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Education

Ph.D. in Physics, University of California at Berkeley (1989)
M.Sc. in Physics, University College Cork, Ireland (1983)
B.Sc. Honors in Physics, University College Cork, Ireland (1981)

Professional Experience

Professor of Physics, ECE and Materials, University of Colorado, Boulder, CO (August 1999 - present)
Associate Professor, EECS and Physics, University of Michigan, Ann Arbor, MI (1996 - 1999)
Associate Professor of Physics, Washington State University, Pullman, WA (1995)
Assistant Professor of Physics, Washington State University, Pullman, WA (1990 - 1995)
Postdoctoral Fellow, University of California at Berkeley (1989 - 1990)

Honors

2018 Science Foundation Ireland St. Patricks Day Science Medal for Academia
2018 Honorary Degree of Doctor of Science, University of Notre Dame
2017 Frederic Ives Medal/Jarus W. Quinn Prize of the Optical Society of America (highest award from OSA)
2017 Alumnus Award for Achievement, UC Berkeley
2016 Honorary Degree of Doctor of Science, Uppsala University, Sweden
2015 Honorary Degree of Doctor of Science, National University of Ireland
2015 Elected to Member, American Philosophical Society
2015 Honorary Degree of Doctor of Science, University College Dublin
2015 Honorary Degree of Doctor of Science, Trinity College Dublin
2014 Moore Foundation Experimental Investigator Award
2014 CU Boulder Inventor of the Year (shared with Henry Kapteyn)
2013 Honorary Member, Royal Irish Academy
2012 Willis Lamb Award for Laser Science and Quantum Optics (shared with Henry Kapteyn)
2012 Chair, President's Committee for the US National Medal of Science (2012-2014)
2011 Boyle Medal of the Royal Dublin Society (highest award to Irish scientist)
2010 Appointed to the President's Committee for the US National Medal of Science
2010 R.W. Wood Prize of the Optical Society of America (shared with Henry Kapteyn)
2010 Arthur L Schawlow Prize in Laser Science of the American Physical Society (shared with Henry Kapteyn)
2009 Ahmed Zewail Award of the American Chemical Society (shared with Henry Kapteyn)
2008 National Security Science and Engineering Faculty Fellowship
2008 Distinguished Professor, University of Colorado
2007 Fellow of the Association for Women in Science
2006 Fellow of the American Academy of Arts and Sciences
2005 Distinguished Alumnus Award, University College Cork (Ireland)
2004 Elected to Member, National Academy of Sciences (USA)
2003 Fellow of the American Association for the Advancement of Science
2003 Richtmyer Memorial Lecturer of the American Association of Physics Teachers
2001 Fellow of the American Physical Society
2001 Loeb Lecturer, Harvard University
2000 John D. and Catherine T. MacArthur Fellow
1998 Fellow of the Optical Society of America
1997 Maria Goeppert-Mayer Award of the American Physical Society
1993 Presidential Faculty Fellowship of the National Science Foundation
1992 Sloan Foundation Fellowship
1991 Presidential Young Investigator Award of the National Science Foundation
1990 Simon Ramo Award of the American Physical Society
1989 University of California President's Postdoctoral Fellowship

1984 Regents Fellowship, University of California at Berkeley
1983 University Fellowship, University of California at Berkeley
1983 Pfizer Postgraduate Scholarship, Pfizer Chemical, Ireland
1977 College Scholarship, University College Cork, Ireland

Professional Affiliations

American Physical Society (APS); Optical Society of America (OSA); Institute of Electrical and Electronic Engineers (IEEE); American Association for the Advancement of Science (AAAS); National Academy of Sciences (US); Association for Women in Science (AWIS)**;** American Chemical Society (ACS)

Professional Activities

Reviewer for the NSF, DOE, Keck, NRC, OSA, IEEE, APS, Science, Nature.
President and Founding member, AWIS Palouse, 1993 -1995.
Program Subcommittee Chair of Physics of Laser Sources, APS DLS Meeting, Portland, OR 1995.
Program Subcommittee Chair of Ultrafast Phenomena, IQEC Meeting, Sydney, Australia 1996.
Conference Chair: OSA Conference on Short Wavelength Sources (Santa Fe, NM, March 1997).
Member, R.W. Wood Prize Committee of the Optical Society of America (1995 and 1997).
Member, Schawlow Prize Committee of the American Physical Society (1996 and 1997).
Member, Max Born Prize Committee of the Optical Society of America(1999).
Topical Editor for Optics Letters in Ultrafast Phenomena (Optical Society of America) ('96 – '04)
Editorial Board of Review of Scientific Instruments (American Institute of Physics) (1995-1998)
Optical Society of America Representative on the Joint Council on Quantum Electronics ('97-'99)
Faculty Advisor, Society of Women Engineers (SWE), University of Michigan (1996-1998)
Faculty Advisor, OSA Student Chapter, CU Boulder (2000 – 2001)
Member, APS Site Visit Team to Improve the Climate for Women in Physics ('96 – '03)
Chair, National Research Council Committee on Atomic, Molecular & Optical Science ('99-'02)
Conference co-Chair, Gordon Conference on Nonlinear Optics (1999 and 2001)
Centennial Speaker, American Physical Society (1998-1999)
Executive Committee Member, American Physical Society Division of Laser Science (1997-1999)
Conference Chair, APS Division of Laser Science Annual Meeting (1999)
Conference Co-Chair, OSA International Conference on Ultrafast Phenomena (2000 and 2002)
Board of Directors of the Optical Society of America (2000 - 2002)
Executive Committee Member, APS Division of AMO Physics (2001-2003)
NRC Committee Member for Report on "Atoms, Molecules, and Light" (2000-2002)
Council Member, American Physical Society (2000-2003)
Committee on Committees Member, American Physical Society (2002)
Member, Review of Accelerator & Fusion Division, Lawrence Berkeley Labs (2002)
Member, American Physical Society Committee on the Status of Women in Physics (2001-2002)
Chair, American Physical Society Committee on the Status of Women in Physics (2003-2004)
Coordinator, American Physical Society Committee on the Status of Women in Physics Site Visit Program to Improve the Climate for Women in Physics (2004-2005)
Executive Board Member, American Physical Society (2002-2003)
Member of the ITAMP External Review Committee (2002 – 2003)
Member of External Review Committee, Trinity College Dublin, Physics Dept. (2003)
Vice-Chair and Chair, Will Allis Prize, American Physical Society (2005-2007)
Associate Chair for Graduate Studies, Physics, CU Boulder (2002 – 2004)
Member, DOE-Basic Energy Sciences Council on Chemical Sciences (2004-2009)
Member at Large, Section on Physics of the AAAS (2003-2007)
Scientific Advisory Committee, LCLS, Stanford University (2004 - 2009)
Chair, Lillienfield Prize Committee of the American Physical Society (2005)
Member, NRC Decadal Report on AMO Physics (2005-2006)
Board of Directors, Tyndall National Institute, Cork Ireland (2004 - 2009)
Board of Directors, Kavli Institute for Theoretical Physics, UC Santa Barbara (2007 - 2009)
Vice-Chair and Chair, Nominating Committee, American Physical Society (2006-2007)
Member, American Physical Society Development Advisory Committee (2007 -)
Member, Advisory Committee for Education and Centers, NSF Division of Engineering (2006 - 2007)

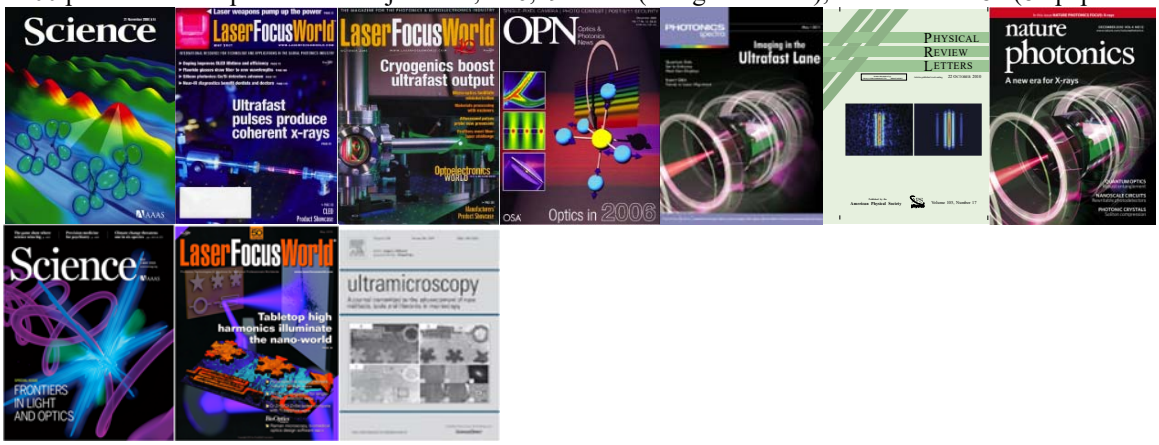
Member NAS Class Membership Committee (2006, 2007, 2009, 2010)
Member, NSF Division of Engineering External Advisory Committee (2006 - 2010)
Chair, NSF Directorate for Engineering External Advisory Committee (2008 - 2009)
Member, Reforming Graduate Education Workshop Committee, APS (2008)
Advisory Committee, Princeton University Physics Department (2011 -)
Review Committee for AMO, Keck Foundation (2010 -)
Member, National Ignition Campaign (LLNL) Committee (2010 -)
Steering Committee Member, Basic Research Directions Workshop on User Science at NIF (2010 -)
Nominating Committee, Optical Society of America, 2010 –
Nominating Committee, National Academy of Sciences, 2011 -
Committee of Visitors, National Science Foundation, ECS and DMR (2011)
National Medal of Science Presidential Committee (2010, 2011), Chair (2012-2014)
Materials Council, Office of Basic Energy Sciences, Department of Energy (2011 -)
American Physical Society, Physics Policy Committee (2013 – 2015)
Chair, NAS Temporary Group for all Physical Sciences (Chemistry, Physics, Astro, Geo, Math) to elect more young/women/minorities/interdisciplinary/geographic/ethnic diversity (2012-2014).
Chair AMO section, National Academy of Sciences (2010-2012)
Editorial Board, Physical Review X (2012-2014)
Editorial Advisory Board, "*Structural Dynamics*" (American Institute of Physics and Crystallographic Assoc.)
Panel chair on the Committee of Visitors (COV) for the Materials Sciences and Engineering (MSE) Division in the Department of Energy's (DOE) Office of Basic Energy Sciences (BES).
Member, Committee of Visitors to Argonne for Improving the Climate for Women in Physics (2012)
Member, Committee of Visitors to review DOE Materials Science at SLAC (2012)
Chair, Board of Directors, Kapteyn-Murnane Labs. Inc. (www.kmlabs.com)
Member, NSF MPSAC Synchrotron Subcommittee (2014)
Member of Council, US National Academy of Sciences (2014 - 2017)
Governing Board, National Research Council (2015 - 2017)
Associate Editor, Science Advances (new online AAAS journal (2015 -)
Foundation Selection Committee (2014 -2017)
Committee Member, DOE Science Grand Challenges Report (2013)
Committee Member, DOE Quantum Materials Report (2016)

