University of Colorado Boulder

LUNAR

CURRICULUM VITAE

JACK O. BURNS

PERSONAL INFORMATION

Home Address: 2420 Outlook Trail
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Current Positions: Professor, Department of Astrophysical and Planetary Sciences,
University of Colorado at Boulder
and
Vice President Emeritus for Academic Affairs & Research
University of Colorado System

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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:

Vice President Emeritus for Academic Affairs & Research
University of Colorado System
2006 – present

Assist CU-Boulder administration with fundraising for projects including the $110 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.

Director
NASA/NLSI Lunar University Network for Astrophysics Research (LUNAR)
University of Colorado at Boulder
2009 – present
Serve as leader of the first national center of excellence for the study of science from the Moon. Center is funded by a four-year, $6.5 million grant from NASA. LUNAR consists of a network of a dozen major research universities and 3 NASA centers dedicated to research on astrophysics from the Moon, including Low Frequency Astrophysics & Cosmology, Radio Heliophysics, and Gravitational Physics via Lunar Laser Ranging. http://lunar.colorado.edu.

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 $630 million in 2007/08 in grants and contracts, and has a $2.2 billion annual operating budget. CU had the 6th largest expenditure of federal grants among public universities in FY 2007 and the 2nd fastest rate of growth in federal funding among its AAU peers in the past 5 years. CU School of Medicine has the sixth largest expenditure of NIH funding among public academic health centers and CU-Boulder has the largest amount of NASA funding among public universities in the nation. CU has 4 Nobel Laureates, 50 members of the National Academies, and 7 MacArthur Fellows.

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 and to champion diversity. The Vice 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).

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 in the past 2 years. Also, 25 new spin-off companies were formed and over 150 new technology licenses were issued over the last 36 months. 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.
- Was a senior member of the negotiating team for the nation's first Performance Contract between a public university and a state government. CU's performance contract guarantees new flexibility in setting tuition, bonding buildings, and approval of new academic programs. In exchange, CU promised a new level of accountability including debt-free graduation for low-income students, an enhanced pipeline of first generation students, a high level of achievement on standardized tests (e.g., CPA, LSAT), and lower administrative costs than peer institutions.
- 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.
- Expanded CU's first-generation, pre-Collegiate pipeline program for middle and high schools that now involves over 2000 first-generation students. Raised $10 million dollars in scholarships for graduates of pre-Collegiate program to attend CU.
- Created new position of Assistant Vice President for Diversity and the first System-wide Diversity Advisory Committee. Provided funds for and assisted in the search for 6 new faculty of color on 3 campuses in 2004/05. Developed a new retention program for diverse faculty.
- Developed agendas and organized discussions for Board of Regents monthly study sessions on Academic Affairs and Strategic Planning. Collaborated with Board in developing university budgets and major new policies on diversity, intellectual property, academic programs, and conflicts of interest.
- Assisted the President with private fundraising, especially with coordination of academic priorities among the 4 campuses and brokering new corporate sponsorships/partnerships. CU successfully completed a $1 billion capital campaign in September, 2003.
- Established the Committee for the Advancement of Learning Innovations to assist in identifying opportunities and strategies to promote, support and enhance learning innovations across the CU System. Established the Cooperative Assessment Project as a systemwide resource to support faculty and administrators in course and program assessment.
- Principal liaison with the Colorado Commission on Higher Education. Helped Commission with new outreach programs for K-12, the development of new admissions standards to higher education institutions, and the development of a state-wide transfer core for community college students completing their education at a four-year school.
- Developed a new partnership agreement with the National Institute for Standards & Technology for an expanded relationship with the JILA Laboratory at CU along with additional activities in the biosciences and nanotechnology.
- Assisted with development of successful proposals for a Department of Homeland

Security Center for Behavioral and Social Aspects of Terrorism/Counter-Terrorism, and an NIH/NIAID Regional Center of Excellence in Biodefense and Emerging Infectious Diseases funded at the level of $40 million.

- Worked with CU system and Colorado State University to create of the first School of Public Health in the Rocky Mountain region.
- Coordinated team from CU System to consolidate the University's downtown Denver campus with the CU-Health Sciences Center to create a new comprehensive research, urban university for Denver. Provided mentorship to new leadership team.
- Established a system-wide "barrier busters" team to reduce bureaucratic impediments for intercampus collaborations in teaching and research.
- 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.

