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Professional Positions:

Deputy Director, Astrophysics Science Division (ASD), NASA Goddard Space Flight Center (GSFC) *(05/2010 – present)*

As Deputy Director of the ASD, I work with the Director to manage all aspects of Division responsibilities. This includes scientific research planning, concept development for new space missions, supervision of staff, budgeting, and workforce planning.

ASD comprises five laboratories: Astroparticle Physics, X-ray Astrophysics, Gravitational Astrophysics, Observational Cosmology, and Exoplanets and Stellar Atmospheres. Overall, ASD has over 375 persons. This includes more than 95 civil servants (faculty level), over 140 Ph.D. contractor scientists (including postdoctoral fellows), more than 35 graduate students, and administrative staff. The Division supports operating missions (e.g. HST, Swift, Fermi), missions in development (e.g. JWST, TESS, NICER, WFIRST), the High Energy Astrophysics Science Archive Research Center (HEASARC), suborbital programs, instrument and technology development, theory, astrophysical modeling, and data analysis.

I currently lead the Astrophysics Line of Business, which oversees the development of technology and new mission concepts. In this role I work collaboratively with the lab chiefs and other scientists within the ASD as well as colleagues in Engineering and Project Management across the Center. I also led a process by which several groups developed successful proposals for the Science Innovation Fund (an HQ initiative) and interdisciplinary Science Task Groups (a GSFC Science Directorate initiative). The most compelling of these efforts is focused on exoplanet climates, is co-led by a scientist from ASD, and has received significant external funding.

Strategic planning is another important area of emphasis. Following the release of the 2010 Astrophysics Decadal Survey, I formed a strategic planning team within ASD that included both senior and junior scientists; this was the first such division-wide team with participation beyond the lab chief level within roughly 10 years. I led a subgroup of this team to serve on the Science Directorate long-range science vision. I am currently working on strategic activities that span ASD and Engineering, including instrument development as well as future technology and workforce development.

Working with several women colleagues within ASD, I spearheaded development of the Women in Astrophysics Roundtable, which provides a safe environment to discuss difficult issues such as harassment in the workplace. I also mentor young scientists (especially, but not exclusively, women), in both individual and group settings.

Strategic Integration Lead, Astrophysics Division (APD), NASA Headquarters (HQ) *(09/2012 – 09/2013)*

I was on detail to the APD at NASA HQ for a year, serving as the Strategic Integration lead.

My first major responsibility was developing the Astrophysics Implementation Plan, in nascent form when I arrived at HQ, and leading it through to completion. Working with the APD Director to understand the goals, I developed processes for participation and input from all the leads in the APD, restructured the document for clarity and usefulness, wrote several missing sections, and edited the full document. I also prepared the plan for review by advisory committees, OMB, OSTP, and the Office of the NASA Administrator. The plan was successfully completed on time, and with updates remains an important document for the APD.

I also served as the HQ lead for preparing the Astrophysics Roadmap, *Enduring Quests, Daring Visions*. I collaborated with the Roadmap Chair to recruit an excellent team of astronomers, including outstanding early and mid-career scientists. We defined a process to allow input from the community while adhering to the tight timetable of less than a year. The Roadmap was completed on time, and is considered a major success.

In addition, I managed the APD's advisory and strategic processes, including the development of the astrophysics strategic goals and input to the 2014 NASA Science Plan. I served as Program Scientist for the Planck mission, coordinating an international press conference for a major data release. I also served as Program Scientist for WFIRST/AFTA during the initial Science Definition Team study. And I was the lead program officer for the Theoretical and Computational Astrophysics Networks (TCAN) solicitation, a joint program with the NSF.

Chief, Gravitational Astrophysics Laboratory, NASA GSFC *(09/2004 – 04/2010)*

I served as lab chief for the newly-created Gravitational Astrophysics Lab (Code 663). During my time as lab chief, I also led the astrophysics modeling effort for LISA.

The lab was staffed by nine civil servant scientists (faculty level), 13 Ph.D. contractor scientists (including postdoctoral fellows), and several graduate students. Lab scientists carried out research in the areas of precision measurements, astrophysical modeling, gravitational wave (GW) data analysis, and theoretical high energy astrophysics. The lab supported the LISA mission through project science, instrumentation, source modeling and data analysis. Lab scientists also supported high energy astrophysics missions such as SWIFT through theoretical modeling.

I managed the people and resources in the lab, working collaboratively across the division as well as with the LISA project, including partners at JPL. I also led this diverse group through major changes at NASA, including the transition to Full Cost Accounting, and the introduction of a new performance planning and evaluation system.

Numerical Astrophysics Research Group leader, NASA GSFC *(2001 – 2010)*

I came to Goddard to initiate, develop, and lead a research group to carry out modeling of astrophysical gravitational wave sources and to build data analysis capabilities for the LISA mission.