Funding

Past and current funding from, NSF, DOE, DoD, Sloan, MacArthur and Moore Foundations.

PUBLICATION SUMMARY

>200 publications in peer reviewed journals; >26,491 cites (Google Scholar); Hirsch index 84 (84 papers with >84 cites)



TALKS SUMMARY

> 300 Invited, Plenary and Keynote talks from group
> 800 total talks presented by group
> 100 Colloquia/seminars presented by Murnane

Example Group Alumni

Dan Hickstein (NRC Postdoctoral Fellow, NIST)
Kathy Hoogeboom-Pot (Intel)
Franklin Dollar (Assistant Professor, Dept. of Physics, UC Irvine)
Tenio Popmintchev (Assistant Professor, Dept. of Physics, UCSD)
Adra (Tory) Carr (IBM)
Damiano Nardi (Intel)
Sterling Backus (Chief Science Officer, KMLabs.)
Alon Bahabad (Assistant Professor, Dept. of Physical Electronics, Tel-Aviv University)
Randy Bartels (Professor, Colorado State University)
Michael Bauer (Professor, University of Kiel)
Zenghu Chang (Professor, University of Central Florida)
Ming-Chang Chen (Assistant Professor, National Tsing-Hua University)
Scott Christiansen (Nufern)
Oren Cohen (Associate Professor, Dept. of Physics, Technion)
Chengyuan Ding (Cymer)
Charles Durfee (Professor, Colorado School of Mines)
Alison Ferris (Graduate student, Stanford University)
Etienne Gagnon (Assistant Professor, Franklin and Marshall College)
David Gaudiosi (Raydiance Inc.)
Dominique Gaudyn (Northrop Grumman)
Erez Gershgoren (Boston University)
Emily Gibson (Assistant Professor - Bioengineering, University of Colorado Denver)
Donna Howland (Northrop Grumman Space Technology)
Chung-Po Huang (New Wave Inc.)
Ellen Keister (Assistant Professor, Earlham College)
Chan La-o-Vorakiat (Assistant Professor, King Mongkut University)
Tim Lei (Associate Professor of Bioengineering, University of Denver)
Qing Li (KLA Tencor)
Wen Li (Assistant Professor, Wayne State University)
Ariel Libertun (Research Scientist, University of Colorado at Boulder)
Robynne Lock (Assistant Professor, Texas A&M Commerce)
Amy Lytle (Assistant Professor of Physics, Franklin & Marshall College)
Leigh Martin (Graduate student, Berkeley)
Stefan Mathias (Professor, University of Goettengen, Germany)
Piotr Matyba (Assistant Professor, Umea University, Dept of Physics)
Luis Miaja-Avila (NIST)
Lino Misoguti (Associate Professor, Institute of Physics of Sao Carlos, Brazil)
Ariel Paul (Physics, University of Colorado)
Justin Peatross (Professor, Brigham Young University)
Predrag Ranitovic (Lawrence Berkeley National Laboratory)
Daisy Raymondson (Customer Service Manager, KMLabs)
Kendall Read (Marketing Consultant at MicroPhage, Inc.)
Andrew Rundquist (Chair, Physics Department, Hamline University)
Guido Saathoff (Max Plank Institute, Garching)
Richard Sandberg (Staff Scientist, Los Alamos National Laboratories)
Arvinder Sandhu (Associate Professor, University of Arizona)
Miranda Schatten (TRW)
Matt Seaberg (SLAC)
Vandana Sharma (Assistant Professor in Indian Institute of Technology-Hyderabad)
Robert Shelton (Nomadics Inc.)
Mark Siemens (Assistant Professor in the Dept. of Physics, University of Denver)
Greg Taft (KMLabs)
Carson Teale (Graduate student, MIT)
Isabell Thomann (Assistant Professor, Electrical and Computer Engineering, Rice)
Sarah Thomson (CTI Laser Inc. Lockheed)
Ra'anan Tobey (Assistant Professor, University of Groningen)

Emrah Turgut (Postdoctoral Researcher, Cornell)
Adrienne Van Allen (Undergraduate, Stanford University)
Nicholas Wagner (NCAR)
Tom Weinacht (Associate Professor, SUNY Stony Brook)
Andrea Wuest (Sensiron)
Wei Xiong (Assistant Prof., University of California, San Diego)
Bosheng Zhang (KLA Tencor)
Xiaoshi Zhang (Production Manager, KMLabs)
Xibin Zhou (SEMATECH)

List of Patents (reverse chronological order)

1. T. Popmintchev, D. Popmintchev, M. M. Murnane, and H. Kapteyn, "Method for phase-matched generation of coherent VUV, EUV, and x-ray light using VUV-UV-VIS lasers," US Patent Application submitted 2013, Notice of Allowance 2015.
2. Xiaoshi Zhang and Henry C. Kapteyn, "Self-Cleaning Of Optical Surfaces In Low-Pressure Reactive Gas Environments In Advanced Optical Systems," US Patent Application submitted October 2011.
3. Tenio Popmintchev, Ming-Chang Chen, Alon Bahabad, Margaret M. Murnane, and Henry C. Kapteyn, "Method for phase-matched generation of coherent soft and hard x-rays using IR lasers," US Patent #8,462,824, 11 June 2013.
4. X. Zhang, A. L. Lytle, O. Cohen, H. C. Kapteyn, and M. M. Murnane, " Quasi-phase matching and quantum control of high harmonic generation in waveguides using counterpropagating beams," US Patent #7,830,928, November 9, 2010.
5. Oren Cohen, Henry C. Kapteyn, and Margaret M. Murnane, "Phase matching of high order harmonic generation using dynamic phase modulation caused by a non-collinear modulation pulse," US Patent #7,664,147, Feb 16, 2010.
6. Jorge Rocca, Henry Kapteyn, Margaret Murnane, David Gaudiosi, Mike Grisham, Tenio Popmintchev, Brandan Reagan "High-Order Harmonic Generation in a Capillary Discharge," US Patent #7,729,403, June 1, 2010.
7. S. J. Backus and H. C. Kapteyn, "Method for optimizing output in ultrashort-pulse multipass laser amplifiers with selective use of a spectral filter," U.S. Patent #7,242,520, July 10, 2007.
8. H. C. Kapteyn and S. J. Backus, "Downchirped pulse amplification," U.S. Patent #7,072,101, July 4, 2006.
9. S. J. Backus, H. C. Kapteyn, and M. M. Murnane, "Ultrashort pulse amplification in cryogenically cooled amplifiers," U.S. Patent #6,804,287, 2004.
10. H. C. Kapteyn, J. L. Hall, and M. M. Murnane. J. Ye, "Multistage synchronization of pulsed radiation sources," US Patent #6,831,935, December 14, 2004.
11. C. G. Durfee, III, A. R. Rundquist, H. C. Kapteyn, and M. M. Murnane, "Guided wave methods and apparatus for nonlinear frequency generation," U.S. Patent #6151155, Nov. 21, 2000.
12. S. Backus, H. C. Kapteyn, and M. M. Murnane, "Laser amplifier and method," U.S. Patent #5644424, July 1, 1997.

Margaret M. Murnane

Peer Reviewed Publications (reverse chronological order)

1. P. Tengdin, W. You, C. Chen, X. Shi, D. Zusin, Y. Zhang, C. Gentry, A. Blonsky, M. Keller, P. Oppeneer, H. Kapteyn, Z. Tao, M. Murnane, "Critical Behavior within 20fs Drives the Out-of-Equilibrium Laser-induced Magnetic Phase Transition in Nickel," in press, Science Advances (2018).

