exploration Research Virtual Institute, 2017-**  
**present.**  
Board of Directors, Space Science Institute, Boulder, CO, 2017 – present.  
**Member of Presidential Transition Landing Team for NASA, 2016-2017.**

## PUBLIC POLICY AND WASHINGTON EXPERIENCE:

Over 30 years experience with federal agencies, including NASA, NSF, NIST, DOE, NIH, and DOD. Served on numerous agency planning committees and task forces. Regularly consults with National Academy of Sciences on study panels.

Served as external advisor for science to NASA Administrator Dr. Michael Griffin as Chair of the Administrator's Science Committee. Worked closely with the Chairs of the NASA Advisory Committee on science issues and planning for NASA's human exploration of the Moon. Similar experience with former NIST Director, Arden Bement.

Raised over \$150 million in funding for two universities via federal advocacy with the Congress. Assisted in the establishment of federal relations offices in Washington for the Universities of Missouri and Colorado.

Served as President of a 19-university consortium of universities in support of a proposal to the DOE for the operations contract of the \$2 billion Los Alamos National Laboratory in 2005, an effort led by the University of Texas and Lockheed-Martin.

After 5 years of service on the American Astronomical Society's Committee on Astronomy & Public Policy, appointed to Chair the Committee by the AAS President in 2006. Committee develops AAS public policy positions, drafts public statements, lobbies Congress on behalf of the science agency budgets, and coordinates with federal agency initiatives. Stepped down from Committee in 2014 to assume duties as elected Senior Vice President of the AAS.

## INTERNATIONAL EXPERIENCE:

Led a major collaborative project with the German Max Planck Institute for Extraterrestrial Physics (MPE) from 1990-2000 involving the ROSAT X-ray satellite observatory. With a large grant from NASA, organized a collaborative study of X-ray, radio, and optical properties of galaxy clusters using proprietary access to the German ROSAT all-sky survey.



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Traveled and lectured extensively in the U.K., France, Germany, Italy, Mexico, and Chile.

### RESEARCH:

Research focuses on extragalactic astronomy and cosmology; observations of active galaxies and galaxy clusters using radio interferometers, optical telescopes, and x-ray satellites; supercomputer numerical simulations of astrophysical jets and large scale structures in the universe; and, design of next-generation low radio frequency observatories in space and on the Moon; space and science policy.

As a Professor of Astrophysical and Planetary Sciences at CU-Boulder, an active NSF and NASA-funded research program is currently maintained with multiple annual publications in peer-reviewed journals, presentations at national conferences, and supervision of postdoctoral fellows and CU students.

#### *Accomplishments include:*

- Pioneered observations and physical interpretations of radio jets in galaxies and quasars as one of the first observers with the Very Large Array radio telescope. Discovered radio jets in the closest active galaxy, Centaurus A, and dual curved jets in tailed radio sources in galaxy clusters.
- The first to use a combination of x-ray observations and radio observations to probe the nature and origin of the intracluster medium in galaxy clusters. This led to a new model of “stormy weather in galaxy clusters” (see review article in Burns, 1998, *Science* referenced below).
- Among the first to perform numerical hydrodynamical 2-D and 3-D simulations of the radio jets, lobes, and tails in realistic galaxy/cluster atmospheres. With students and postdocs, constructed the first 3-D MHD numerical simulations of extragalactic radio sources.
- Changed the paradigm of the origin and evolution of galaxy clusters via advanced N-body + adaptive mesh refinement hydrodynamical numerical cosmological simulations. In comparing the simulations with x-ray and radio observations, a model of a dynamic, nonequilibrium gas in clusters emerged stimulated by mergers and accretion of dark matter and gas from supercluster filaments.
- Proposed a much-improved method to measure cluster masses from the Sunyaev-Zeldovich effect that produces dramatically better measures of fundamental cosmological parameters including the Hubble constant.
- Conducted pioneering studies of the design of astronomical observatories on the Moon. Assembled teams of astronomers, physicists, geologists, and engineers to produce NASA-funded concepts for a far-side low frequency radio interferometer on the Moon. Currently operates a NASA-funded center of excellence for Exploration and Space Science from the Moon (NESS).

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*Collaborative and Consultant appointments (in addition to faculty positions) include:*

Consultant to the President  
Associated Universities, Inc., Washington, DC.  
2006 – 2016

Consultant to the CEO  
Moon Express, Inc., Mountain View, CA.  
2013 - 2016

Consulting with the South Carolina Commission on Higher Education  
Provide yearly advice and reviews of proposals for Endowed Professorship Programs  
2005 - 2015

Adjunct Research Collaborator  
National Radio Astronomy Observatory  
1984 - 2000

Consultant in Space Plasma Physics  
SST-8 Division, Los Alamos National Lab  
1985 - 1994

Visiting Senior Research Scientist (during sabbatical leave)  
National Center for Supercomputing Applications, University of Illinois  
1987

Consultant in Computer Image Processing  
Sandia National Laboratories  
1980-1988

Postdoctoral Research Associate  
National Radio Astronomy Observatory  
1978 – 1980

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### **SELECTED RESEARCH GRANTS: Total Grant Funding Exceeds \$15,000,000 over last 10 years**