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 has a student population of 23,000 and a faculty of over 1600. 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.

Accomplishments include:

- Increased MU research awards by an unprecedented 132% from 1997 to 2001.
- Increased 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.
- Helped lead successful federal, state, and private fundraising effort for the construction of a $75 million Life Sciences Center.
- Built a new Technology Transfer Office for the University of Missouri System that produced new industry partnerships, enhanced technology licensing opportunities, and created start-up companies based on faculty inventions.
- Reorganized the Office of Sponsored Programs to include satellite offices at four strategic locations on the MU campus, with a strong service orientation.
- Developed and implemented a campus Master Plan for Research and Technology Development designed to boost extramural funding, assist faculty in the development of large interdisciplinary projects and Centers, and create new companies.
- Created a new research magazine called *Illumination* which won three national awards and continues to be published semiannually.

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.

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.
- Developed a social sciences summer bridge program for Native American community college students with funding from the Kellogg Foundation.
- 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.
- Reorganized College and University grants administration with new electronic proposal and Web-based management tools.

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.
- 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.
- Helped raise $5 million in federal funds for a Science Education Center at the Apache Point Observatory.

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, 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 a new class on Space Science & Space Policy at U. Colorado; supervised Ph.D. dissertation research for 14 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
University of New Mexico
1980 - 1984

Graduate Teaching Assistant
Indiana University
1975 – 1977

SERVICE: Serves 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 & 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.

RECENT 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.
National Center for Women and IT, Board of Directors, 2004 – present.
Colorado Science Forum, 2005 – present (founding Board of Directors).
Electorate Nominating Committee, Section on General Interest in Science & Engineering, American Association for the Advancement of Science (AAAS), 2006 – present.
Committee on Astronomy & Public Policy, American Astronomical Society, 1999 – present (Chair, 2006 – 2009, 2011 - present).
Constellation-X Facility Science Team, 2008.
Executive Committee, NASA Lunar Science Institute, 2009 – present.
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 – present (Chair 2010 – present).

PUBLIC POLICY AND WASHINGTON EXPERIENCE:

Over 25 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 principal external advisor for science for 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 current NSF Director, Arden Bement, when he was Director of NIST.

Raised over $150 million in funding for two universities via federal advocation 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.

INTERNATIONAL EXPERIENCE:

Traveled and lectured extensively in China beginning in 1986. Collaborated on research and research policy with faculty at Beijing and Shanghai universities. Recruited and supervised Chinese graduate students studying in the U.S.

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.

Traveled and lectured extensively in the U.K., France, Germany, Italy, 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 observatories in space and on the Moon.

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 Astrophysics from the Moon.

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

Consultant to the President
Associated Universities, Inc.
2006 – present

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

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

Jack O. Burns

SELECTED RESEARCH GRANTS: Total Grant Funding Exceeds $10,000,000

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 3 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”, 2007/10, $332,700.
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, 2009/13, $6.5 million.

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.

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.

SELECTED RESEARCH COLLOQUIA:

1. Cambridge University, England, July 13, 1988
2. Jodrell Bank Radio Observatory, England, July 19, 1988
3. Los Alamos National Laboratory, October 7, 1988
4. NASA Headquarters, October 13, 1988
5. NASA-Goddard Space Flight Center, October 14, 1988
6. University of Minnesota, October 27, 1988
7. Los Alamos National Laboratory, Center for Nonlinear Studies, December 2, 1988
8. National Radio Astronomy Observatory, Socorro, NM, June 1, 1989
9. IBM Research Laboratory, San Jose, CA, December 14, 1989
10. University of Illinois, May 7, 1990
11. Lockheed Corporation, Palo Alto, CA, September 13, 1990
12. Massachusetts Institute of Technology, November 13, 1990
13. NASA/Goddard Space Flight Center, Greenbelt, MD, November 14, 1990
14. Los Alamos National Laboratory, January 30, 1991
15. New Mexico State University, Physics Department, March 21, 1991
16. National Solar Observatory, Sacramento Peak, NM, July 19, 1991
17. University of Kansas, January 21, 1992
18. University of Chicago, January 22, 1992
19. Los Alamos National Laboratory, July 15, 1992
20. Max Planck Institute for Extraterrestrial Physics, Munich, Germany, July 31, 1992
21. Sandia National Laboratories, October 16, 1992
22. NASA Goddard Space Flight Center, October 28, 1992
23. Naval Research Laboratory, October 29, 1992
24. NASA Marshall Space Flight Center, September 24, 1993
25. University of Illinois, November 16, 1993
26. National Radio Astronomy Observatory, March 9, 1994
27. University of Alabama, March 11, 1994
28. Max Planck Institute for Extraterrestrial Physics, July 27, 1994