2. C. Porter, M. Tanksalvala, M. Gerrity, G. Miley, X. Zhang, C. Bevis, E. Shanblatt, R. Karl jr., M. Murnane, D. Adams, H. Kapteyn, "General-purpose, wide field-of-view reflection imaging with a tabletop 13nm light source", Optica **4**(12) 1552-1557 (2017).

3. DD Hickstein, DR Carlson, A Kowligy, M Kirchner, S Domingue, N Nader, H Timmers, A Lind, M Murnane, H Kapteyn, S Papp, S Diddams, "High-harmonic generation in periodically poled waveguides," Optica **4**(12) 1538-1544 (2017).

4. D. Zusin, D. Legut, K. Carva, H. Nembach, S. Mathias, M. Aeschlimann, T. Silva, G. Zhang, P. Oppeneer, H. Kapteyn, M. Murnane, "Direct measurement of the static and transient magneto-optical permittivity of cobalt across the entire M-edge in a reflection geometry by use of polarization scanning," Physical Review B **97**, 024433 (2018). https://doi.org/10.1103/PhysRevB.97.024433

5. D. Popmintchev, B. Galloway, M.C. Chen, F. Dolar, C. Mancuso, L. Miaja-Avila, G. O'Neil, J. Shaw, G. Fan, S. Ališauskas, G. Andriukaitis, T. Balčiunas, O. Mücke, A. Pugzlys, A. Baltuška, H. Kapteyn, T. Popmintchev, M. Murnane, "Near and extended edge X-ray absorption fine structure spectroscopy using ultrafast coherent high harmonic supercontinua", in press, Physical Review Letters (2018). https://journals.aps.org/prl/accepted/de076Y00Tba19c7cb0db67b1e5451d70170ec08b0

6. C. Bevis, R. Karl, J. Reichanadter, D. Gardner, C. Porter, E. Shanblatt, M. Tanksalvala, G. Mancini, Henry Kapteyn, M. Murnane, D. Adams, "Multiple beam ptychography for large field of view, high throughput, quantitative phase contrast imaging," Ultramicroscopy **184**, 164-171 (2018).

7. W. Peters, D. Couch, B. Mignolet, X. Shi, Q. Nguyen, R. Fortenberry, H. Bernhard Schlegel, F. Remacle, H. Kapteyn, M. Murnane, W. Li, "Ultrafast 25fs relaxation in highly excited states of methyl azide mediated by strong nonadiabatic coupling," *PNAS* **114** (52), E11072 (2017). https://doi.org/10.1073/pnas.1712566114

8. C. Chen, C. Hernández-García, Z. Tao, W. You, Y. Zhang, D. Zusin, C. Gentry, P. Tengdin, A. Becker, A. Jaron-Becker, H. Kapteyn, M. Murnane, "Influence of microscopic and macroscopic effects on attosecond pulse generation using two-color laser fields," Optics Express **25**(23), 28684-28696 (2017).

9. C. Chen, Z. Tao, A. Carr, P. Matyba, T. Szilvási, M. Piecuch, S. Emmerich, M. Keller, D. Zusin, M. Rollinger, W. You, S. Mathias, U. Thumm, M. Mavrikakis, M. Aeschlimann, P. Oppeneer, H. Kapteyn, M. Murnane, "Distinguishing Attosecond Electron-Electron Scattering and Screening in Transition Metals," PNAS **114** (27) E5300-E5307 (2017). doi:10.1073/pnas.1706466114

10. K. Dorney, J. Ellis, C. Hernández-García, D. Hickstein, Christopher A. Mancuso, N. Brooks, T. Fan, G. Fan, P. Grychtol, D. Zusin, C. Gentry, H. Kapteyn, M. Murnane, "Helicity-selective enhancement and polarization control of attosecond high harmonic waveforms driven by bichromatic circularly polarized laser fields", Physical Review Letters **119**, 063201 (2017).

11. C. Mancuso, K. Dorney, D. Hickstein, J. Chaloupka, X-M. Tong, J. Ellis, H. Kapteyn, M. Murnane, "Observation of ionization enhancement in two-color circularly polarized laser fields," Physical Review A **96**, 023402 (2017). DOI: 10.1103/PhysRevA.96.023402

12. C. Hernandez-Garcıa, T. Popmintchev, M.Murnane, H.C. Kapteyn, L. Plaja, A. Becker, A. Jaron-Becker, "Isolated broadband attosecond pulse generation with near- and mid-infrared driver pulses via time-gated phase matching," Optics Express **25**, 11855 (2017).

13. J. Hernandez-Charpak, K. Hoogeboom-Pot, Q. Li, T. Frazer, J. Knobloch, M. Tripp, S. King, E. Anderson, W. Chao, M. Murnane, H. Kapteyn, D. Nardi, "Full characterization of the mechanical properties of 11-50nm ultrathin films: influence of bond coordination on the Poisson's ratio", Nano Letters **17** (4), 2178–2183 (2017). **DOI:** 10.1021/acs.nanolett.6b04635

14. S. Eich, M. Plötzing, M. Rollinger, S. Emmerich, R. Adam, C. Chen, H. Kapteyn, M. Murnane, L. Plucinski, D. Steil, B. Stadtmüller, M. Cinchetti, M. Aeschlimann, C. Schneider, S. Mathias, "Band-structure evolution during the ultrafast ferromagnetic-paramagnetic phase transition in Cobalt," Science Advances **3**, e1602094 (2017).

15. D. Gardner, M. Tanksalvala, E. Shanblatt, X. Zhang, B. Galloway, C. Porter, R. Karl, C. Bevis, D. Adams, H. Kapteyn, M. Murnane, G. Mancini, "Sub-wavelength coherent imaging of periodic samples using a 13.5 nm tabletop high harmonic light source," Nature Photonics **11**, 259 (2017). doi:10.1038/nphoton.2017.33

16. S. Backus, M. Kirchner, C. Durfee, M. Murnane, H. Kapteyn, "Direct diode-pumped Kerr Lens 13 fs Ti:sapphire ultrafast oscillator using a single blue laser diode", Optics Express **25**(11) 12469-12477 (2017).

17. D. Couch, G. Buckingham, J. Baraban, J. Porterfield, L. Wooldridge, G.B. Ellison, H. Kapteyn, M. Murnane, W. Peters, "Tabletop Femtosecond VUV Photoionization and PEPICO Detection of Microreactor Pyrolysis Products," J. Physical Chemistry **121** (28), 5280–5289 (2017). DOI: 10.1021/acs.jpca.7b02821

18. W. Peters, D. Couch, R. Fortenberry, H. Kapteyn, M. Murnane, "Uncovering highly-excited state mixing in acetone using ultrafast VUV pulses and coincidence imaging techniques," J. Phys. Chem. A, **121**, 2361–2366 (2017). 10.1021/acs.jpca.7b01112

19. L. Fan, S. Lee, Y. Tu, B. Mignolet, D. Couch, K. Dorney, Q. Nguyen, M. Murnane, F. Remacle, H. Bernhard Schlegel, W. Li, "A New Electron-Ion Coincidence 3D Momentum-Imaging Method and Its Application in Probing Strong Field Dynamics of 2-Phenylethyl-N,N-Dimethylamine," Journal of Chemical Physics **147**, 013920 (2017). http://doi.org/10.1063/1.4981526

20. J. Ellis, K. Dorney, C. Durfee, C. Hernandez-Garcia, F. Dollar, C. Mancuso, T. Fan, P. Grychtol, D. Zusin, C. Gentry, H. Kapteyn, M. Murnane, D. Hickstein, "Phase Matching of Noncollinear Sum and Difference Frequency High-Harmonic Generation," Optics Express **25**(9), 10126-10144 (2017).

21. S. Backus, M. Kirchner, R. Lemons, D. Schmidt, C. Durfee, M. Murnane, H. Kapteyn, "Direct diode pumped Ti:sapphire ultrafast regenerative amplifier system," Optics Express **25**(4), 3666-3674 (2017).

22. X. Gao, G. Patwardhan, S. Schrauth, D. Zhu, T. Popmintchev, H. Kapteyn, M. Murnane, D. Romanov, R. Levis, A. Gaeta, "Picosecond ionization dynamics in femtosecond filaments at high pressures," Phys. Rev. A **95**, 013412 (2017).

23. Z. Tao, C. Chen, T. Szilvasi, M. Keller, M. Mavrikakis, H. Kapteyn, M. Murnane, "Influence of the Attosecond Final-state Lifetime on Photoemission from a Transition Metal", *Science* **353**, 62 (2016).
** See Science Perspective on this work, Science **353**, 28 (2016).*

24. E. Shanblatt, C. Porter, D. Gardner, G. Mancini, R. Karl Jr., M. Tanksalvala, C. Bevis, H. Kapteyn, D. Adams, M. Murnane, "Imaging Buried Nanostructures using Extreme Ultraviolet Ptychographic Coherent Diffractive Imaging," Nano Letters **16** (9), pp 5444–5450 (2016). **DOI:** 10.1021/acs.nanolett.6b01864

25. K. Hoogeboom-Pot, E. Turgut, J. Hernandez-Charpak, J. Shaw, H. Kapteyn, M. Murnane, D. Nardi, "Nondestructive measurement of the evolution of layer-specific mechanical properties in sub-10nm bilayer films," Nano Letters **16** (8), pp 4773–4778 (2016). DOI: 10.1021/acs.nanolett

26. C. Mancuso, K. Dorney, J. Chaloupka, J. Ellis, F. Dollar, R. Knut, P. Grychtol, D. Zusin, C. Gentry, H. Kapteyn, D. Hickstein, M. Murnane, "Controlling nonsequential double ionization in two-color circularly polarized femtosecond laser fields," Physical Review Letters **117**, 133201 (2016).