1. Sandia National Laboratories (Sandia-University Research Program) "Study of Extragalactic Radio Sources", October, 1980 to September, 1982; \$45,000
2. NASA, "Monetary Support of Einstein Observatory Projects", December, 1980 to November, 1982; \$21,000
3. NASA, "An X-Ray and Radio Survey of Abell Clusters of Galaxies", October, 1982 to November, 1985; \$36,594
4. NASA, "A Search for X-Ray Counterparts of Radio Jets", October, 1983 to November, 1985; \$6,648
5. National Science Foundation, "A Systematic Study of Radio Galaxies and Their Environs", January, 1984 to September 1986; \$76,400
6. Research Corporation, "Charge-Coupled Device (CCD) Observations of Quasars, Active Galaxies and Clusters of Galaxies", November, 1984 to December, 1986; \$15,800
7. National Science Foundation, "An Image Processor for Astronomy", July, 1985 to December, 1986; \$30,000
8. National Science Foundation, "Studies of Large Scale Structures in the Universe", February 15, 1986 to August 31, 1988; \$150,000
9. Lockheed Engineering, "A Study of Astronomical Observations from a Lunar Base", January 10, 1986 to June 1, 1986; \$2,600
10. Los Alamos National Lab., "A Study of Astronomical Experiments on a Lunar Base and During a Manned Mars Mission", February 24, 1986 to August 24, 1986; \$9,521
11. National Science Foundation, "Observations and Models of Extragalactic Radio Sources and Their Environs", June 1, 1987 to September 30, 1989; \$150,000
12. NASA-Johnson Space Center, "A Study of Astronomical Observatories on the Moon", September 1, 1987 to August 31, 1989; \$139,608
13. NASA (SADAP), "A Study of X-Ray Emission from Poor Clusters of Galaxies", August 1, 1987 to July 31, 1988; \$29,635
14. University of Illinois, "A Search for Active Magnetic Field Effects in Extragalactic Radio Sources" October 1, 1986 to September 30, 1987; \$12,240
15. NASA-Goddard Space Flight Center, "Ground-Based Studies of Radio and Infrared Emissions from the Planet Mercury", December 15, 1987 to December 14, 1989; \$41,760
16. NASA (ADP), "Analysis and Modeling of X-Ray Emission from Clusters with Dominant Galaxies", July, 1988 to July 1990; \$64,874
17. NASA-Johnson Space Center, "A Continuing Study of Lunar Astronomical Observatories", July, 1989 to June 1991; \$181,868
18. National Science Foundation, "Numerical Simulations and Observations of Radio Galaxies", April, 1990 to September, 1993; \$192,000
19. NASA, "ROSAT PSPC Observations of Galaxy Clusters with Extended Radio Sources"; \$29,000
20. NASA-Marshall Space Flight Center, "Lunar Dust Mitigation", October, 1991 to October, 1992; \$20,000
21. NASA, "Correlative Optical and Gamma-Ray Study of GRO Phase I Targeted Objects", May, 1991 to April, 1992; \$32,000
22. NASA, "PSPC Observations of Clusters with Giant Wide-Angle Tailed Radio Galaxies", November, 1991 to October, 1992; \$15,000
23. NASA Marshall Space Flight Center, "Lunar Lander-Soil Interaction, Lunar Dust, and Testbed Precursor", October 1991 to October 1993; \$20,000
24. NASA and Physical Science Laboratory, "Southwest Spaceport Initiative", September 1992 to December 1993; \$35,400
25. NASA (Long Term Space Astrophysics Program), "Studies of Astrophysical Plasmas in Clusters of Galaxies", June 1992 to June 1997; \$805,000
26. National Science Foundation, "Multiwavelength Studies and Numerical Simulations of Radio Galaxies and Galaxy Clusters," May 1994 to April 1997, \$204,137
27. NASA, "ROSAT HRI Observations of X-ray Emission Around Nearby Radio Galaxies", July 1996 to June 1997; \$9500
28. NASA, "ASCA Observations of Poor Clusters of Galaxies", September 1996 to August 1997, \$11,500
29. NASA (Astrophysics Theory Program), "Modelling X-ray Clusters: Evolution & Realistic Physics", May 1997 - Feb. 2001, \$350,000.
30. National Science Foundation, "Multiwavelength Observations & Numerical Simulations of Galaxy Cluster Evolution", June 30 1997- May 1999, \$130,000.
31. NASA (Astrophysics Data Program), "The X-ray Properties of Poor Clusters of Galaxies from the ROSAT All-Sky Survey", Nov. 1997 - Oct. 2000, \$95,000.
32. NASA, "ROSAT Observations of Distant Abell Clusters", Nov. 1997 - Oct. 1999, \$10,000.
32. NASA, "Chandra Observations of the Poor Cluster AWM7", 2000/03, \$32,000.
33. NASA, "A Public Archive of Numerical Galaxy Clusters: Testing a Hierarchical Merger Model For Cooling Cores", 2003/06, \$93,000.
34. National Science Foundation, "Unlocking the Potential of Sunyaev-Zeldovich Cluster Surveys with Advanced Cosmological Simulations", 2004/07, \$105,000.
35. NASA, "Beyond the Cool Cores in Galaxy Clusters: Testing a Hierarchical Model with X-ray Observations and AMR Simulations", 2007/11, \$332,700.

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36. NASA (via subcontract from NRL), "Radio Observatory for Lunar Sortie Science", 2007/08, \$15,000.
37. National Science Foundation, "TOWARD AN INTEGRATED UNDERSTANDING OF GALAXY CLUSTERS: AMR MHD/N-BODY SIMULATIONS OF THERMAL AND NONTHERMAL PROCESSES", 2008/2010, \$250,000.
38. NASA, "Lunar University Network for Astrophysics Research (LUNAR): Exploring the Cosmos from the Moon, 2009/15, \$6.5 million.
39. National Science Foundation, "Making more realistic Galaxy Clusters: Confronting AMR Cosmological Simulations of Thermal and Nonthermal Processes with Observations", 2011/15, \$382,692.
40. Lockheed Martin Corporation, "Laboratory Simulations of Surface Telerobotics for an Orion EM-L2 Mission", \$114,120, J.O. Burns (P.I.), 28 Jul. 2014 - 1 Aug. 2016.
41. NASA, Astrophysics Data Analysis Program, "The Biggest Bangs Since the Big Bang: Unveiling Mergers of Galaxy Clusters with Radio Halos/Relics Using X-ray Temperature Maps", \$392,008, J.O. Burns (P.I.), 1/26/2015—1/25/2018.
42. NASA, Astrophysics Theory Program, "The First Rays of Cosmic Dawn: Signatures of Feedback in the Early Universe", \$61,309, J.O. Burns (Co-I), 7/1/2015-6/30/2018.
43. NASA Ames Research Center, "Low Frequency Radio Cosmology from the Moon", \$289,820, J.O. Burns (P.I.), 1/1/2015-12/31/2016.
44. JPL, "Theoretical Investigations of Cosmic Dawn Using the Redshifted 21-cm Line at Low Radio Frequencies", \$55,000, J.O. Burns(P.I.), 10/21/2015-9/25/2016.
45. NASA Ames Research Center (SSERVI), "Network for Exploration and Space Science", \$3.5 million, J.O. Burns (P.I.), 7/1/17-6/30/22.