From the beginning, my group's most important challenge was to calculate the GW signals from the merger of massive black holes using simulation of the Einstein equation. These signals would impact the LISA mission design choices and data analysis strategies. To start the group, I brought one of my postdocs from Drexel, and recruited others with key expertise and knowledge. I received start-up funds from GSFC to get the effort underway; thereafter the research was supported with NASA funding

I obtained through the ROSES process. I negotiated arrangements for using supercomputing resources at GSFC, and later from the DOE and NASA Ames Research Center (ARC). I led the research and managed the people and resources throughout.

The merger of binary black holes was an extremely difficult physics problem, unsolved for over 30 years. We started our work at GSFC with the 3-D adaptive mesh code that my group developed at Drexel. We then improved the numerical algorithms and added capabilities for black holes. The key to simulating the merger was a novel method we developed for handling the black holes numerically. We worked closely with the supercomputing team at ARC, enabling us to carry out the largest black hole merger simulations at that time.

The GW signals we calculated provided templates for extracting black hole mergers from the LISA data stream, simplifying the data analysis and increasing the science return from the mission without raising its cost. (Our results were applicable to LIGO, providing important progress towards their template data banks.) Our work also produced more accurate estimates for the rates of LISA sources, and electromagnetic signals that may result from a black hole merger. The ARC team produced spectacular 3-D visualizations of the mergers, revealing new scientific insights and exciting the imagination of the public – nearly a decade later these graphics of our models are still in demand.

I served on the LISA International Science Team, participating in the sources and science requirements working groups and leading the advocacy efforts for LISA. I organized and led a team that developed and executed outreach strategies to the scientific community; we increased the size of the GW constituency and educated key stakeholders about GW science.

Professor, Department of Physics, Drexel University *(1984 – 2001)*

Professor (1997-2001), Associate Professor (1984-1997; tenured 1987)

I came to Drexel in 1984, the first person hired by the University in their new astrophysics research area. I formed and led a research group using numerical modeling to probe complex astrophysical systems. To this end, I recruited and supervised postdocs as well as graduate and undergraduate students; secured NSF research funding (maintained throughout my career at Drexel); managed the budgets; set up and oversaw a local computer lab; obtained NSF funding for local computing equipment; and secured access to national supercomputer centers.

In my research, I embarked on a major new direction: modeling astrophysical events that produce GWs detectable by the ground-based LIGO. This significantly increased the scope and complexity of my research. My group focused on two key sources: compact binary coalescence and rotational (bar-mode) instabilities in compact stars. The binary coalescence studies were the first to look at the gravitational energy spectrum and showed that the GWs from these sources can be used to probe binary properties such as mass ratio and spin. We also were the first to calculate the GWs emitted by the bar-mode instability in a rapidly rotating neutron star. In addition, I led the group in developing adaptive mesh capability in 3-D numerical general relativity codes. We were the first to publish a calculation of a GW traveling across a 3-D adaptive grid.

I continued working with the 1-D numerical relativity code I had developed earlier, applying it to study a range of important phenomena including cosmic nucleosynthesis and inflation.

I taught both undergraduate and graduate physics courses, including Drexel's first graduate course in general relativity. I developed a new format for introductory astronomy with greater student classroom participation. In addition, I supervised Ph.D., Masters, and undergraduate theses.

My administrative activities included serving as associate graduate advisor and chairing faculty search and tenure review committees. I also chaired a university-wide Workgroup on Research, Scholarship, and Creative Activity for Drexel's self-study for accreditation. Externally, I served on advisory committees for NSF's Physics Division and Advanced Scientific Computing Initiative.

Lecturer, Department of Astronomy, University of Texas *(1983 – 1984)*

During my time as a lecturer in the Department of Astronomy, I began work on a new research problem: the collapse, shock heating, and thermal evolution of superclusters of galaxies. I used a 1-D code hydrodynamics code I had developed earlier, adding conduction and cooling of the gas; the dark matter was simulated by direct N-body techniques. These pioneering calculations showed the crucial role of conduction in cooling the gas, which must occur if the pancake is to fragment into galaxies and stars.

I continued my work simulating 3-D models of large scale structure, working with Cray Research. I also started a new collaboration with Digital Productions, a computer animation company. This effort produced highly detailed and visually compelling movies of large scale structure developing in the universe. The movies enabled deeper scientific understanding of the dynamics and also reached audiences far beyond the astronomy community.

I also taught an undergraduate astronomy course for non-science majors that focused on explosive astrophysical phenomena such as novae and supernovae.