27. E. Turgut, P. Grychtol, J. Shaw, R. Knut, D. Zusin, D. Legut, K. Carva, H. Nembach, S. Mathias, T. Silva, P. Oppeneer, M. Murnane, H.C. Kapteyn, "Heisenberg vs. Stoner: Magnon Generation and Exchange Renormalization during Ultrafast Demagnetization," Physical Review B **94**, 220408(R) (2016). *Also selected as Editor's Suggestion*.

28. Carrier multiplication and gap dynamics in the femtosecond response of a strongly correlated electron material, S. Mathias, S. Eich, J. Urbancic, S. Michael, A.V. Carr, A. Stange, T. Popmintchev, T. Rohwer, M. Wiesenmayer, A. Ruffing, S. Jakobs, S. Hellmann, P. Matyba, C. Chen, L. Kipp, M. Bauer, H. Kapteyn, H. Schneider, K. Rossnagel, M. Murnane, M. Aeschlimann, Nature Communications **7**, 12902 (2016). doi:10.1038/ncomms12902

29. Lorentz drift compensation in high harmonic generation in the soft and hard X-ray regions of the spectrum, B. Galloway, D. Popmintchev, M. Murnane, H. Kapteyn, T. Popmintchev, Optics Express **24**, 21818 (2016).

30. Hyperspectral EUV Coherent Diffractive Imaging, B. Zhang, D. Gardner, M. Seaberg, E. Shanblatt, H. Kapteyn, M. Murnane, D. Adams, Optics Express **24**(16) 18745-18754 (2016).

31. C. Hernández-García, T. Popmintchev, M. Murnane, H. Kapteyn, L. Plaja, A. Becker, A. Jaron-Becker, "Group velocity matching in high-order harmonic generation driven by mid-infrared lasers," New Journal of Physics **18**, 073031 (2016).

32. C.A. Mancuso, D.D. Hickstein, K.M. Dorney, J.L. Ellis, E. Hasovic, R. Knut, P. Grychtol, C. Gentry, M. Gopalakrishnan, D. Zusin, F.J. Dollar, X.M. Tong, D.B. Milosevic, W. Becker, H.C. Kapteyn, M.M. Murnane, "Controlling electron-ion rescattering in two-color circularly polarized femtosecond laser fields", Physical Review A **93** (5), 053406 (2016), *also selected as an Editor's Suggestion*.

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Publications Submitted and in Preparation

261. *Colloidal Crystal Order and Structure Revealed by Tabletop Extreme Ultraviolet Scattering and Coherent Diffractive Imaging*, G. Mancini1, R. Karl, E. Shanblatt, C. Bevis, D. Gardner, M. Tanksalvala, J. Russell, D. Adams, H. Kapteyn, J. Badding, T. Mallouk, M. Murnane, submitted (2017).

262. *Polarization Control of Isolated Attosecond Pulses*, P-C. Huang, J. Huang, C. Hernández-García, B. Huang, C. Lu, L. Rego, D. Hickstein, J. Ellis, A. Jaron-Becker, A. Becker, S. Yang, C. Durfee, L. Plaja, H. Kapteyn, M. Murnane, A. Kung, M.-C. Chen, submitted (2017).

263. *Isolated broadband attosecond pulse generation via time-gated phase and group velocity matching*, C. Hernández-García, T. Popmintchev, M. Murnane, H. Kapteyn, L. Plaja, A. Becker, A. Jaron´-Becker, submitted (2017).

264. *Controlling the distribution of virtual bound states in Permalloy (Fe0:2Ni0:8) by Cu alloying*, R. Knut, E. Delczeg, J. Shaw, H. Nembach, P. Grychtol, D. Zusin, C. Gentry, E. Turgut, H. Kapteyn, M. Murnane, D. Arena, O. Eriksson, O. Karis, T. Silva, submitted (2017).

265. *High harmonic interferometry of the Lorentz force in strong mid-infrared laser fields*, E. Pisanty, D. Hickstein, C. Durfee, M. Murnane, M. Ivanov, submitted (2017).

266. *Revealing the Role of Electron-Electron Correlations by Mapping Dissociation of Highly Excited D_2^+ using Attosecond XUV Pulses*, L. Martin, R. Bello, C. Hogle, A. Palacios, X. Tong, J. Sanz-Vicario, T. Jahnke, M. Schöffler, R. Dörner, T. Weber, F. Martín, H. Kapteyn, M. Murnane, P. Ranitovic, submitted (2017).

267. *Isolated broadband attosecond pulse generation with near- and mid-infrared driver pulses via time-gated phase matching,* C. Hernandez-Garcıa, T. Popmintchev, M.Murnane, H.C. Kapteyn, L. Plaja, A. Becker, A. Jaron-Becker, submitted (2017).

268. *Ultrahigh-Efficiency High Harmonic Generation in the VUV Driven by UV Lasers*, D. Popmintchev, M.C. Chen, C. Hernández-García, J.A. Pérez-Hernández, J. Sequeira, S. Brown, F. Dollar, P. Grytchtol, B. Walker, Luis Plaja, M. Murnane, H.C. Kapteyn, T. Popmintchev, in preparation (2017).

269. *Close-packed nanoscale thermal transport in 1D and 2D*, K. M. Hoogeboom-Pot, D. Nardi, J. Hernandez-Charpak, Q. Li, M. Tripp, S. King, E. Anderson, M. Murnane, H. Kapteyn, in preparation (2017).

270. *Direct observation of efficient heat dissipation in close-packed nanoheaters using coherent EUV beams,* J.N. Hernandez-Charpak, T. Frazer, J. Knobloch, K. Hoogeboom-Pot, D. Nardi, W. Chao, M. Tripp, H. Kapteyn, M. Murnane, in preparation (2017)

271. *Imaging of buried magnetic domains using linearly polarized bright high harmonics from Ti:Sapphire laser*, D. Popmintchev, B. Zhang, D. Zusin, J. Shaw, H. Nembach, M. Chen, J. Siqueira, C. Mancuso, F. Dollar, S. Brown, A. Hankla, I. McNulty, S. Dietze, O. Shpyrko, T. Silva, P. Grychtol, T. Popmintchev, M. Murnane, H. Kapteyn, *in prep*. (2017).

272. *Circularly polarized high harmonic generation using collinearly propagated two-color counter-rotating circularly polarized beams with wavelength 2μm and 0.79μm,* K.M. Dorney, T. Fan, P. Grychtol, R. Knut, J.L. Ellis, D. Hickstein, T. Popmintchev, H.C. Kapteyn, M.M. Murnane, in preparation (2017).

Invited & Keynote Presentations by Margaret Murnane (reverse chronological order) **Colloquia are listed later in vita**

Note that presentations by other members of Kapteyn-Murnane Group are not listed.

1. **Keynote Talk,** EUV Lithography, Berkeley, CA, June 2017
2. **Wilson Lecture,** UCSD, June 2017
3. **Invited talk,** FRISNO, Israel, March 2017
4. **Plenary talk,** Physics at Veldhoven, Netherlands, January 2017.
5. **Invited talk,** ASML, Eindhoven, May 2016.
6. **Invited talk,** Uppsala University, Sweden, Jan 2016.
7. **Invited talk, Student Career Discussions,** OSA Travelling Lecturer, Technion, Haifa, Israel, Jan 2016.