## ADDITIONAL GRANT AWARDS AS PRINCIPAL INVESTIGATOR:

1. National Institutes of Health (C06), "Conversion of Shell Space for the Dalton Cardiovascular Research Center" Univ. of Missouri, 2001/03, \$1,036,000.

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### SELECTED INVITED REVIEW TALKS:

1. International Workshop on "Cosmic Jets", held in Torino, Italy in October, 1982
2. NASA Symposium on "Lunar Bases and Space Activities of the 21st Century", held in Washington, DC in October 1984 (talk entitled "Radio Interferometry on the Moon")
3. Workshop on "Jets from Stars and Galaxies", held in Toronto, Canada in June, 1985 (talk entitled "Wide-Angle Tailed Radio Galaxies")
4. American Astronomical Society meeting held in Ames, Iowa in June, 1986 (review talk on "Radio Galaxies and Quasars")
5. Guest Lectureship in Radio Astronomy at Peking and Nanking Universities, P.R. China, August 13-24, 1986
6. American Astronomical Society meeting held in Albuquerque, NM in June, 1990 (review talk on "Numerical Observations of Extragalactic Radio Sources")
7. SPACE '92 Conference held in Denver, CO in June 1992 (plenary review talk entitled "Back to the Moon, Back to the Future")
8. First Stromlo Symposium: The Physics of Active Galaxies, held in Canberra, Australia in June 1993 (review talk entitled "On the Effects of X-ray Subclumps and Cluster/Subcluster Mergers on Extended Radio Sources")
9. Energy Transport Radio Galaxies & Quasars, University of Alabama, September 1995 (review talk entitled "An Environmental Impact Assessment for Cluster Radio Galaxies").
10. Cooling Flows in Galaxies & Clusters, Haifa University, Israel, August 1996 (review talk entitled "Listening" to Cluster Cooling Flows: Radio Sources & the Cluster Environment).
11. Iowa Space Grant Consortium Conference, Iowa State University, November 1996 (keynote address entitled "The American Space Program: Back to the Future?").
12. Galaxy Clusters at Different Redshifts, Inn of the Mountain Gods, Ruidoso, NM, May 1997 (invited talk entitled "Extended Radio Sources As Probes of Cluster Weather").
13. American Astronomical Society meeting held in Pasadena, CA in June 2001 (invited lecture entitled "Superclusters & Cluster Winds").
14. The Riddle of Cooling Flows in Galaxies and Galaxy Clusters conference held at the University of Virginia in June 2003 (invited lecture entitled "On the Formation of Cool, Non-Flowing Cores in Galaxy Clusters via Hierarchical Mergers").
15. NLSI Lunar Science Forum (invited lecture on "Exploring the Cosmos from the Moon"), July 2009.
16. Aspen Summer Conference on Astrophysics & Cosmology with the 21-cm Background, June 2010 (invited lecture on "Measuring the Global 21-cm Signal with a Dipole Antenna in Lunar Orbit").
17. NLSI Lunar Science Forum, July 2010, invited lecture "Into the Dark Ages: A Lunar-Orbiting, Low Frequency Antenna to Measure the Global Signature of the First Collapsing Structures in the Early Universe".
18. Conference on Building on New Worlds, New Horizons: New Science from Submillimeter to Meter Wavelengths, March 2011, Santa Fe, NM, invited lecture "The Dark Ages Radio Explorer".
19. NLSI Lunar Science Forum, July 2011, invited lecture "The Dark Ages Radio Explorer".
20. American Astronomical Society Meeting, Anchorage, AK, June 2012, invited lecture on "The Dark Ages Radio Explorer: Constraining Cosmic Dawn from the Global 21-cm Signal".
21. Conference on Bridging the Gap in Space Robotics, MIT, Cambridge, MA, July 2017, invited opening plenary lecture on "Planetary Surface Telerobotics".
22. IAA Symposium, Torino, Italy, June 2017, invited presentation on "Science & Exploration at the Moon and Mars Enabled by Surface Telerobotics".
23. Kavli Symposium on U.S. Radio Futures III, Berkeley, CA, August 2017, invited presentation on "Low Frequency Radio Astronomy from Space".