Postdoctoral Research Associate, Department of Astronomy, University of Illinois *(1981 – 1983)*

In my second postdoc, I started work on a new problem that had attracted growing interest in the astrophysics: the development of large scale structure in the universe. Using the facilities at Lawrence Livermore National Laboratory (LLNL), I optimized a 3-D code to run on a Cray supercomputer and modeled larger regions of the universe with better resolution than had been done before. I also recognized the key role that computer visualization of the models plays in understanding the scientific results and communicating them to broad audiences. To this end, I developed a collaboration with Cray Research that exploited the power of supercomputers to produce 3-D images and movies showing the evolution of large scale structure.

I also continued development of the 1-D numerical relativity code I had begun earlier, expanding the scope and adding general relativistic hydrodynamics.

Postdoctoral Research Associate and Lecturer, Department of Physics and Relativity Center, University of Texas *(1979 – 1981)*

During my first postdoc, I continued to develop the 1-D code I had begun during my Ph.D. work, and applied it to an important open issue in general relativity: the nonlinearity of GW interactions. I also started a collaboration with astrophysics colleagues at LLNL to continue my research. I gained access to their powerful computing facilities and worked with computer scientists to continue my code development. I obtained the Secret-level security clearance needed to work there.

In addition, I developed and taught an undergraduate physics course for non-scientists that featured many in-class demonstrations.

Education

Ph.D. Institute of Astronomy, Cambridge University (1980)

For my Ph.D. research, I pioneered the use of numerical relativity (solving Einstein's equations of general relativity on a computer) to study gravitational waves in the early universe. I developed the first full numerical relativity computer code for this work.

B.S. University of Massachusetts at Amherst (1975; *summa cum laude*)

Professional Activities (representative sample)

- Chair, Advisory Board, North American Nanohertz Observatory for Gravitational Waves (NANOGrav) (2010 – present)
- Community Science Team for Gravitational-Wave Astrophysics Mission Concepts, NASA's Physics of the Cosmos Program (2011-2012)
- Particle Astrophysics and Gravitation Program Prioritization Panel, Astro2010: The Astronomy and Astrophysics Decadal Survey (Board on Physics and Astronomy, The National Academies) (2009 – 2010)
- Fachbeirat (Scientific Advisory Board), Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Potsdam and Hannover, Germany (2007 – 2013)
- LISA International Science Team (LIST) (2005 – 2011); co-chair of Advocacy Working Group (2007-2008)
- Executive Committee, Division of Astrophysics, American Physical Society (APS) (2005-2007; 1994-1996)
- Program Advisory Committee, Laser Interferometric Gravitational-wave Observatory (LIGO) (2001-2004)
- Editorial Board, Classical and Quantum Gravity (1995-1996)
- Committee on Science and the Arts, The Franklin Institute, Philadelphia (1986-1992)
- Editorial Board, Computers in Physics (1988-1991)

Membership in Professional Societies

American Physical Society (Fellow)

American Astronomical Society

Professional Honors and Awards

- **Robert H. Goddard Exceptional Achievement Award for Mentoring**, NASA GSFC (2013)

  Citation*: For your demonstrated commitment to mentoring women scientists at all stages of their careers, which has resulted in a positive and supportive environment for all.*

- **John C. Lindsay Memorial Award for Space Science**, Goddard's highest honor for outstanding contributions to space science, NASA GSFC (2008, jointly awarded with John Baker)

  Citation: *In recognition of your ground-breaking research in the simulation of the gravitational wave signature from the final stages of the merger of two black holes.*

- **NASA Exceptional Scientific Achievement Medal** (2007)

  Citation: *For ground-breaking work in the simulation of gravitational wave signals from merging black holes*

- **Fellow, American Physical Society** (elected 1998)

  Citation: *For her original contributions to numerical relativity, cosmology, and astrophysics, in particular for her studies of large-scale structure in the universe and sources of gravitational radiation.*

- **Presidential Young Investigator Award**, NSF (1985-1990)
- **Amelia Earhart Fellowship** (1978-1979)
- **Marshall Scholarship** (1975-1978)

Recent Professional Education

- "Visioning and Leading Change" (Brookings Institution, March 2016)
- "Road to Mission Success: Leadership for Complex Decision Making" (NASA GSFC, Nov/Dec 2015)
- "New Business Capture Class" (NASA GSFC, Oct 2015)
- "Political Savvy: Mastering Power and Politics" (NASA HQ, May 2015)
- "Working Across Organizational Boundaries" (NASA HQ, Dec. 2014)
- "Finance for Non-Financial Managers" (Brookings Institution, Oct. 2014)
- "Politics and Policy Making" (Brookings Institution, June 2014)
- "Road to Mission Success" (NASA GSFC, May 2011)
- "Executive Development Seminar: Leading Change" (OPM-EMDC, May 2010)
- "Gender Differences in Negotiation" (NASA GSFC, Mar 2008)
- "Goddard Leadership Education Series" (NASA GSFC, July 2006)