8. **Invited talks (3),** ITAMP Winter School in AMO Physics, Tucson, AZ, Jan 2016.
9. **Invited talk,** "Big Ideas in Quantum Materials", La Jolla, CA, Dec (2015).
10. **Public Lecture,** Royal Irish Academy, Dublin, Ireland, Nov. 2015.
11. **Invited Masterclass for Students,** Royal Irish Academy, Dublin, Ireland, Nov. 2015.
12. **Invited talk,** International Conference on Nonlinear Optics, Hawaii, July 2015.
13. **Invited talk,** IONS Conference (International OSA Network of Students), Boulder, CO, July 2015.
14. **Plenary talk,** German Physical Society AMO Section, Heidelberg, Germany, March 2015.
15. **Invited talk,** German Physical Society Condensed Matter Section, Berlin, Germany, March 2015.
16. **Invited talk,** APS March Condensed Matter Meeting, Kavli Foundation Special Symposium on Frontiers of Light**,** March 2015 **http://www.aps.org/meetings/march/events/kavli.cfm**
17. **NSF Distinguished Lecturer,** National Science Foundation, Washington, DC, October 2014.
18. **Plenary** talk, M. Murnane et al, ''Capturing dynamics in spintronic and correlated electron materials using ultrafast X-rays," Winter Colloquium on the Physics of Quantum Electronics (PQE), Snowbird UT, Jan 2014.
19. **Invited talk, M Murnane,** Wallenburg Foundation, Stockholm, Sweden, Jan 2014.
20. **Invited talk,** Uppsala University, Jan 2014.
21. **Invited talk,** AMOLF, Amsterdam, Jan 2014.
22. **Invited talk,** APS March Meeting, Denver, CO, March 2014.
23. **Invited talk,** CLEO-QELS Special Symposium for AFOSR, San Jose, CA, June 2014.
24. **Invited talk,** Conference on Light induced dynamics and control of correlated quantum systems, Hohwacht (Germany), June 2014.
25. **Invited talk,** Aspen workshop on Many-Body Quantum Systems Far from Equilibrium, August 2014.
26. **Invited talk,** Intel, Hillsboro, OR, September 2014.
27. **Invited talk,** NanoCity: Nanoscience and Technology Conference, Amsterdam, NL, October 2014.
28. **Keynote Address,** Conference on Undergraduate Women in Physics, School of Mines, Golden, January 2013.
29. **Invited talk,** Margaret Murnane et al, "Nonlinear Optics into the X-Ray Regime and Application in Materials Science," Physics @ FOM 2013, Veldhoven, Netherlands, January 2013. Presented by Margaret Murnane.
30. **Invited talk,** Margaret Murnane and Henry Kapteyn, "Applying coherent ultrafast x-rays to real world problems in nano and materials science", ATTOFEL Winter School, Bormio, Italy, January 2013.
31. **Invited talk,** Margaret Murnane et al, "Quantum Control in Extreme Environments", Conference on New Directions in the Quantum Control Landscape," Kavli Institute of Theoretical Physics, Santa Barbara, CA, February 2013. Presented by Margaret Murnane.
32. **Invited talk**, M.M. Murnane et al, "Nanoscale Acoustics, Energy Flow, and Imaging Using Tabletop Coherent EUV High Harmonic Light Sources," 2013 International Conference on Frontiers of Characterization and Metrology for Nanoelectronics, Gaithersburg, MD, March 2013. Presented by Margaret Murnane.
33. **Keynote Talk**, Tenio Popmintchev et al, "Frontiers in Extreme Nonlinear Optics: Attosecond-to-Zeptosecond Coherent Kiloelectronvolt X-rays on a Tabletop," CLEO Europe, Munich, Germany May 2013. Presented by Tenio Popmintchev.
34. **Invited talk**, Eight International Conference on Ultrafast Surface Dynamics, Estes Park, CO, May 2013.
35. **Invited talk**, "Acoustic Nanometrology using Tabletop Coherent EUV Light," Semiconductor Research Corporation Annual Review on Nano Materials, Stanford University, Stanford, CA, August 2013.
36. **Invited talk**, 246th ACS National Meeting, Indianapolis, IN, September 2013.
37. **Plenary talk**, Henry C. Kapteyn and Margaret M. Murnane, Frontiers in Optics 2013/ Laser Science XXIX, Orlando, FL, October 2013.
38. **Keynote talk**, Margaret Murnane et al, "Coherent keV X-Rays from Tabletop Femtosecond Lasers and Applications in Nanometrology," 2013 International Workshop on EUV and Soft X-Ray Sources, Dublin, Ireland, November 2013. Presented by Margaret Murnane.
39. **Invited talk**, "Probing Electron Dynamics in Molecules, Quantum Dots and Materials at the Space-Time Limits Using Coherent Tabletop High Harmonic X-Rays," FEIS 2013 – Workshop on Femtosecond Electron Imaging and Spectroscopy, Key West, Florida, December 2013.

40. **Keynote talk**, "The Quest for the X-Ray Laser: How Diverse Teams lead to Discovery Science and Technology", MISSION SCIENCE: Global Issues facing Science and Society, Dublin, Ireland, Oct 11, 2013.
41. **Plenary talk,** Physics of Quantum Electronics (Snowbird, UT, January 2012).
42. **Invited talk,** Winter School on Atomic, Molecular and Optical Physics (Biosphere 2, AZ, January 2012).
43. **Keynote Opening Talk**, Conference on Earth & Energy Research (Golden, CO, Feb 2012).
44. **Invited talk,** AAAS Annual Meeting (Vancouver, Canada, Feb 2012).
45. **Invited talk,** American Physical Society March Meeting (Boston, MA, Feb 2012).
46. **Invited talk,** Black Forest Focus on Soft Matter 7 Multidimensional Optical Spectroscopy and Imaging: Temporal and spatial resolution at the cutting edge, (Black Forest, Germany, March 2012)
47. **Plenary Talk,** Workshop on Frontiers in Ultrafast Optics, National Tsing-Hua Univ., Taiwan, April 2012.
48. **Invited talk,** Institute of Physics Ireland High Flyer Event, Royal College of Surgeons, Dublin, May 2012.
49. **Invited talk,** EuroScience OpenForum Session on Big Science for Small Countries, Dublin, July 2012.
50. **Invited talk,** 21th International Laser Physics Workshop (LPHYS'12), Calgary, Canada, July 2012.
51. **Invited talk,** 4th International Symposium on Filamentation, Tucson, AZ, October 2012.
52. **Invited Seminar,** "Capturing the Fastest Dynamics in Materials using Ultrafast Coherent X-Rays," Department of Physics, Lund University, November 2012. Presented by Murnane.
53. **Plenary talk,** Physics of Quantum Electronics (Snowbird, UT, January 2011).
54. **Plenary talk,** International Conference on Nonlinear Optics, Hawaii, July 2011.
55. **Invited talk,** International Workshop on Surfaces and Interfaces, Kloster Banz, Germany, June 2011. (Presented by Margaret Murnane)
56. **Plenary opening talk,** XXVII International Conference on Photonic, Electronic and Atomic Collisions, Belfast, July 2011.
57. **Plenary opening talk,** Stanford Photonics Research Center, Stanford, Sept. 2011.
58. **Invited talk**, "Attosecond Light and Science at the Time-scale of Electron Motion," Symposium on the History and Future of Laser Technology, 2010 Annual Meeting of the American Association for the Advancement of Science (AAAS), San Diego CA, February 2010. Presented by Margaret Murnane.
59. **Invited talk**, "Ultrafast molecular and materials dynamics probed by attosecond coherent x-rays," March Meeting of the American Physical Society, Portland, March 2010. Presented by Margaret Murnane.
60. **Invited talk**, "Materials Dynamics probed by Ultrafast Coherent X-Rays," Gordon Research Conference on Ultrafast Phenomena In Cooperative Systems, Galveston, TX, March 2010. Presented by Margaret Murnane.
61. **Invited talk**, "Attosecond Science using Extreme Nonlinear Optics", Special Symposium to celebrate 90th birthday of Nichlaas Bloembergen, University of Arizona, Tucson, AZ, March 2010. Presented by Margaret Murnane.
62. **Invited talk,** APS Division of AMO Physics Annual Meeting, Houston, May (2010). Presented by Margaret Murnane.
63. **Invited talk,** Gordon Research Conference on Multiphoton Processes, Tilton, NH, June 2010. Presented by Margaret Murnane.
64. **Invited talk,** Gordon Research Conference on Radiation Chemistry, Andover, New Hampshire, July 2010. Presented by Margaret Murnane.
65. **Invited talk,** Gordon Research Conference on Vibrational Chemistry, Biddeford, Maine, August 2010. Presented by Margaret Murnane.
66. **Schawlow Prize Lecture**, OSA Annual Meeting, Rochester, NY, October 2010. Presented by Margaret Murnane.

67. **Invited talk,** IEEE Photonics Society Annual Meeting, Denver, CO, October 2010. Presented by Margaret Murnane.

68. **Invited talk,** International Symposium on Frontiers in Quantum Photon Science, Max Planck Hamburg, Germany, Nov. 2010. Presented by Margaret Murnane.

69. **Plenary opening talk,** 2010 Australian Institute of Physics Congress, Melbourne, Australia, December 2010. Presented by Margaret Murnane.

70. **Invited talk,** Physics of Quantum Electronics (Snowbird, UT, January 2009). (Presented by Margaret Murnane)

71. **Invited talk**, "Monitoring Molecular and Materials Dynamics using Ultrafast X-Rays", 2009 Workshop on Wave Function Engineering and Coherent Control in Nanostructured Materials, Los Alamos, February 2009

72. **Invited talk**, Progress on Doubling Session, March Meeting of the American Physical Society, March 2009. (Presented by Margaret Murnane)

73. **Ahmed Zewail Prize talk**, Annual Meeting of the American Chemical Society, Salt Lake City, UT March 2009. (Two talks presented by Margaret Murnane)

74. **Invited talk**, "Observing the Dance of Electrons in Atoms, Molecules and Materials using Coherent Electrons and x-rays," Graduate Student Symposium, Division of Atomic, Molecular, and Optical Physics of the American Physical Society (DAMOP), Charlottesville, May 2009. Presented by Margaret Murnane.

75. **Invited talk**, DEPS Conference, Boston, June 2009. (Presented by Margaret Murnane)

76. **Invited talk**, Gordon Conference on Atomic Physics, Tilton, NH June, 2009. (Presented by Margaret Murnane)

77. **Invited talk**, "Harnessing Attosecond Science for Extreme Nonlinear Optics," 18th International Laser Physics Workshop (LPHYS'09), Barcelona, Spain, July 2009. Presented by Margaret Murnane.

