

## JORGE J. ROCCA

Jorge Rocca is a University Distinguished Professor at Colorado State University who is internationally recognized for contributions to x-ray lasers and their applications, ultra-high-power lasers, and plasma physics. His group demonstrated the first table-top soft x-ray laser (Phys.Rev. Letters, 1994, > 1000 citations in Google Scholar), and other advances in these subjects have been published in more than 260 peer review journal papers. More recently his group developed one of the world's most powerful compact lasers and used it to show that irradiation of nanostructures with ultrashort laser pulses creates ultra-high energy density plasmas leading to record conversion efficiency into x-rays, and micro-scale fusion. He has received the Arthur L. Schawlow Prize in Laser Science of the American Physical Society in 2011, and the Willis E. Lamb Award for Laser Science and Quantum Optics in 2012. He was elected Fellow of the American Physical Society, the Optical Society of America, and Institute of Electrical and Electronic Engineers. Early in his career, he was a National Science Foundation Presidential Young Investigator.

### PRESENT POSITION:

University Distinguished Professor  
Department of Electrical and Computer Engineering, and Department of Physics  
Colorado State University

### EDUCATION:

1983 Ph.D. Electrical Engineering, Colorado State University  
1978 Physics Diploma, University of Rosario (Argentina)

### PROFESSIONAL CAREER:

2003 – 2014 Director, National Science Foundation ERC for Extreme Ultraviolet Science and Technology; a partnership between Colorado State University, University of Colorado, and University of California Berkeley/Lawrence Berkeley Nat. Lab.  
2002 – Present Professor of Physics  
Colorado State University  
1991 - Present Professor of Electrical and Computer Engineering  
Colorado State University  
1987 – 1991 Associate Professor of Electrical Engineering  
Colorado State University  
1983 – 1987 Assistant Professor of Electrical Engineering  
Colorado State University  
1979 – 1983 Research Assistant - Department of Electrical Engineering  
Colorado State University  
1978 – 1979 Assistant Professor of Physics - University of La Pampa, Argentina  
Research Staff Member - CEILAP Laser Laboratory, Buenos Aires, Argentina

### HONORS and AWARDS:

Distinguished Alumni Award, Colorado State University, 2016  
Willis E. Lamb Award for Laser Science and Quantum Optics, 2012  
Arthur L. Schawlow Prize in Laser Science (American Physical Society), 2011  
Distinguished Lecturer Award, Lasers Electro-Optics Society of the Institute of Electrical and Electronic Engineers (IEEE-LEOS), 2008  
University Distinguished Professor, Colorado State University, 2007

Fellow of the American Physical Society, 2006, Citation: *“For breakthrough developments in compact soft X-ray lasers and in the applications of these lasers to plasma diagnostics, interferometry and material studies”*

Fellow of the Institute of Electrical and Electronic Engineers, 2000, Citation: *“For the development of plasma excited lasers and the table-top soft X-ray laser”*

Fellow of the Optical Society of America, 1997, Citation: *“For the demonstration of the first discharge pumped soft X-ray laser and contributions to the understanding of capillary discharges”*

Abell Research and Graduate Program Award, Colorado State University, 2006

W.M. Keck Foundation Award, 2000

Colorado State University Research Foundation “Researcher of the Year Award”, 1995