Refereed Publications

- "Mergers of black-hole binaries with aligned spins: Waveform characteristics," Bernard Kelly, John Baker, Sean McWilliams, William D. Boggs, and Joan Centrella, 2011, Phys. Rev. D, **84**, 084009
- "Merging Black Holes," Joan Centrella, John Baker, Bernard Kelly, and James van Meter, 2011, Contemporary Physics, **52**, 1
- "Black hole binaries, gravitational waves, and numerical relativity," J. Centrella, J. Baker, B. Kelly, and J. van Meter, 2010, Rev. Mod. Phys. **82**, 3069
- "Gravitational Waves from Black-Hole Binary Mergers," Joan M. Centrella, John G. Baker, Bernard J. Kelly, and James R. van Meter, 2010, Annual Reviews of Nuclear and Particle Physics, **60**, 75
- "Modeling Flows around Merging Black Hole Binaries," James R. van Meter, John H. Wise, M. Coleman Miller, Christopher S. Reynolds, Joan M. Centrella, John G. Baker, William D. Boggs, Bernard J. Kelly, and Sean T. McWilliams, 2010, Ap. J. Lett., **711**, L89
- "Status of NINJA: the Numerical INJection Analysis project," B. Aylott, et al., 2009, Class. Quant. Grav., **26**, 114008
- "Testing gravitational-wave searches with numerical relativity waveforms: Results from the first Numerical INJection Analysis (NINJA) project," B. Aylott, et al., 2009, Class. Quant. Grav., **26**, 165008
- "Mergers of nonspinning black hole binaries: gravitational radiation characteristics," J. Baker, W. Boggs, J. Centrella, B. Kelly, S. McWilliams, and J. van Meter, 2008, Phys. Rev. D, **78**, 044046

- "Modeling kicks from the merger of generic black-hole binaries," J. Baker, W. Boggs, J. Centrella, B. Kelly, S. McWilliams, M. Miller, and J. van Meter, 2008, Ap. J., **682**, L29
- "Anatomy of the binary black hole recoil: A multipolar analysis," J. Schnittman, A. Buonanno, J. van Meter, J. Baker, W. Boggs, J. Centrella, B. Kelly, and S. McWilliams, 2008, Phys. Rev. D, **77**, 044031
- "A data-analysis driven comparison of analytic and numerical coalescing binary waveforms: nonspinning case," Y. Pan, A. Buonanno, J. Baker, J. Centrella, B. Kelly, S. McWilliams, F. Pretorius, and J. van Meter, 2008, Phys. Rev. D, **77**, 024014
- "Toward faithful templates for non-spinning binary black holes using the effective-one-body approach," A. Buonanno, Y. Pan, J. Baker, J. Centrella, B. Kelly, S. McWilliams, and J. van Meter, 2007, Phys. Rev. D, **76**, 104049
- "Modeling kicks from the merger of non-precessing black-hole binaries," J. Baker, W. Boggs, J. Centrella, B. Kelly, S. McWilliams, M. Miller, and J. van Meter, 2007, Ap. J., **668**, 1140
- "Recoiling from a kick in the head-on collision of spinning black holes," D. Choi, B. Kelly, W. Boggs, J. Baker, J. Centrella, and J. van Meter, 2007, Phys. Rev. D, **76**, 104026
- "Binary black hole late inspiral: Simulations for gravitational wave observations," J. Baker, S. McWilliams, J. van Meter, J. Centrella, D. Choi, B. Kelly, and M. Koppitz, 2007, Phys. Rev. D, **75**, 124024
- "Consistency of post-Newtonian waveforms with numerical relativity," J. Baker, J. van Meter, S. McWilliams, J. Centrella, and B. Kelly, 2007, Phys. Rev. Lett., **99**, 181101
- "Getting a kick out of numerical relativity," J. Baker, J. Centrella, D. Choi, M. Koppitz, J. van Meter, and M. C. Miller, 2006, Ap. J., **653**, L93
- "Binary black hole merger dynamics and waveforms," J. Baker, J. Centrella, D. Choi, M. Koppitz, and J. van Meter, 2006, Phys. Rev. D, **73**, 104002
- "Gravitational wave extraction from an inspiraling configuration of merging black holes," J. Baker, J. Centrella, D. Choi, M. Koppitz, and J. van Meter, 2006, Phys. Rev. Lett., **96**, 111102
- "Wave zone extraction of gravitational radiation in three-dimensional numerical relativity," D. Fiske, J. Baker, J. van Meter, D. Choi, and J. Centrella, 2005, Phys. Rev. D, **71**, 104036.
- "Impact of LISA's low frequency sensitivity on observations of massive black hole mergers," J. Baker and J. Centrella, 2005, Classical and Quantum Gravity, **22**, S355
- "Evolving a puncture black hole with fixed mesh refinement," B. Imbiriba, J. Baker, D. Choi, J. Centrella, D. Fiske, J. D. Brown, J. van Meter, and K. Olson, 2004, Phys. Rev. D, **70**, 124025.
- "Resource Letter GrW-1: Gravitational Waves," Joan Centrella, 2003, Am. J .Phys., **71**, 520
- "Interface Conditions for Wave Propagation Through Mesh Refinement Boundaries," D. Choi, J. D. Brown, B. Imbiriba, J. Centrella, and P. MacNeice, 2004, J. Comp. Phys., **193**, 398
- "Dynamical Rotational Instability at Low *T/W*," J. Centrella, K. New, L. Lowe, and J. D. Brown, 2001, Ap. J. Lett., **550**, L193
- "Three-Dimensional Adaptive Evolutions of Gravitational Waves in Numerical Relativity," K. New, D. Choi, J. Centrella, P. MacNeice, M. Huq, and K. Olson, 2000, Phys. Rev. D, **62**, 084039