78. **Invited talks**, Femtochemistry, Femtobiology, and Femtophysics (Femtochemistry IX), Beijing, China, August, 2009. (Invited talks each presented by Henry Kapteyn and Margaret Murnane)

79. **Invited talk**, Gordon Conference on Quantum Control of Light and Matter, Mt. Holyoke MA, August 2009. (Presented by Margaret Murnane)

80. **Invited talk**, Gordon Conference on Laser Diagnostics, Waterville, NH August 2009. (Presented by Margaret Murnane)

81. **Invited talk**, Margaret Murnane et al, "Coherent X-rays from Ultrafast Lasers, and Applications — Attosecond Science Meets Nonlinear Optics," 2009 Synchrotron Radiation Center Users' Meeting, Stoughton WI, October 2009. Presented by Margaret Murnane.

82. **Invited talk**, "Coherent x-rays from ultrafast lasers, and applications-- attosecond science meets nonlinear optics," Workshop on Lasers for Extreme Fields and Interactions with Matter (LEFIM), Santa Fe NM, Nov. 2009. Presented by Margaret Murnane.

83. **Invited talk,** Physics of Quantum Electronics (Snowbird, UT, January 2008). (Presented by Margaret Murnane)

84. **Invited Tutorial**, Attosecond Science and Technology, CLEO/QELS, San Jose, May 2008. (Presented by Margaret Murnane)

85. **Invited talk**, 6th International Conference on Ultrafast Surface Dynamics 6, Kloster Banz, Germany, July 2008. (Presented by Margaret Murnane)

86. **Invited talk**, International Workshop on Ultrafast X-Ray Science, Dresden Germany, August 2008. (Presented by Margaret Murnane)

87. **Keynote lecture,** 3rd EPS-QEOD Europhoton Conference, Paris, France, August 2008. (Presented by Margaret Murnane)

88. **Plenary lecture,** Sigma Pi Sigma (physics honor society) Congress, Chicago, November 2008. (Presented by Margaret Murnane)
89. **Plenary talk,** "Attosecond Science - Latest Developments and Expanding Opportunities". Physics of Quantum Electronics (Snowbird, UT, January 2007). (Presented by Margaret Murnane)
90. **After dinner talk,** West Point Academy, APS/AAPT Joint Meeting, April 2007. (Presented by Margaret Murnane)
91. **Invited talk,** Annual Biophysical Society Meeting, Baltimore, MD, March 2007. "How to recruit and retain the best scientists in your department". (Presented by Margaret Murnane)
92. **Invited talk,** American Physical Society April Meeting, Jacksonville, FL, April 2007. "How to recruit and retain the best scientists in your department". (Presented by Margaret Murnane)
93. **Edison Lecture,** Naval Research Laboratory, May 2007. (Presented by Margaret Murnane)
94. **Invited talk,** "Attosecond nonlinear optics in high harmonic generation", Rochester Conference on Coherence and Quantum Optics, Rochester, NY, June 2007. (Presented by Margaret Murnane)
95. **Invited talk,** "Attosecond nonlinear optics and aplications", Summer school on ultrafast x-ray science, Stanford, CA, June 2007. (Presented by Margaret Murnane)
96. **Plenary talk**, 16th International Conference on Laser Physics, León, Mexico, August 2007). (Presented by Margaret Murnane)
97. **Invited talk,** "All-optical quasi phase matching of high harmonic generation", International Conference on Ultrafast Optics and Short Wavelength Generation, Santa Fe, NM, Spetember 2007. (Presented by Margaret Murnane)
98. **Distinguished Lecturer,** University of Arizona, October 2007. (Presented by Margaret Murnane)
99. **Sponer Presidential Lectureship,** Duke University, November 2007. (Presented by Margaret Murnane)
100. **Invited talk,** German Annual AMOP Meeting, Frankfurt, Germany, March 2006. (Presented by Margaret Murnane)
101. **Invited talks,** Daresbury, UK, March 2006. (Presented by Margaret Murnane)
102. **Invited talk,** Gordon Conference on Multiphoton Processes, Tilton, NH June 2006. (Presented by Margaret Murnane)
103. **Invited talk,** University of Sao Paulo, Sao Carlos, Brazil, June 2006. (Presented by Margaret Murnane)
104. **Invited talk,** "Probing vibrational dynamics using electrons rescattered during high-order harmonic generation," Nizhny, Russia, July 2006. (Presented by Margaret Murnane)
105. **Invited talk,** "Probing vibrational dynamics using electrons rescattered during high-order harmonic generation," 15h International Laser Physics Workshop (LPHYS'06), Lausanne, Switzerland, August 2006. (Presented by Margaret Murnane)
106. **Invited talk,** Workshop on Attosecond Science, KITP UC Santa Barbara, August 2006. (Presented by Margaret Murnane)
107. **Invited talk,** OSA Annual Meeting, Rochester, NY, October 2006. (Presented by Margaret Murnane)
108. **Invited talk,** Workshop on Nonlinear Optical Processes, Tucson, AZ, October 2006. (Presented by Margaret Murnane)
109. **Invited talk, "**Extreme Nonlinear Optics – Applied Attosecond Science", APS DAMOP Annual Meeting, Lincoln, NB May 2005. (Presented by Margaret Murnane)
110. **Invited tutorial,** "Extreme Ultraviolet Sources and Applications," OSA Conference on Lasers and Electro-optics/ Quantum Electronics and Laser Science (CLEO/QELS), Baltimore, MD, May 2005. Presented by Margaret Murnane.

111. **Invited talk,** NEW DEVELOPMENTS IN OPTICS AND RELATED FIELDS: MODERN TECHNIQUES, MATERIALS AND APPLICATIONS , NATO Advanced Study Institute, Ettore Majorana Center Erice, Italy, June 6, 2005. (Presented by Margaret Murnane)
112. **Invited talk**, Gordon Conference on Atomic Physics, Tilton, New Hamshire, June 26 (2005).
113. **Plenary talk**, 20th International Conference on X-ray and Inner-Shell Processes, Victoria, AUSTRALIA, 5-9 July 2005. (Presented by Margaret Murnane)
114. **Plenary talk**, EGAS conference (European Group for Atomic Systems), Dublin, Ireland, August 2005. (Presented by Margaret Murnane)
115. **Invited lecture**, Femtochemistry VII Conference, Washington, DC July 17 - 22, 2005. (Presented by Margaret Murnane)
116. **Plenary talk**, BA Festival of Science, Dublin, Ireland, September 2005. (Presented by Margaret Murnane)
117. **Invited Talk,** M. Murnane et al, "Probing vibrational dynamics using electrons rescattered during high-order harmonic generation," 4th International Workshop on Optimal Control of Quantum Dynamics: Theory and Experiment, Ringberg, Bavaria, Germany, Dec 2005. (Presented by Margaret Murnane)
118. **Invited talk,** "Coherent Control and Chemical Sensing", Physics of Quantum Electronics (Snowbird, UT, January 2004). (Presented by Margaret Murnane)
119. **Invited Lecture Series**, Institute of Physics, (University College Cork, University College Dublin, Queens University Belfast, Ireland, January 2004. (Presented by Margaret Murnane)
120. **Invited talk**, "Multiphoton and Attosecond EUV Photonics", American Chemical Society Annual Meeting (March 2004). (Presented by Margaret Murnane)
121. **Invited talk**, "Ultrafast EUV Spectroscopy", Conference on Molecular Reaction Dynamics (March 2004).
122. **Invited talk**, "Multiphoton and Attosecond EUV Photonics", Center for Ultracold Atoms, Harvard/MIT (March 2004). (Presented by Margaret Murnane)
123. **Invited talk**, "Ultrafast EUV Photonics and Applications in Spectroscopy", Workshop on Attoscience, Ringberg, Germany (April 2004 (Presented by Margaret Murnane)
124. **Invited talk**, "How to make Atoms Sing and Molecules Dance – using fast light pulses to observe and control nature", APS April Meeting (Denver, CO, May 2004). (Presented by Margaret Murnane)
125. **Invited talk**, "Multiphoton and Attosecond EUV Photonics", CLEO/IQEC, San Francisco, CA (May 2004). (Presented by Margaret Murnane)
126. **Invited lecture**, Roman Baths Summer School on Advanced Glass-Based Nano-Photonics, Newton St.Loe, Bath, United Kingdom, 12-16 July 2004. (Presented by Margaret Murnane)
127. **Richtmeyer Memorial Lecturer of the AAPT**, Austin, TX, January 2003. (Presented by Margaret Murnane)
128. **Invited talk,** "Ultrafast, coherent, laser and x-ray science", Western Spectroscopy Annual Meeting, Silamar, CA (January 2003). (Presented by Margaret Murnane)
129. **Invited talk,** "Ultrafast, coherent, laser and x-ray science", AAAS Annual Meeting, Denver, CO (February 2003). (Presented by Margaret Murnane)
130. **Keynote Speaker,** "How to make atoms sing and molecules dance", National Council of University Research Administrators", Denver, CO (April 2003). (Presented by Margaret Murnane)
131. **Invited talk**, "Multiphoton EUV Photonics: Quasi Phase Matching of EUV High Harmonic Generation", CLEO/QELS Conference, Baltimore, MD (June 2003). (Presented by Ariel Paul)
132. **Invited talk,** Gordon Research Conference on Electronic Spectroscopy and Dynamics, Bates College, Lewiston, ME, July 6-11, 2003. (Presented by Margaret Murnane)
133. **Invited talk,** Gordon Research Conference on Photoions, Photoionization and Photodetachment, Queen's College, Oxford, England, 21-26 September 2003. (Presented by Margaret Murnane)