### SELECTED RESEARCH COLLOQUIA:

1. University of Maine, March 29, 1995
2. St. Mary's University of Halifax, Nova Scotia, March 31, 1995
3. Florida State University, April 24, 1995
4. Brigham Young University, October 11, 1995
5. California Institute of Technology, May 8, 1996
6. Iowa State University, November 9, 1996
7. University of Missouri – Columbia (Physics & Astronomy Dept.), March 18, 1997
8. University of Missouri – Columbia (Computer Engineering & Computer Science Dept.), November 13, 1997
9. University of Missouri – Columbia (Physics & Astronomy Dept.), February 1998
10. University of Kansas, April 1998
11. Center for Astrophysics, Harvard University, June 1998
12. Iowa State University, September 1998
13. University of Missouri – Columbia (Mechanical & Aerospace Engineering Dept.), September 1998

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14. University of Missouri – St. Louis, October 1998
15. Kansas State University, September 1999
16. University of Massachusetts, September 2000
17. University of Maine, September 2000
18. Northwestern University, November 2000
19. University of Colorado – Boulder, December 2002
20. University of California – San Diego, January 2003
21. University of Texas – Austin, September 2005
22. Indiana University – Bloomington, October 2005
23. Naval Research Laboratory – Washington, DC, June 2006.
24. Southwest Research Institute – Boulder, CO, July 2006.
25. Ball Aerospace – Boulder, CO, August 2006.
26. JILA – Boulder, CO, October 2006.
27. University of New Mexico – Albuquerque, NM, October 2006.
28. National Radio Astronomy Observatory – Socorro, NM, October 2006.
29. Los Alamos National Laboratory – Los Alamos, NM, March 2007.
30. St. Mary’s University -- Halifax, Canada, July 2007.
31. University of Maine – Orono, September 2008
32. Naval Research Laboratory – Washington, DC, September 2008
33. National Radio Astronomy Observatory & University of Virginia, Charlottesville, VA, September 2008
34. Los Alamos National Laboratory – Los Alamos, NM, October 2008
35. University of California at San Diego, December 2008
36. Colloquium on Astrophysics from the Moon, NASA Goddard Space Flight Center, Greenbelt, MD, March 2009
37. Colloquia on “Exploring the Cosmos from the Moon”, University of Colorado, Dept. of Engineering, Sep. 2009; Naval Research Observatory, Washington, DC, March 2010; Michigan State University, East Lansing, MI, March 2010; University of Michigan, Ann Arbor, MI, April 2010
38. Colloquium on “Space Science from the Moon”, NASA Headquarters, Washington, DC, November 2012.
39. Colloquia on “The Dark Ages Radio Explorer”: University of Colorado, CASA, Jan. 2011; University of Waterloo, Canada, March 2011; Jet Propulsion Lab Caltech, Pasadena, CA, April 2011; University of New Mexico, Albuquerque, NM, April 2011; National Radio Astronomy Observatory, Socorro, NM, April 2011; Max Planck Institute for Radio Astronomy, Bonn, Germany, October 2011; NASA Ames Research Center, Moffett Field, CA, March 2012; Naval Research Laboratory, Washington, DC, April 2012; University of Toronto, Toronto, Canada, May 2012; Arizona State University, Tempe, AZ, October 2012; Trinity University, San Antonio, TX, January 2013; University of Texas at Austin, Austin, TX, February 2013; Brigham Young University, Provo, UT, October 2013; University of Colorado Boulder, Boulder, CO, January 2014; Space Telescope Science Institute, Baltimore, MD, February 2014; Stanford University, Palo Alto, CA, September 2014; University of California at Berkeley, Berkeley, CA, November 2014; Ball Aerospace Corporation, Boulder, CO, February 2015; National Radio Astronomy Observatory, Charlottesville, VA, March 2015; George Washington University, Washington, DC October 2015; New Mexico State University, March 2017.

## SUPERVISION OF GRADUATE STUDENTS

1. David Batuski, Ph.D., University of New Mexico, 1986.
2. David Clarke, Ph.D., University of New Mexico, 1988.
3. Jun-Hui Zhao, Ph.D., University of New Mexico, 1990.
4. Ilias Fernini, Ph.D., University of New Mexico, 1991.
5. David Brown, M.S., New Mexico State University, 1992.
6. Brian Kooiman, M.S., New Mexico State University, 1993.
7. Jason Pinkney, Ph.D., New Mexico State University, 1995.
8. Kurt Roettiger, Ph.D., New Mexico State University, 1995.
9. Kevin Marvel, Ph.D., New Mexico State University, 1996.
10. Percy Gómez, Ph.D., New Mexico State University, 1997.
11. Mark Bliton, New Mexico State University, Ph.D., 2000.
12. Elizabeth Rizza, New Mexico State University, Ph.D., 2000.
13. Samuel Skillman, University of Colorado, Ph.D., 2013.
14. Jason Henning, University of Colorado, 2007 – 2009.
15. Laura Kruger, University of Colorado, 2009 – 2014.
16. David Schenck, University of Colorado, 2011 – 2015.
17. Jordan Mirocha, University of Colorado, 2009 – 2015, Ph.D. 2015.
18. Hilary Egan, University of Colorado, 2013–2016.

## Jack O. Burns

19. Bang Nhan, University of Colorado, 2013 – present.
20. Scott Sullivan, University of Colorado, 2014 – 2015.
21. Keith Tauscher, University of Colorado, Physics, 2015-2020, Ph.D. 2020.
22. Brian Alden, University of Colorado, 2016-present.
23. Benjamin Mellinkoff, University of Colorado, Aerospace Engineering, M.S. 2018
24. Michael Walker, University of Colorado, Computer Science, 2017 – present.
25. Joshua Hibbard, University of Colorado, 2019 – present.
26. Neil Bassett, University of Colorado, 2018 – present.

## SUPERVISION OF POSTDOCTORAL FELLOWS

1. Thomas Balonek, University of New Mexico, 1982-1984.
2. J. Ward Moody, University of New Mexico, 1985-1987.
3. Martin Sulkanen, University of New Mexico, 1986-1989.
4. Michael Newberry, University of New Mexico, 1988-1989.
5. George Rhee, New Mexico State University, 1990-1993.
6. Chris Loken, New Mexico State University, 1990-1996.
7. Michael Ledlow, New Mexico State University, 1994-1997.
8. Kurt Roettiger, University of Missouri, 1997-2000.
9. Patrick Motl, University of Missouri and University of Colorado, 2000 – 2004.
10. Eric Hallman, University of Colorado, 2004 – 2009.
11. Geraint Harker, University of Colorado, 2009 – 2014.
12. Abhi Datta, University of Colorado, 2010 – 2015.
13. Stephen Skory, University of Colorado, 2010 – 2013.
14. Raul Monsalve, University of Colorado, 2016 – present.
15. David Rapetti, University of Colorado, 2016-present.