- "Gravitational Waves from Long-Duration Simulations of the Dynamical Bar Instability," K. New, J. Centrella, and J. Tohline, 2000, Phys. Rev. D, **62**, 064019
- "Stable 3-Level Integration in Numerical Relativity," K. New, K. Watt, C. Watt, and J. Centrella, 1998, Phys. Rev. D, **58**, 064022
- "Gravitational Radiation from Rotational Instabilities in Compact Stellar Cores with Stiff Equations of State," Janet L. Houser and Joan M. Centrella, 1996, Phys. Rev. D, **54**, 7278
- "Gravitational Radiation from the Coalescence of Binary Neutron Stars: Effects Due to the Equation of State, Spin, and Mass Ratio," Xing Zhuge, Joan M. Centrella, and Stephen L. W. McMillan, 1996, Phys. Rev. D, **54**, 7261
- "Simulations of Nonaxisymmetric Instability in a Rotating Star: A Comparison between Eulerian and Smooth Particle Hydrodynamics," Scott Smith, Janet Houser, and Joan Centrella, 1996, Ap. J., **458**, 236
- "Gravitational Radiation from Coalescing Binary Neutron Stars," Xing Zhuge, Joan M. Centrella, and Stephen L. W. McMillan, 1994, Phys. Rev. D, **50**, 6247
- "A Three-Dimensional Hydrodynamics Code for Modeling Sources of Gravitational Radiation," Scott Smith, Joan Centrella, and Sean Clancy, 1994, Ap. J. Suppl., **94**, 789
- "Gravitational Radiation from Nonaxisymmetric Instability in a Rotating Star," Janet Houser, Joan Centrella, and Scott Smith, 1994, Phys. Rev. Lett., **72**, 1314
- "Gravitational Radiation from Nonaxisymmetric Collisions of Neutron Stars," Joan Centrella and Stephen McMillan, 1993, Ap. J. , **416**, 719
- "Large Scale Anisotropies of the Cosmic Background Radiation in a 'Hot' Dark Matter Universe," Peter Anninos, Richard Matzner, Robin Tuluie, and Joan Centrella, 1991, Ap. J., **328**, 71
- "The Fragmentation of 'Pancakes' in a Dark-Matter Dominated Universe," Wenbo Yuan, Joan Centrella, and Michael Norman, 1991, Ap. J. Lett., **376**, L29
- "Nonlinear Wave Solutions to the Planar Vacuum Einstein Equations," Peter Anninos, Joan Centrella, and Richard Matzner, 1991, Phys. Rev. D, **43**, 1825
- "Numerical Methods for Solving the Planar Vacuum Einstein Equations," Peter Anninos, Joan Centrella, and Richard Matzner, 1991, Phys. Rev. D, **43**, 1808
- "Primordial Nucleosynthesis with Horizon Scale Inhomogeneities," Hannu Kurki-Suonio and Joan Centrella, 1991, Phys. Rev. D, **43**, 1087
- "Properties of Gravitational 'Solitons'," Patricia Boyd, Joan Centrella, and Scott Klasky, 1991, Phys. Rev. D, **43**, 379
- "Nonlinear Solutions for Initial Data in the Vacuum Einstein Equations in Plane Symmetry," Peter Anninos, Joan Centrella, and Richard Matzner, 1989, Phys. Rev. D., **39**, 2155
- "A Case Study of Large Scale Structure in a 'Hot' Model Universe," Joan Centrella, John S. Gallagher, Adrian Melott, and Howard A. Bushouse, 1988, Ap. J., **333**, 24
- "Inhomogeneous Nucleosynthesis with Neutron Diffusion," Hannu Kurki- Suonio, Richard Matzner, Joan Centrella, Tony Rothman, and Jim Wilson, 1988, Phys. Rev. D, **38**, 1091
- "Inflation from Inhomogeneous Initial Data in a 1-D Backreacting Cosmology," Hannu Kurki-Suonio, Joan Centrella, Richard A. Matzner, and James R. Wilson, 1987, Phys. Rev. D, **35**, 435