134. **Invited talk,** "Multiphoton EUV Photonics", Four Corners Section of the American Physical Society (Arizona, October 2003). (Presented by Margaret Murnane)
135. **Invited talk,** "Multiphoton EUV Photonics", Annual IEEE LEOS Meeting, October 26-30, Tucson, Arizona (Presented by Margaret Murnane)
136. **Invited talk,** "Table-top EUV Sources", ALFF Workshop, October 30-31, Argonne National Lab, Illinois (Presented by Margaret Murnane)
137. **Invited talk,** "Attosecond timescale coherent control of EUV generation", Workshop on Coherent Control (Ringberg, Germany, December 2003). (Presented by Maragret Murnane)
138. **Plenary talk**, "Coherent control techniques in quantum systems", Winter Quantum Electronics Conference, Snowbird, UT, January 2002. (Presented by Margaret Murnane)
139. **Science Innovation Topical Lecture**, "Can we make atoms sing and molecules dance? Using fast light pulses to observe and control nature", AAAS Annual Meeting, Boston, MA (2002). (
140. **Invited speaker**, Launch event of new Graduate Research Fellowships for Science Foundation Ireland (April 2002) (Presented by Margaret Murnane)
141. **Invited tutorial,** American Physical Society Division of Atomic, Molecular, and Optical Physics, Williamsburg, VA, May 2002. (Presented by Margaret Murnane)
142. **Invited talk,** Gordon Conference on Nonlinear Optics, New Hampshire, July 2002. (Presented by Margaret Murnane)
143. **Invited talk,** "Nonlinear Optics for Coherent EUV Generation", International Workshop on Photoionization, IWP2002, SPring-8, Japan, August 2002. (Presented by Margaret Murnane)
144. **Keynote Speaker,** "Multiphoton Photonics", OPTO-IRELAND, Galway, Ireland, September 2002. (Presented by Margaret Murnane)
145. **Invited talk,** AIP Industrial Physics Forum, October 2002. (Presented by Margaret Murnane)
146. **Invited talk,** Optical Society of America Annual Meeting, October 2002. (Presented by Margaret Murnane)
147. **Invited talk,** "EUV Photonics", Air Force Workshop on Strong Field Physics, December 2002.
148. **Invited talk**, "Direct observation of surface chemistry using ultrafast x-ray pulses", Winter Quantum Electronics Conference, Snowbird, UT, January 2001. (Presented by Margaret Murnane)
149. **Invited talk**, "Optics – where does it belong?", AAPT Meeting, San Diego, CA, January 2001.
150. **Invited talk**, "Feedback Optimization of Coherent X-Ray Generation using Shaped X-Ray Pulses", March Meeting of the American Physical Society, Seattle, WA, March 2001. (Presented by Margaret Murnane)
151. **Invited talk**, "Generation of coherent, ultrafast, EUV pulses", VUV 2001, Trieste, July 2001. (Presented by Margaret Murnane)
152. **Invited talk**, "Coherent Control of Extreme Nonlinear Systems", ACMS Workshop, Cork, Ireland, September 2001. (Presented by Margaret Murnane)
153. **Invited talk,** International Workshop on Optimum Control of Quantum Dynamics: Theory and Experiment, Tegernsee, Germany, Dec. 2001. (Presented by Margaret Murnane)
154. **Invited talk,** APS Topical Conference on Atomic Processes in Plasmas, Reno, NM, March 2000.
155. **Invited talk**, Advanced Accelerator Concepts Workshop, Santa Fe, NM, June 2000. (Presented by Margaret Murnane)
156. **Invited**, M. Murnane et al, " Extreme Nonlinear Optics", DOE Workshop, MD, Oct. 1998 and Jan. 1999.
157. **Invited Centennial Talk**, M. Murnane et al, " New Physics with Femtosecond Lasers", APS Centennial Symposium, Atlanta, GA, March 1999.

158. **Invited talk**, M. Murnane et al, " Extreme Nonlinear Optics", Gordon Conference on Atomic Physics, July 1999.

159. **Plenary Speaker**, M. Murnane et al, " Extreme Nonlinear Optics", OSA Conference on Generation and Application of Short Wavelength Sources, Potsdam, Germany, July 1999.

160. **Invited talk**, M. Murnane et al, "Ultrafast Coherent Soft-X-Ray Sources", International Conference on X-Ray Processes, Chicago, IL August 1999.

161. **Invited talk**, M. Murnane et al, " Phase-matching at short wavelengths", International Conference on Ultrafast Spectroscopy, Taipei, Taiwan, October 1999.

162. **Plenary Speaker**, M. Murnane et al, " Extreme Nonlinear Optics", Israeli Optical Society, Tel Aviv, Israel, Nov 1999.

163. **Invited talk,** LEOS Annual Meeting, San Jose, CA, Nov. 1999. (Presented by Margaret Murnane)

164. **Invited**, M. Murnane et al, "Extreme Nonlinear Optics: Generation of Coherent X-Rays below 2.7nm," XIth International Conference on Ultrafast Phenomena, Garmish-Partenkirchen, Germany, July 1998.

165. **Invited**, M. Murnane et al, Generation of Coherent, Femtosecond Light in the UV and X-Ray Regions" , SPIE Photonics West, San Jose, CA, January 1998. (Presented by Margaret Murnane)

166. **Invited**, M. Murnane et al, "Femtosecond Coherent X-Rays below 2.7nm," ICAP '98 (International Conference on Atomic Physics), Windsor, Canada, August 1998. (Presented by Margaret Murnane)

167. **Invited**, M. Murnane et al, "Ultrahigh E-fields and X-Rays", Winter Colloquium on Quantum Electronics, Snowbird, UT, January 1998. (Presented by Margaret Murnane)

168. **Prize talk,** "The Science of Ultrashort Pulse Generation in the Visible and X-Ray Regions." American Physical Society/AAPT Joint Meeting, Washington, DC 1997. (Presented by Margaret Murnane)

169. **Invited talk,** "Generation and Applications of Coherent Soft-X-Rays," European Femtochemistry Conference, Lund, Sweden 1997. (Presented by Margaret Murnane)

170. **Invited talk,** "Femtosecond superhigh, supershort, harmonics," Quantum Electronics and Laser Science Conference, QELS '97, Baltimore, MD, May 1997. (Presented by Margaret Murnane)

171. **Invited talk,** "Attosecond Pulse Generation using High Harmonic Emission," International Conference on Superstrong Fields in Plasmas, Varenna, Italy, August 1997. (Presented by Margaret Murnane)

172. **Invited talk**, C. Durfee et al., "Guided-Wave Phase-Matching in Hollow-Core Fibers", Conference on Ultrafast Optics, Monterey, CA, August 1997. (Presented by Margaret Murnane)

173. **Invited talk**, "Enhanced high-harmonic generation using 25 fs laser pulses," International Quantum Electronics Conference, IQEC, Sydney Australia 1996. (Presented by Margaret Murnane)

174. **Invited talk**, "Generation of 12 fs UV pulses by third-harmonic generation in air." Nonlinear Optics: Materials, Fundamentals, and Applications, Maui, HI, July 1996. (Presented by Margaret Murnane)

175. **Invited talk,** "XUV High-harmonic generation using 25 fs laser pulses." Quantum Electronics and Laser Science Conference, QELS '96, Anaheim, CA May 1996. (Presented by Margaret Murnane)

176. **Invited talk**, SPIE Annual Symposium OE'LASE, San Jose, CA, February 1995. (Presented by Jianping Zhou) "Generation of 26 fs, 2 TW pulses near the gain-narrowing limit in Ti:sapphire."

177. **Invited Tutorial**, APS March Meeting, San Jose, CA, March 1995. "Advances in Femtosecond Lasers."

178. **Invited Talk**, NSF Forum on Optical Science and Engineering, SPIE Annual Meeting, San Diego, CA 1995. "Advances in Femtosecond Laser Technology" (Presented by Margaret Murnane)

179. **Plenary Talk**, Australian Optical Society Annual Meeting, Brisbane, Australia, July 1995. "Advances in Femtosecond Lasers." (Presented by Margaret Murnane)

180. **Invited talk**, Gordon Conference on Nonlinear Optics, July 1995. "Dispersive Limits of Ultrashort-Pulse Generation." (Presented by Margaret Murnane)

181. **Invited talk**, Euroconference on Generation and Application of Ultrashort X-Ray Pulses II, Pisa, Italy 1995. "High Intensity Laser-Matter Interactions with sub-30fs Optical Pulses." (Presented by Margaret Murnane)

182. **Invited talk**, International Conference on Lasers and Applications, Cairo, Egypt, 1994. "Ultrashort-Pulse Lasers."