Abell Research and Graduate Program Award, Colorado State University, 1995

Colorado Advanced Technology Institute Technology Transfer Award, 1995

Halliburton Education Foundation Award, 1985

National Science Foundation Presidential Young Investigator Award, 1985-1990

#### SELECTED PROFESSIONAL SERVICE ACTIVITIES

- Chair LaserNet US 2019-2020 (US Department of Energy Network of Ultra-High Intensity Lasers)
- Program Committee Member American Physical Society Division of Plasma Physics, Commission Planning Process for the US Department of Energy Fusion Energy Science Program, 2019-2020
- Co-Chair, National Science Foundation/Dept. of Energy Workshop on Plasma Science, January 2017
- Chair, International Conference on X-Ray Lasers, Fort Collins, Colorado, May 2014
- Chair Arthur Schawlow Prize Selection Committee, American Physical Society, 2013
- Interim Chair National Ignition Facility Users Group 2009-2010
- Chair of HEDSA (High Energy Density Science Association) 2008-2009
- Co-Chair “Joint Conference on Ultrafast Optics VI and Applications of High Field and Short Wavelength Sources” XII, Santa Fe, New Mexico, September 2007
- Chair Charles Townes Award Committee, Optical Society of America, 2003
- Co-Chair 8<sup>th</sup> International Conference on X-ray Lasers, Aspen, Co, May 27-31, 2002
- Member International Advisory Board “International Conference on X-ray Lasers”, 1996-2017
- Chair Optical Society of America “X-ray and XUV Physics,” Technical Group, 1999-2000
- Chair IEEE LEOS Subcommittee on “Short Wavelength and Gas Lasers”, 1998-1999; Member 1989 – 2000
- Program Committee, IEEE Laser and Electro-Optics Society Annual Meeting, 1992-2002
- Conference co-Chair - SPIE Symposium, “Soft X-ray Lasers and Applications III”, SPIE, Denver, CO, July 1999
- Conference Co-chair, “X-ray Lasers and Applications III,” SPIE Conference, Denver, CO, July 1999. (Co-chair: Dr. Luiz B. Da Silva, Lawrence Livermore Laboratory)
- Vice Chair Optical Society of America, “X-ray and XUV Physics”, Technical Group 1998
- Conference Co-chair, “X-ray Lasers and Applications II”, SPIE Conference, San Diego, CA, July 1997. (Co-chair: Dr. Luiz B. DaSilva, Lawrence Livermore Laboratory)
- Symposium organizer, “Table Top Soft-X-ray Lasers”, Optical Society of America Annual Meeting, Rochester, NY, October 1996
- Program Committee CLEO'95, Baltimore, MD, May 1995, CLEO'96, Anaheim, CA, June 1996
- Program Committee International Quantum Electronics Conference, Australia, June 1996
- Conference Co-chair, “X-Ray Lasers and Applications”, SPIE Conference, San Diego, CA, July 1995. (Co-chair: Prof. P. Hagelstein, MIT)

### CONFERENCES ORGANIZED (Since 2014)

- Organizing Committee Member SPIE “XIII X-Ray Lasers and Coherent X-Ray Sources: Development and Applications,” 2019
- Program Chair Compact EUV and X-Ray Light Sources, OSA High Brightness sources and Light-driven interactions Congress, 2019, 2020
- Session Organizer/Chair, 48<sup>th</sup> Winter Colloquium on the Physics of Quantum Electronics, Snowbird, Utah, January 2019
- Organizing Committee Chair, 2nd QST International Symposium, Nara, Japan, November 2018
- Session Chair, 16<sup>th</sup> International Conference on X-Ray Lasers, Prague, Czech Republic, October 2018
- Session Chair, 8<sup>th</sup> Conference of the International Committee on Ultrahigh Intensity Lasers, Lindau, Germany, September 2018
- Session Chair, 2018 Frontiers in Optics & Laser Science, Washington, DC, September 2018
- Organizing Committee Member: Ultrafast Optics XI, Jackson Hole, Wyoming, October 2017
- Organizing Committee Member: “X-Ray Lasers and Coherent X-Ray Sources: Developments and Applications XII”, Prague, Czech Republic, April 2017
- Organizing Committee Member: “Extreme Ultraviolet (EUV) Lithography VIII”, SPIE Advanced Lithography, San Jose, California, February 2017
- Organizing Committee Member: “Extreme Ultraviolet (EUV) Lithography V”, SPIE Advanced Lithography, San Jose, California, February 2014-2017
- Organizing Committee Member: “X-Ray Lasers and Coherent X-Ray Sources: Developments and Applications XI”, San Diego, California, August 2015
- Organizing Committee Member: “Extreme Ultraviolet (EUV) Lithography VI”, SPIE Advanced Lithography, San Jose, California, February 2015
- Chair, 14th International Conference on X-ray Lasers, “X-Ray Lasers 2014”, Fort Collins, Colorado, May 2014

### EDITORSHIPS:

Co-Editor, X-Ray Lasers 2014, Springer, 2016

Editorial Board, Opto-Electronic Review, 2006-2010

Editorial Board, Review of Scientific Instruments, 2002-2004

Co-Editor, X-ray Lasers 2002, American Institute of Physics, 2002

Co-Editor, Soft X-ray Lasers and Applications IV, SPIE J. Vol. 4504, 2001

Co-Editor, Soft X-ray Lasers and Applications III, SPIE J. Vol. 3776, 1999

Guest Co-Editor, IEEE Journal of Selected Topics in Quantum Electronics - Special Issue on “Short - Wavelength Lasers and Applications”, 1999