- "Cosmic Nucleosynthesis and Nonlinear Inhomogeneities," Joan Centrella, Richard A. Matzner, Tony R. Rothman and James R. Wilson, 1986, Nuc. Phys. B, **266**, 171
- "On the Reliability of Virgo Infall in Estimating the Mass Density of the Universe," H. Bushouse, A. L. Melott, J. M. Centrella, and J. S. Gallagher, 1985, Mon. Not. Royal Astr. Soc., **217**, 7p
- "The Cooling of Supercluster Pancakes," J. R. Bond, J. M. Centrella, A. S. Szalay, and J. R. Wilson, 1984, Mon. Not. Royal Astr. Soc., **210**, 515
- "Planar Numerical Cosmology II: The Difference Equations and Numerical Tests," Joan Centrella and James R. Wilson, 1984, Ap. J. Suppl., **54**, 229
- "Three-Dimensional Simulation of Large-Scale Structure in the Universe," Joan Centrella and Adrian L. Melott, 1983, Nature, **305**, 196
- "Planar Numerical Cosmology I: The Differential Equations," Joan Centrella and James R. Wilson, 1983, Ap. J., **273**, 428
- "Colliding Gravitational Waves in Expanding Cosmologies," Joan Centrella and Richard A. Matzner, 1982, Phys. Rev. D, **21**, 930
- "Interacting Gravitational Shocks in Vacuum Plane-Symmetric Cosmologies," Joan Centrella, 1980, Ap. J., **241**, 875
- "Gravitational Wave Perturbations and Gauge Conditions," Joan Centrella, 1980, Phys. Rev. D, **21**, 2776
- "Plane-Symmetric Cosmologies," Joan Centrella and Richard A. Matzner, 1979, Ap. J., **230**, 311

Contributions to Conference Proceedings

- "Gravitational Waves and Time Domain Astronomy," Joan Centrella, Samaya Nissanke, and Roy Williams , 2012, Proc. IAUS 285, *New Horizons in Transient Astronomy*, Oxford, **285**, 191
- "Gravitational Wave Astrophysics: Opening the New Frontier," Joan Centrella, Proceedings of the *25th Texas Symposium on Relativistic Astrophysics, Heidelberg Germany*, 2011, AIP Conf. Proc. **1381**, 98
- "Gravitational radiation characteristics of nonspinning black-hole binaries," Bernard J. Kelly, John G. Baker, William D. Boggs, Joan M. Centrella, and James R. Van Meter, Sean T. McWilliams, 2009, J. Phys. Conf. Ser. **154**, 012050
- "Binary black holes, gravitational waves, and numerical relativity," Joan M. Centrella, John G. Baker, Bernard J. Kelly, William D. Boggs, Sean T. McWilliams, and James R. Van Meter, Proceedings of *Scientific Discovery through Advanced Computing (SciDAC 2007)*, Boston, 2007, J. Phys. Conf. Ser., **78**, 012010
- "The Final Merger of Comparable Mass Binary Black Holes," Joan M. Centrella, Proceedings of *6th International LISA Symposium, Greenbelt, Maryland*, 2006, AIP Conf. Proc., **873**, 70
- "Calculating Gravitational Wave Signatures from Binary Black Hole Mergers," Joan Centrella, 2003, Proceedings of the workshop *The Astrophysics of Gravitational Wave Sources*, 2003, AIP Conf. Proc., **686**, 219
- "What can we learn about cosmic structure from gravitational waves?" Joan M. Centrella, 2003, Proceedings of the October 2002 Maryland Conference *The Emergence of Cosmic Structure*, 2003, AIP Conf. Proc. **666**, 337