183. **Invited talk**, Optical Society of America Annual Meeting, Dallas, TX (1994). "Review of Ultrashort Pulse Generation in Solid-State Lasers - Capabilities and Limitations." (Presented by Margaret Murnane)

184. **Invited talk**, SPIE Annual International Symposium on Optical and Optoelectronic Applied Science and Engineering, Los Angeles, CA, January 1993. "Ultrashort-Pulse Solid-State Lasers."

185. **Invited talk**, Workshop on Short Scale-length Plasmas, Ann Arbor, MI, April 1993. "Applications of Ultrashort X-Ray Pulses." (Presented by Margaret Murnane)

186. **Invited talk**, OSA Annual Meeting, Toronto, Canada, October 1993. "Generation and Amplification of Ultrashort Light Pulses." (Presented by Margaret Murnane)

187. **Invited talk**, Oregon Center for Advanced Technology Education, March 1992. "High-Power Lasers and Applications."

188. **Invited talk**, American Physical Society March Meeting, Indianapolis, IN (1992). "Intense femtosecond x-ray emission from waveguides and clusters."

189. **Invited talk**, Gordon Conference on Nonlinear Optics, Wolfboro, NH, July 1991. "Generation of efficient sub-picosecond x-ray sources."

190. **Invited talk**, APS Meeting of the Division of Plasma Physics, Cincinnati, OH, November 1990. "High-density plasmas - generation of efficient sub-picosecond x-ray sources."

191. **Invited talk**, Workshop on Highly Charged Ions, Lawrence Berkeley Laboratory, Berkeley, CA, March 1989. "Sub-picosecond laser-produced plasmas."

192. **Invited talk**, APS Meeting of the Division of Atomic, Molecular, and Optical Physics, Windsor, Ontario, Canada, May 1989.

193. **Invited talk**, SPIE 33rd Annual International Symposium on Optical and Optoelectronic Applied Science and Engineering, San Diego, CA, August 1989."Generation and Measurement of Sub-Picosecond X-Ray Pulses."

194. **Invited talk**, OSA Meeting on Short Wavelength Coherent Radiation: Generation and Applications, Cape Cod, MA, September 1988."X-Ray Emission Studies of Sub-Picosecond Laser Produced Plasmas."

Colloquia presented by M Murnane (reverse chronological order)

1. Bethe Lecture, Cornell (2017)
2. Wilson Lecture, UCSD (2017)
3. Chapman Lecture, Rice University, February 2016.
4. Colloquium, Rice University, February 2016.
5. Colloquium, Rutgers University, February 2016.
6. Colloquium, University of Indiana Physics, February 2015.
7. Colloquium, Johns Hopkins University Physics, February 2015.
8. Colloquium, University of Southern California Physics, February 2015.
9. UCLA Arman Physics Colloquium, February 2015.
10. **Marker Lectures**, Penn State University, 2014.
11. **Small** Lecture, College of William and Mary, March 2014.
12. **Irons** Public Lecture, Rutgers University, March 2014.
13. Colloquium, Princeton University Mechanical Engineering, April 2014.
14. Colloquium, Cornell University Applied Physics, April 2014.
15. Colloquium, MIT Chemistry, May 2014.
16. Colloquium, CUNY Physics, May 2014.
17. Colloquium, Department of Physics, University of Groningen, Netherlands, January 2013.
18. Colloquium, Colorado State University, April 2013.
19. **Bernstein** Lecture, Chemistry, UCLA, April 2013.
20. **Bertman** Lecture, Physics, Wesleyan University, April 2013.
21. McElvain Lecture, University of Wisconsin Chemistry Department, February 2012.
22. Colloquium, IAMS, National Taiwan University, March 2012.
23. Vasser-Woolley Seminar in Chemistry, Georgia Tech, April 2012.
24. Yale Rosenthal Lecture, Yale April 2012.
25. Colloquium, Institute of Atomic and Molecular Science, National Taiwan University, Taipei, April 2012.
26. Physics Colloquium, University of Ottawa, September 2012.
27. Colloquium, University of Minnesota, May 2011.
28. Colloquium, Northwestern University, June 2011. Presented by Margaret Murnane.
29. Colloquium, Louisiana State University, Sept 2011.
30. Colloquium, Stanford University, November 2011.
31. Colloquium, UCLA, November 2011.
32. Physical Chemistry Colloquium, UC Berkeley (Jan 2010).
33. Colloquium, Fermilab, IL, March 2010.
34. Colloquium, UC San Diego, June 2010.
35. Colloquium, Frontiers in Chemistry Series, Wayne State University, September 2010.
36. Colloquium, Physics, University of Madison (March 2009).
37. Colloquium, Physics, MIT (March 2009).
38. Colloquium (Chemistry), University of Washington (April 2009).
39. Colloquium, Technical University of Vienna, Vienna Austria, April 2009.
40. Condensed Matter Seminar, UC Berkeley (May 2009).
41. Seminar, Dept. of Physics, University of Oxford, July 2009.
42. Colloquium, BYU, January 2008.
43. **Munushian Lecturer**, University of Southern California (March 2008).

44. Colloquium, Penn State University (April 2008).
45. **Malmstrom Lecturer**, Hamline University (May 2008).
46. Basic Energy Sciences Invited Speaker Series, Sandia National Labs (September 2008).
47. Colloquium (Physics), University of Washington (November 2008).
48. Invited talk (Chemistry) Temple University (November 2008).
49. Colloquium, Ecole Polytechnique de Montreal, February 2007.
50. Colloquium, University of Richmond, April 2007.
51. Lecture Series: Distinguished Women in Science and Engineering (Colorado State University, Oct 2007).
52. Distinguished Women in Science and Engineering (University of Arizona, October 2007).
53. **Sponer Presidential Lectureship,** Duke University, November 2007
54. Colloquium, UC Santa Barbara, January 2006.
55. Colloquium, IBM Yorktown Hights, April 2006.
56. Colloquium, Princeton University, February 2005.
57. Colloquium, Institute of Physics Lecture Series, University College Dublin, January 2004.
58. Colloquium, Institute of Physics Lecture Series, University College Cork, January 2004.
59. Colloquium, Institute of Physics Lecture Series, Queen's College Belfast, January 2004.
60. Colloquium, University of Southern California, February 2004.
61. Colloquium, Center for Ultracold Atoms, MIT, April 2004.
62. Colloquium, The Ohio State University, May 2004.
63. Colloquium, Northwestern University, November 2004.
64. Colloquium, Harvard University, November 2004.
65. Colloquium, Trinity College Dublin, March 2003.
66. Colloquium, UC Irvine, May 2003.
67. Colloquium, Stanford University, April 2002
68. Colloquium, Sonoma State University, April 2002
69. Colloquium, Kansas State University, September 2002.
70. Colloquium, University of Chicago, February 2001.
71. Colloquium, University of San Diego, February 2001.
72. Colloquium, Harvard University, March 2001.
73. Colloquium, Colorado State University, March 2001.
74. Colloquium, Yale University, May 2001.
75. Seminar, MIT, May 2001.
76. Colloquium, Vanderbilt University, November 2001.
77. Colloquium, Reed College, November 2001.
78. Colloquium, Colorado School of Mines, January 2000.
79. Colloquium, College of William and Mary, April 2000.
80. Colloquium, Temple University, April 2000
81. Colloquium, University of Arizona, October 2000.
82. Colloquium, University of Michigan, October 2000.
83. Colloquium, Caltech, April 1999.
84. Seminar, Princeton University, April 1999.
85. Colloquium, University of Toronto, February 1998.
86. Colloquium, University of Michigan, February 1998.
87. Colloquium, University of Rochester, Freruary 1998.

88. Colloquium, Bryn Mawr College, March 1998.
89. Colloquium, Purdue University (Physics), September 1998.
90. Colloquium, University of California at Berkeley, September 1998.
91. Seminar, MIT, November 1998.
92. Colloquium, University of Minnesota, May 1997.
93. Colloquium, University of Connecticut, June 1997.
94. Colloquium, University of Illinois at Urbana-Champagne, October 1997.
95. Colloquium, Argonne National Laboratory, October 1997.
96. Colloquium, Williams College, October 1997.
97. Colloquium, University of Groningen, Holland, December 1997.
98. Colloquium, Ohio State University, April 1996.
99. Colloquium, Harvard University, April 1996.
100. Seminar, Purdue University (Engineering), April 1996.
101. Colloquium, Swarthmore College, October 1996.
102. Colloquium, University of Maryland, February 1995.
103. Colloquium, University of Michigan, Ann Arbor, MI, March 1995.
104. Seminar, Lawrence Livermore National Laboratory, March 1995.
105. Colloquium, Utah State University, April, 1995.
106. Seminar, University of Washington, May 1995.
107. Colloquium, State University of New York at Stony Brook, October 1995.
108. Colloquium, University of Texas at Austin, November 1995.
109. Colloquium, University of Michigan, Ann Arbor, MI, January 1994.
110. Invited talk, American Association of University Women, Pullman, WA, Febuary, 1993.
111. Quantum Electronics Seminar, Stanford University, Stanford, CA, January 1993.
112. Colloquium, Oregon State University, Spring 1991.
113. Departmental Colloquium, University of Idaho, Moscow, ID 1991.
114. Condensed Matter Physics Seminar, University of California at Davis, May 1990.
115. Plasma Physics Seminar, University of California at Los Angeles, May 1990.
116. Colloquium, University of Maryland, 1990.
117. Seminar, SUNY Stony Brook, 1990.