## AWARDS, HONORS, AND FELLOWSHIPS

Commonwealth of Massachusetts Scholarship, 1970 - 1974  
B.S. Degree Magna Cum Laude, University of Massachusetts, 1974  
Elected Phi Beta Kappa, 1974  
NRAO Summer Student Scholars Program, 1974, 1975  
Indiana University Astronomy Department Fellowship, 1974 - 1975  
National Radio Astronomy Observatory Predoctoral Fellowship, 1977 - 1978  
University of New Mexico Presidential Professorship, 1986 - 1988  
Senior Research Scientist Fellowship, National Center for Supercomputing Applications, University of Illinois, 1987  
**Elected Fellow of the American Physical Society, 1998.**  
**Elected Fellow of the American Association for the Advancement of Science, 2008.**  
**Awarded NASA's Exceptional Public Service Medal, 2010.**  
**Awarded NASA's Group Achievement Award for Surface Telerobotics, 2014.**  
**Appointed by Mexican National Academy of Sciences as Distinguished Visiting Professor to the 2015-2016 AMC-FUMEC at INAOE.**  
**Honorary Doctoral Degree, National Institute of Astrophysics, Optics, & Electronics, Puebla, Mexico, 2017.**  
**Elected Legacy Fellow of the American Astronomical Society, 2020.**

## PROFESSIONAL SOCIETIES:

American Physical Society (Fellow, 1998- present)  
American Association for the Advancement of Science (Fellow, 2008 – present)  
American Astronomical Society (Vice President, 2014 – present)  
Royal Astronomical Society of England  
Astronomical Society of the Pacific  
International Astronomical Union  
U.S. National Committee for the International Union of Radio Science  
Sigma Xi  
American Geophysical Union

## Jack O. Burns

**SELECTED PUBLICATIONS** (471 total publications according to NASA ADS; full publication list via <https://www.colorado.edu/faculty/burns/publications>):

1. "The Tungus Event as a Small Black Hole: Geophysical Considerations", 1976, J. O. Burns, G. Greenstein and K. L. Versub, *Month.Notice.Royal.Astro.Soc.*, 175, 355
2. "A Statistical Investigation of Radio Sources in the Directions of Zwicky Clusters of Galaxies", 1977, J. O. Burns and F. N. Owen, *Astrophys. J.*, 217, 34
3. "Classical Double Sources in the Directions of Rich Clusters of Galaxies", 1978, J. O. Burns, F. N. Owen, and L. Rudnick, *Astron. J.*, 83, 312
4. "Radio Sources in Zwicky Clusters of Galaxies I. Pencil Beam and Preliminary Interferometer Observations", 1978, J. O. Burns, *Astron. J.*, 83, 1143
5. "Radio Sources in Zwicky Clusters of Galaxies II. Detailed Interferometer Observations and Analysis", 1979, J. O. Burns, and F. N. Owen, *Astron. J.*, 84, 1478
6. "VLA Observations of NGC 1265 at 4886 MHz", 1978, F. N. Owen, J. O. Burns, and L. Rudnick, *Astrophys. J. (Letters)*, 226, L119
7. "VLA Observations of Head-Tail Radio Sources", F. N. Owen, J. O. Burns, L. Rudnick, and E. W. Greisen, 1979, *Astrophys. J. (Letters)*, 229, 006, L59
8. "The Wide-Angle Tailed Radio Galaxy 1159+583: Observations and Models", 1979, J. O. Burns, F. N. Owen, and L. Rudnick, *Astron. J.*, 84, 1683
9. "Dual Curved Jets in the Tailed Radio Galaxy 1638+538 (4C53.37)", 1980, J. O. Burns and F. N. Owen, *Astron. J.*, 85, 204
10. "On the Distribution of Radio Emission in the X-Ray Cluster of Galaxies Abell 401", 1980, J. O. Burns and M. P. Ulmer, *Astron. J.*, 85, 773