- "Calculating Gravitational Radiation from Collisions," Joan Centrella, Proceedings of the AMNH Conference *Stellar Collisions, Mergers, and Their Consequences*, 2002, Astronomical Society of the Pacific Conference Series
- "Rotational Instabilities and Centrifugal Hangup," Kimberly New and Joan Centrella, *Astrophysical Sources of Gravitational Radiation for Ground-Based Detectors*, 2001, AIP Press
- "Gravitational Waves from Coalescing Neutron Stars," Xing Zhuge, Joan Centrella, and Stephen McMillan, Proceedings of the *17th Texas Symposium on Relativistic Astrophysics*, 1995, New York Academy of Sciences
- "Instabilities in Rapidly Rotating Polytropes," Scott Smith and Joan Centrella, *Approaches to Numerical Relativity*, 1992, Cambridge University Press
- "Numerical Relativity: A Review of the Workshop at GR12," Joan Centrella, *General Relativity and Gravitation*, 1990, Cambridge University Press
- "Initial Value Solutions in Planar Cosmologies," Peter Anninos, Joan Centrella, and Richard Matzner, *Frontiers of Numerical Relativity*, 1989, Cambridge University Press
- "Primordial Nucleosynthesis in a Universe with Nonlinear Inhomogeneities," Richard Matzner, Joan Centrella, Tony Rothman and James Wilson, *The Origin and Distribution of the Elements*, 1988, World Scientific
- "Observing Models of the Universe on a Supercomputer," Joan Centrella, *The Use of Supercomputers in Observational Astronomy*, 1988, Greenbank, NRAO
- "Numerical General Relativistic Cosmology," Joan Centrella, Proceedings of the *13th Texas Symposium on Relativistic Astrophysics,* 1987, World Scientific
- "Test-Bed Calculations in Numerical Relativity," Joan Centrella, Stuart L. Shapiro, Charles R. Evans, John F. Hawley and Saul A. Teukolsky, Dynamical *Spacetimes and Numerical Relativity*, 1986, Cambridge University Press
- "Nonlinear Gravitational Waves and Inhomogeneous Cosmologies," Joan Centrella, *Dynamical Spacetimes and Numerical Relativity*, 1986, Cambridge University Press
- "Numerical Cosmology: Revealing the Universe Using Computers," Joan Centrella, Brian Tolman and Richard Matzner, *Algorithms, Architectures and the Future of Scientific Computing*, 1986, University of Texas Press
- "Massive Neutrinos and Matter Collapse," James R. Wilson, J. R. Bond, Joan Centrella and A. S. Szalay, *Numerical Astrophysics*, 1985, Jones and Bartlett
- "A Computation of Nucleosynthesis in a One-Dimensional Inhomogeneous Cosmology," Richard A. Matzner, Joan Centrella, Tony Rothman and James R. Wilson, *Numerical Astrophysics*, 1985, Jones and Bartlett
- "The Large Scale Structure of the Universe," Joan Centrella and Adrian L. Melott, *Numerical Astrophysics*, 1985, Jones and Bartlett
- "Dark Matter and Shocked Pancakes," J. R. Bond, Joan Centrella, A. S. Szalay and James R. Wilson, Proceedings of the Third Moriond Astrophysics Meeting, *Formation and Evolution of Galaxies and Large Scale Structure in the Universe*, 1984, Reidel
- "Numerical Cosmologies," Joan Centrella, 1983, Proceedings of the VII Course of the Erice International School of Cosmology and Gravitation, *Origin and Evolution of Galaxies*, 1983, Reidel

Books Edited

- *The Astrophysics of Gravitational Wave Sources*, 2003, ed. J. Centrella (AIP Press)
- *Astrophysical Sources of Gravitational Radiation for Ground-Based Detectors*, 2001, ed. J. Centrella (AIP Press)
- *Dynamical Spacetimes and Numerical Relativity*, 1986, ed. J. Centrella (Cambridge: Cambridge University Press)
- *Numerical Astrophysics*, 1985, eds. J. Centrella, J. LeBlanc and R. Bowers (Boston: Jones and Bartlett)

Popular Articles

- "Computing Cosmic Cataclysms," J. Centrella, B. Kelly, J. van Meter, J. Baker, R. Stebbins, and R. Naeye, SciDAC Review, Issue #8, Summer 2008 (http://www.scidacreview.org/0802/pdf/astro.pdf)
- "Computer Animation in Scientific Filmmaking: A Case Study in Large Scale Structure of the Universe", Craig Upson and Joan Centrella, 1990, Pixel, 1, 36
- "Using the Computer as a Camera", Joan Centrella, 1988, Computers in Physics, **2**, 3
- "Collisionless Matter and Galaxy Formation", Joan Centrella and James R. Wilson, Energy and Technology Review, 1983 (March)

Recent Invited Conference Presentations (2008-present)