29. University of Nevada at Las Vegas, September 30, 1994
30. University of California at Santa Cruz, November 2, 1994
31. University of Maine, March 29, 1995
32. St. Mary's University of Hallifax, Nova Scotia, March 31, 1995
33. Florida State University, April 24, 1995
34. Brigham Young University, October 11, 1995
35. California Institute of Technology, May 8, 1996
36. Iowa State University, November 9, 1996
37. University of Missouri – Columbia (Physics & Astronomy Dept.), March 18, 1997
38. University of Missouri – Columbia (Computer Engineering & Computer Science Dept.), November 13, 1997
39. University of Missouri – Columbia (Physics & Astronomy Dept.), February 1998
40. University of Kansas, April 1998
41. Center for Astrophysics, Harvard University, June 1998
42. Iowa State University, September 1998
43. University of Missouri – Columbia (Mechanical & Aerospace Engineering Dept.), September 1998
44. University of Missouri – St. Louis, October 1998
45. Kansas State University, September 1999
46. University of Massachusetts, September 2000
47. University of Maine, September 2000
48. Northwestern University, November 2000
49. University of Colorado – Boulder, December 2002
50. University of California – San Diego, January 2003
51. University of Texas – Austin, September 2005
52. Indiana University – Bloomington, October 2005
53. Naval Research Laboratory – Washington, DC, June 2006.
54. Southwest Research Institute – Boulder, CO, July 2006.
55. Ball Aerospace – Boulder, CO, August 2006.
56. JILA – Boulder, CO, October 2006.
57. University of New Mexico – Albuquerque, NM, October 2006.
58. National Radio Astronomy Observatory – Socorro, NM, October 2006.
59. Los Alamos National Laboratory – Los Alamos, NM, March 2007.
60. St. Mary's University -- Halifax, Canada, July 2007.
61. University of Maine – Orono, September 2008
62. Naval Research Laboratory – Washington, DC, September 2008
63. National Radio Astronomy Observatory & University of Virginia, Charlottesville, VA, September 2008
64. Los Alamos National Laboratory – Los Alamos, NM, October 2008
65. University of California at San Diego, December 2008

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, 2007 – present.
14. Jason Henning, University of Colorado, 2007 – 2009.
15. Jordan Mirocha, University of Colorado, 2009 – present.
16. Laura Kruger, University of Colorado, 2009 – present.
17. David Schenck, University of Colorado, 2011 – present.

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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 – present.
12. Abhi Datta, University of Colorado, 2010 – present.
13. Stephen Skory, University of Colorado, 2010 – 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
Participant in NRAO Summer Student 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
Invited to write three articles for Scientific American, in 1983, 1986, and 1990
Invited to write review article for *Science* entitled "Stormy Weather in Galaxy Clusters"
Elected Fellow of the American Physical Society, November 1998.
Elected Fellow of the American Association for the Advancement of Science, April 2008.
Awarded NASA's Exceptional Public Service Medal, 2010.

PROFESSIONAL SOCIETIES:

American Physical Society (Fellow, 1998- present)
American Association for the Advancement of Science (Fellow 2008 – present)
American Astronomical Society
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

PUBLICATIONS (not including published abstracts; 368 total publications according to NASA ADS):

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", J. O. Burns, F. N. Owen, and L. Rudnick, 1978, *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*,

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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
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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
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30. "An Old Jet in 3C338?", 1983, J. O. Burns, *ibid*, p. 300
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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
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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
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45. "VLA Observations of Quasars with Dogleg Radio Structure", 1985, J. T. Stocke, J. O. Burns and W. A. Christiansen, *Astrophys. J.*, *299*, 799
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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
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50. "Astronomy on a Manned Mars Mission", 1986, J. O. Burns, in *Manned Mars Mission*, NASA M002, Volume 2, p. 497
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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
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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
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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
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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
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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
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101. "Numerical Simulations of a Restarting Jet", 1991, D. Clarke and J. Burns, *Astrophys. J.*, *369*, 308
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