11. "Radio Emission in the Directions of cD and Related Galaxies in Poor Clusters I. Pencil Beam Observations at 6-cm", 1980, R. A. White and J. O. Burns, *Astron. J.*, 85, 117
12. "Radio Emission in the Directions of cD and Related Galaxies in Poor Clusters II. 1400-MHz Pencil Beam Observations", 1980, J. O. Burns, R. A. White, and R. J. Hanisch, *Astron. J.*, 85, 191
13. "Radio Jets and Bridges in the Classical Double Sources 3C388 and 0816+526", 1980, J. O. Burns and W. A. Christiansen, *Nature*, 287, 208
14. "Radio Emission in the Directions of cD and Related Galaxies in Poor Cluster III. VLA Observations at 20-cm", 1981, J. O. Burns, R. A. White, and D. H. Hough, *Astron. J.*, 86, 1
15. "The Structure and Environment of the Wide-Angle Tailed Radio Galaxy 1919+479", 1981, J. O. Burns, *M.N.R.A.S.*, 195, 523
16. "3C129 Closeup", 1981, L. Rudnick and J. O. Burns, *Astrophys. J. (Letters)*, 246, L69
17. "Globular Cluster Winds with Central Accretion by a Massive Compact Object or Subcluster", 1981, R. H. Durisen and J. O. Burns, *M.N.R.A.S.*, 195, 535
18. "X-Ray Emission Around Radio Sources in Clusters of Galaxies: A Possible Physical Link Between Environment and Nonthermal Radio Emission", 1981, J. O. Burns, S. A. Gregory, and G. D. Holman, *Astrophys. J.*, 250, 450
19. "A Search for Neutral Hydrogen in D and cD Galaxies", 1981, J. O. Burns, R. A. White, and M. P. Haynes, *Astron. J.*, 86, 1120
20. "Redshifts, Optical Properties, and Refinements in the Radio Parameters of 4C Radio Galaxies in Non-Abell Zwicky Clusters", 1982, S. A. Gregory and J. O. Burns, *Astrophys. J.*, 55, 373
21. "Detection of Radio Emission From the Jet in Centaurus-A", 1981, E. J. Schreier, J. O. Burns, and E. Feigelson, *Astrophys. J.*, 251, 523
22. "Multifrequency VLA Observations of 3C388: Evidence for an Intermittent Jet", 1982, J. O. Burns, W. Christiansen, and D. Hough, *Astrophys. J.*, 257, 538
23. "What Bends Wide-Angle Tailed Radio Sources", 1982, J. O. Burns, J. A. Eilek, and F. N. Owen, *I.A.U. Symposium No. 97 on Extragalactic Radio Sources*, edited by D. Heeschen and C. Wade, (D. Reidel), p. 45
24. "High Resolution VLA Observations of Quasars with Distorted Radio Structures", 1982, J. Stocke, W. Christiansen, and J. O. Burns, *I.A.U. Symposium No. 97 on Extragalactic Radio Sources*, edited by D. Heeschen and C. Wade (D. Reidel), p.39
25. "The Structure of 4C Radio Galaxies in Poor Clusters", 1982, J. O. Burns and S. A. Gregory, *Astron. J.*, 87, 245
26. "The Curvature of Radio Jets and Tails in the Intracluster Media of Abell 1446 and 2220, 1982, J. O. Burns and T. J. Balonek, *Astrophys. J.*, 263, 546
27. "cD Galaxy Dynamics and An Aged Ridge (Jet) in 3C388", 1983, J. O. Burns, E. Schwendeman and R. A. White, *Astrophys. J.*, 271, 575
28. "The Inner Radio Structure of Centaurus-A: Clues to the Origin of the X-Ray Jet", 1983, J. O. Burns, E. Feigelson and E. J. Schreier, *Astrophys. J.*, 273, 128
29. "Bent Jets and Tailed Radio Galaxies", 1983, J. O. Burns, *Astrophysical Jets*, ed. A. Ferrari and A. Pacholczyk (Dordrecht: Reidel), p. 67
30. "An Old Jet in 3C338?", 1983, J. O. Burns, *ibid*, p. 300
31. "Centaurus A -- The Nearest Active Galaxy", J. O. Burns and R. M. Price, 1983, *Scientific American*, 249, 56