- Star Clusters and Black Holes in Galaxies across Cosmic Time, Beijing, Sept. 2014
- Gravitational Wave Astronomy Workshop, New Horizons in Transient Astronomy, Oxford, Sept. 2011
- Gravitational Wave Astrophysics, Binary Supermassive Black Holes, and Galaxy Mergers, Lijiang, China, August 2011
- International Pulsar Timing Array Science Meeting, Snowshoe, WV, June 2011
- Building on "New Worlds, New Horizons," Santa Fe, NM, March 2011
- 25th Texas Symposium on Relativistic Astrophysics, Heidelberg, Germany, December 2010
- Accretion and Outflow in Black Hole Systems, Kathmandu, Nepal, October 2010
- COSPAR 2010, Bremen, Germany, July 2010
- 8th International LISA Symposium, Stanford University, June 2010
- High Energy Astrophysics Division (HEAD) 2010 meeting, Waikoloa, HI, March 2010
- American Association of Physics Teachers National Meeting, Washington, DC, February 2010
- Workshop on Matter and Electromagnetic Fields in Strong Gravity, University of Maryland, August 2009
- Conference on Massive Black Hole Binaries and their Coalescences in Galactic Nuclei, Beijing, China, July 2009

- Summer School on Nuclear and Particle Astrophysics: Connecting Quarks with the Cosmos, University of Washington, June 2009
- Eighth Edoardo Amaldi Conference on Gravitational Waves, Columbia University, New York City, June 2009
- Plenary Lecture, April Meeting of the American Physical Society, Denver, May 2009
- Workshop on Observational Signatures of Black Hole Mergers, Space Telescope Science Institute, March 2009
- High Energy Astrophysics Division Special Session, American Astronomical Society Meeting, Long Beach, CA Jan 2009
- Workshop on Merging Black Holes in Galaxies, Katoomba, Australia, June 2008

Recent Colloquia (2008-present)

- Enduring Quests and Daring Visions: Taking Astrophysics at NASA into the Future, Colloquium for Engineering Directorate, GSFC, May 2014
- University of Texas at Brownsville, Keynote Address at Student Research Symposium, April 2014
- Space Telescope Science Institute Colloquium, April 2014
- Scottish Universities Physics Alliance (SUPA) Distinguished Visitor Lecturer (graduate lectures at University of Glasgow; colloquia at the Universities of Glasgow, St. Andrews, and Aberdeen), April – May 2012
- Physics Department Colloquium, Drexel University, October 2010
- David L. Anderson Lecture, Oberlin College, April 2010
- Physics and Astronomy Lecture Series, Oberlin College, April 2010
- Big Apple Colloquium, Columbia University, New York City, April 2010
- Physics and Astronomy Colloquium, University of Tennessee, November 2009
- Institute of Physics Ireland Lectures (University College Cork, Waterford Institute of Technology, National University of Ireland - Galway, National University of Ireland - Maynooth), April 2009
- Program in Integrative Information, Computer, and Application Sciences Colloquium, Princeton University, March 2009
- High Energy Physics Seminar, University of Massachusetts at Amherst, October 2008
- Astronomy and Astrophysics Colloquium, Rochester Institute of Technology, May 2008
- Joint Munich Astronomy Colloquium, Garching, Germany, April 2008
- Department of Astrophysical and Planetary Sciences Colloquium, University of Colorado, March 2008
- European Space Research and Technology Center (ESTEC) Scientific Colloquium, Noordwijk, The Netherlands, February 2008
- Astronomy Colloquium, Radboud University, Nijmegen, The Netherlands, February 2008

Recent Outreach Activities (representative sample 2007-present)

- "Our Violent Universe," National Air and Space Museum, Sept. 2015
- Presentation on NASA science at an evening event at the Brownsville (TX) Museum of Fine Arts and presentation to high school students on NASA Science in conjunction with the South Padre Island Space Exhibition, November 2014
- Tour of Goddard Space Flight Center for science students and faculty from Gilbert High School, Winsted, CT, February 2010
- "Experimenting with Black Holes," 2009, interviewed by ScienceFace.org, available online at: http://www.scienceface.org/, on YouTube at: http://www.youtube.com/watch?v=yWILv7fNTqQ, and on Facebook at: http://www.facebook.com/pages/sciencefaceorg/87094134515
- Interviewed by Sky and Telescope for podcast, 2009, available online at: http://www.skyandtelescope.com/skytel/beyondthepage/39792292.html
- "Solving the Mysteries of the Universe," Interviewed by Scientific Computing World, October/November 2008 issue, online at: http://www.scientific-computing.com/features/feature.php?feature_id=209
- "Computing Cosmic Cataclysms," J. Centrella, B. Kelly, J. van Meter, J. Baker, R. Stebbins, and R. Naeye, 2008, popular article for the Department of Energy's SciDAC Review, available online at: http://www.scidacreview.org/0802/html/astro.html
- Lecture on Black Hole Mergers to Washington Academy of Sciences, Affiliates Reception, November 2007
- Public Lectures on Gravitational Waves and Black Holes for Smithsonian Research Associates Program, May 2007