## Jack O. Burns

32. "What Bends 3C465?", 1984, J. A. Eilek, J. O. Burns, F. N. Owen and C. P. O'Dea, *Astrophys. J.*, 278, 37
33. "Small Black Holes: Ionization Tracks and Range", 1984, G. Greenstein and J. O. Burns, *Am. J. of Physics*, 52, 531
34. "Preliminary Results of the 20-cm VLA Survey of Abell Clusters", 1984, F. N. Owen, J. O. Burns and R. A. White, *Clusters and Groups of Galaxies*, edited by F. Mardirossian et al., (D. Reidel), p. 295
35. "A Catalog of Candidate Superclusters and Voids", 1984, J. O. Burns and D. J. Batuski, *ibid*, p. 43
36. "Radio Jets in Classical Double Radio Sources with Strong Cores", 1984, J. O. Burns, J. Basart, D. S. De Young, D. C. Ghiglia, *Astrophys. J.*, 283, 515
37. "The Radio Structure of the X-Ray Jet in Centaurus A", 1984, J. O. Burns, E. Feigelson and E. J. Schreier, *Annals of the New York Academy of Sciences*, 422, 334
38. "Dark Matter in the Universe", 1984, J. O. Burns, *Sky and Telescope*, 68, 396
39. "A Polarization Flare in OJ 287", 1984, Holmes et al., *M.N.R.A.S.*, 211, 497
40. "X-Ray Emission Possibly Coincident with the Radio Tail of PKS 0301-123", 1985, J. O. Burns, E. R. Nelson, R. A. White and S. A. Gregory, *Astrophys. J.*, 291, 611
41. "Laboratory Electron Beam Simulation of Cosmic Radio Jets", 1985, R. G. Spulak and J. O. Burns, in *Physics of Energy Transport in Extragalactic Radio Sources*, edited by A. Bridle and J. Eilek, (NRAO), p. 265
42. "Radio Jets in Strong Core Classical Doubles", 1985, J. O. Burns, *ibid*, p. 25
43. "Sidewise Shocks in the Centaurus A Radio Jet", 1985, J. O. Burns, D. Clarke, E. D. Feigelson, and E. J. Schreier, *ibid*, p. 255
44. "A Moon-Earth Radio Interferometer", 1985, J. O. Burns in *Lunar Bases and Space Activities of the 21st Century*, edited by W. W. Mendell, (Lunar and Planetary Institute; Houston), p. 293
45. "VLA Observations of Quasars with Dogleg Radio Structure", 1985, J. T. Stocke, J. O. Burns and W. A. Christiansen, *Astrophys. J.*, 299, 799
46. "Finding Lists of Candidate Superclusters and Voids of Abell Clusters", 1985, D. J. Batuski and J. O. Burns, *Astron. J.*, 90, 1413
47. "A Possible 300 Mpc Filament of Clusters of Galaxies in Perseus-Pegasus", 1985, D. J. Batuski and J. O. Burns, *Astrophys. J.*, 299, 5
48. "Limb Brightening and Filamentation in the Inner Radio Jet of Centaurus A", 1986, D. A. Clarke, J. O. Burns and E. D. Feigelson, *Astrophys. J. (Letters)*, 300, L41
49. "Wide-Angle Tailed Radio Galaxies", 1986, J. O. Burns, *Canadian J. Physics*, 64, 373
50. "Astronomy on a Manned Mars Mission", 1986, J. O. Burns, in *Manned Mars Mission*, NASA M002, Volume 2, p. 497
51. "Observational Constraints on Bending the Wide-Angle Tailed Radio Galaxy 1919+479", 1986, J. O. Burns, C. P. O'Dea, S. A. Gregory, and T. J. Balonek, *Astrophys. J.*, 307, 73
52. "Very Large Structures in the Universe", 1986, J. O. Burns, *Scientific American*, 254, 38
53. "Jet Disruption in Wide-Angle Tailed Radio Galaxies", 1986, J. O. Burns, M. L. Norman, and D. A. Clarke in *Continuum Processes in Clusters of Galaxies*, edited by C. P. O'Dea and J. M. Uson (NRAO), p. 175
54. "Numerical Simulations of a Magnetically Confined Jet", 1986, D. A. Clarke, M. L. Norman and J. O. Burns, *Astrophys. J. (Letters)*, 311, L63
55. "B2 0800+24: A Narrow-Angle Tail Radio Galaxy in a Small Group of Galaxies", 1987, J. T. Stocke and J. O. Burns, *Astrophys. J.*, 319, 671
56. "A VLA 20-cm Survey of Poor Groups of Galaxies", 1987, J. O. Burns, R. J. Hanisch, R. A. White, E. R. Nelson, K. A. Morrisette and J. W. Moody, *Astron. J.*, 94, 587
57. "Radio Astronomy on the Moon", 1987, J. O. Burns and J. Asbell, in *Radio Astronomy From Space*, edited by K. Weiler, J. Burns, B. Dennison (NRAO), p. 29
58. "Tracing Superclusters and Voids with Abell Clusters", 1987, J. O. Burns and D. J. Batuski in *Observational Cosmology, IAU Symp. #124*, edited by G. Burbidge and L. Fang, p. 319
59. "Simulations of Large-Scale Structure Compared to Abell Cluster Distribution", 1987, D. J. Batuski, A. Melott and J. O. Burns, in *Observational Cosmology, IAU Symp. #124*, edited by G. Burbidge and L. Fang, p. 32
60. "Comparisons of the Spatial Distribution of Abell Clusters Against Models with Gaussian Initial Conditions", 1987, D. J. Batuski, A. L. Melott and J. O. Burns, *Astrophys. J.*, 322, 48
61. "Possible Calorimetric Effects at Mercury Due to Solar Wind-Magnetosphere Interactions", 1987, D. N. Baker, J. E. Borovsky, J. O. Burns, G. R. Gisler and M. Zeilik, *J. Geophys. Res.*, 92, 4707
62. "Radio Interferometric Imaging of the Subsurface Emissions from the Planet Mercury", 1987, J. O. Burns, G. R. Gisler, J. E. Borovsky, D. N. Baker and M. Zeilik, *Nature*, 329, 224
63. "Tracing Large-Scale Structures with Abell Clusters", 1987, J. O. Burns, J. W. Moody and D. J. Batuski in *13th Texas Symposium on Relativistic Astrophysics*, ed. M. P. Ulmer (World Scientific: Singapore), p. 286
64. "Jets in Luminous Extragalactic Radio Sources", 1987, J. O. Burns, D. A. Clarke and M. L. Norman, *13th Texas Symposium on Relativistic Astrophysics*, ed. M. P. Ulmer (World Scientific: Singapore), p. 341
65. "A 50 Mpc Diameter Void in Pisces-Cetus", 1988, J. O. Burns, J. W. Moody, J. P. Brodie and D. J. Batuski, *Astrophys. J.*, 335, 542
66. "Future Astronomical Observatories on the Moon", 1988, editors J. O. Burns and W. W. Mendell, NASA Conference Publication 2489
67. "Disruption of Galactic Radio Jets by Shocks in the Ambient Medium", 1988, M. L. Norman, J. O. Burns and M. Sulkanen,

## Jack O. Burns

- Nature*, 335, 146
68. "Radio Sources Associated with Emission-Line Galaxies in the Bootes Void", 1988, J. O. Burns, J. W. Moody and S. A. Gregory, *Astron. J.*, 95, 668
  69. "A CCD Camera System at Capilla Peak Observatory, New Mexico", 1988, B. E. Laubscher, S. A. Gregory, T. J. Bauer, M. Zeilik and J. O. Burns, *P.A.S.P.*, 100, 131
  70. "AGNs in Clusters of Galaxies and the Bootes Void", 1988, J. O. Burns in *Active Galactic Nuclei*, ed. H. R. Miller and P. J. Wiita (Springer-Verlag), p. 400
  71. "MHD Simulations of Extended Extragalactic Radio Sources", 1988, M. L. Norman, D. A. Clarke and J. O. Burns, in *Magnetic Fields and Extragalactic Objects*, Proceedings of the Cargese Workshop, ed. E. Asseo and D. Gresillon, (Les Ulis: Edition de Physique), p. 297
  72. "21st Century Astronomical Observatories on the Moon", 1988, J. O. Burns in *Engineering, Construction, and Operations in Space*, Proceedings of Space 88, ed. S. W. Johnson and J. P. Wetzel, (ASCE: New York), p. 1083
  73. "Large Scale Streaming of Galaxies: Evidence for a Great Attractor?", J. O. Burns, *Physics Today*, 41, S-9
  74. "Holes in the Distribution of Rich Clusters of Galaxies", 1988, J. O. Burns, *P.A.S.P.*, 100, 1325
  75. "A 20-cm VLA Survey of Abell Clusters of Galaxies I. Distance Class < 3 Clusters", 1989, J.-H. Zhao, J. O. Burns and F. N. Owen, *Astron. J.*, 98, 64
  76. "The Distribution of Clusters in the Southern ACO Catalog", 1989, D. Batuski, N. Bahcall, R. Olowin and J. O. Burns, *Astrophys. J.*, 341, 700
  77. "Numerical Observations of a Simulated Jet with a Passive Helical Magnetic Field", 1989, D. Clarke, M. Norman, J. O. Burns, *Astrophys. J.*, 342, 700
  78. "Low Temperature Transonic Cooling Flows in Galaxy Clusters", 1989, M. Sulkanen, J.O. Burns, M. Norman, *Astrophys. J.*, 344, 604
  79. "The Radio Properties of cD Galaxies", 1989, J.O. Burns in *Clusters of Galaxies: Proceedings of STScI Workshop*, edited by M. Fitchett and W. Oegerle, STScI Publications, p. 35
  80. "Developing Concepts for Lunar Astronomical Observatories: Interdisciplinary Team Experiences at the University of New Mexico", 1989, S. W. Johnson, K. Chua, N. Duric, W. Gerstle and J. Taylor, in *ASEE Annual Conference Proceedings*, American Soc. of Engin. Education, Session 1201, p. 12
  81. "A Lunar Far-Side Very Low Frequency Array", 1989, edited by J. O. Burns, N. Duric, S. W. Johnson, J. Taylor, *NASA Conference Publication #3039*
  82. "The Radio Properties of cD Galaxies in Abell Clusters I. An X-Ray Selected Sample", 1990, J. O. Burns, *Astron. J.*, 99, 14
  83. "Observatories on the Moon", 1990, J. O. Burns, N. Duric, J. Taylor and S. W. Johnson, *Scientific American*, 262, 42
  84. "Astronomical Science From a Lunar Base", 1990, N. Duric, J. O. Burns and I. Fernini, *Engineering, Construction and Operations in Space II*, Proceedings of Space 90, edited by S. W. Johnson and J. Wetzel, ASCE, p. 666
  85. "LOUISA: A Lunar Optical-Ultraviolet-Infrared Synthesis Array", 1990, J. O. Burns, N. Duric, S. W. Johnson and J. Taylor, *ibid*, p. 677
  86. "Initial Design of a Lunar Far-Side Very Low Frequency Array", 1990, J. Basart and J. O. Burns, *ibid*, p. 687
  87. "Dispersal of Gases Generated Near a Lunar Outpost", 1990, I. Fernini, J. Burns, J. Taylor, M. Sulkanen, N. Duric and S. W. Johnson, *Journal of Rockets and Spacecraft*, Oct./Nov.
  88. "Numerical Modelling of Born-Again Radio Jets", 1990, J. Burns and D. Clarke in *Parsec-Scale Radio Jets*, eds. J. A. Zensus and T. J. Pearson, Cambridge University Press, p. 260
  89. "The Lunar Observer Radio Astronomy Experiment", 1990, J. Burns in *Low Frequency Astrophysics From Space*, ed. N. E. Kassim and K. W. Weiler, Springer-Verlag, p. 19
  90. "A Very Low Frequency Array for the Lunar Far-Side", 1990, J. Basart and J. Burns, *ibid*, p. 52
  91. "Review of Recent Lunar Observatories Workshops", 1990, J. Burns, *Astrophysics from the Moon*, eds. M. J. Mumma and H. J. Smith, American Inst. of Physics, p. 305
  92. "VLF Radio Astronomy From the Moon - Probing Astrophysical Plasmas", 1990, N. Duric and J. Burns, *ibid*, p. 515
  93. "The Polarization Structure of Centaurus A", J. Burns and D. Clarke, in *IAU Symposium #140*, eds. R. Beck, P. Kronberg, and R. Wielebinski, Kluwer Academic Pub., p. 469
  94. "Numerical Observations of a Restarting Radio Jet", *ibid*, p. 435
  95. "Lunar Astronomical Observatories: Design Studies", 1990, S. W. Johnson, K.-M. Chua, J. Burns, N. Duric, W. H. Gerstle, and J. Taylor, *Journal of Aerospace Engineering*, 3, No. 4, 211
  96. "Chasing the Monster's Tail: New Views of Cosmic Jets", J. Burns, 1990, *Astronomy*, 18, No. 8, p. 28
  97. "Numerical Models of Extragalactic Radio Sources", J. Burns and M. L. Norman, D. A. Clarke, *Science*, 253, 522
  98. "The Dynamics of the Rich Cluster A2634", 1990. G. Rhee, J. C. Pinkney, J. Burns, J. Hill, W. Oegerle, P. Hintzen, D. J. Batuski, *After the First Three Minutes Astrophysics Workshop*, ed. S. Holt, C. Bennett and V. Trimble, Amer. Inst. of Physics, p. 413
  99. "Depolarization Asymmetry in the Quasar 3C 47", with I. Fernini, J. P. Leahy, J. Burns, J. P. Basart, 1991, *Astrophys. J.*, 371, 63
  100. "X-ray Emission from Poor Clusters of Galaxies", R. Price, J. Burns, N. Duric, M. V. Newberry, 1991, *Astron. J.*, 102, 14
  101. "Numerical Simulations of a Restarting Jet", 1991, D. Clarke and J. Burns, *Astrophys. J.*, 369, 308
  102. "Optical Interferometry from the Moon", 1991, J. Burns, *Science Objectives and Architectures for Optical Interferometry in*

## Jack O. Burns

- Space*, eds. M. Shao, S. Kulkarni, D. Jones, (JPL D-8540, Vol. 1), p. 107
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