Co-Editor, Soft X-ray Lasers and Applications II, SPIE J. Vol. 3156, 1997

Co-Editor, Soft X-ray Lasers and Applications, SPIE J. Vol. 2520, 1995

Associate Editor, IEEE Journal of Quantum Electronics, 1994-1996, 1997-1999

### PROFESSIONAL SOCIETIES

American Physical Society, APS (fellow)

Optical Society of America, OSA (fellow)

Institute of Electrical and Electronics Engineers, IEEE (fellow)

American Association for the Advancement of Science, AAAS (member)

## TECHNICAL PUBLICATIONS

Citations Google Scholar: 12,595; h-Index: 57; I 10-Index: 221.

Citations ISIS Web of Science: 8096; h-Index: 47

## REFEREED JOURNAL PUBLICATIONS:

1. Y. Wang, H. Chi, C. Baumgarten, K. Dehne, A.R. Meadows, A. Davenport, G. Murray, B.A. Reagan, C.S. Menoni, **J.J. Rocca**, "1.1 J Yb:YAG picosecond laser at 1 kHz repetition rate," *Optics Letters*, **45**, 6615-6618, (2020).
2. H. Chi, Y. Wang, A. Davenport, C.S. Menoni, **J.J. Rocca**, "Demonstration of a kilowatt average power, 1 J, green laser," *Optics Letters*, **45**, 6803-6806, (2020).
3. A. Moreau, R. Hollinger, C. Calvi, S. Wang, Y. Wang, M.G. Capeluto, A. Rockwood, A. Curtis, S. Kasdorf, V.N. Shlyaptsev, V. Kaymak, A. Pukhov, and **J.J. Rocca**, "Enhanced electron acceleration in aligned nanowire arrays irradiated at highly relativistic intensities," *Plasma Physics and Controlled Fusion*, **62**, 014013, (2020).
4. R. Hollinger, S. Wang, Y. Wang, A. Moreau, M.G. Capeluto, H. Song, A. Rockwood, E. Bayarsaikhan, V. Kaymak, A. Pukhov, V.N. Shlyaptsev, and **J.J. Rocca**, "Extreme ionization of heavy atoms in solid-density plasmas by relativistic second-harmonic laser pulses," *Nature Photonics*, **14**, (2020).
5. M. Bailly-Grandvaux, D. Kawahito, C. McGuffey, J. Strehlow, B. Edghill, M.S. Wei, N. Alexander, A. Haid, C. Brabetz, B. Bagnoud, R. Hollinger, M.G. Capeluto, **J.J. Rocca**, and F.N. Beg, "Ion acceleration from microstructured targets irradiated by high-intensity picosecond laser pulses," *Physical Review E*, **102**, 021201, (2020).
6. H.C. Wang, A.R. Meadows, E. Jankowska, E. Randel, B.A. Reagan, **J.J. Rocca**, and C.S. Menoni, "Laser induced damage in coatings for cryogenic Yb:YAG active mirror amplifiers," *Optics Letters*, **45**, 4476-4479, (2020).
7. S.J. Wang, A. Rockwood, Y. Wang, W.L. Chao, P. Naulleau, H.Y. Song, C.S. Menoni, M. Marconi, and **J.J. Rocca**, "Single-shot large field of view Fourier transform holography with a picosecond plasma-based soft X-ray laser," *Optics Express*, **28**, 35898-35909, (2020).
8. J. Wild, P. Pira, T. Burian, L. Vysin, L. Juha, Z. Zelinger, S. Danis, V. Nehasil, Z. Rafaj, V. Nevrlý, M. Dostal, P. Bitala, P. Kudrna, M. Tichý, and **J.J. Rocca**, "Ablation of single-crystalline cesium iodide by extreme ultraviolet capillary-discharge laser," *Nukleonika*, **65**, 205-210, (2020).
9. C. N. Danson, C. Haefner, J. Bromage, T. Butcher, J. C. F. Chanteloup, E. A. Chowdhury, A. Galvanauskas, L. A. Gizzi, J. Hein, D. I. Hillier, N. W. Hopps, Y. Kato, E. A. Khazanov, R. Kodama, G. Korn, R. X. Li, Y. T. Li, J. Limpert, J. G. Ma, C. H. Nam, D. Neely, D. Papadopoulos, R. R. Penman, L. J. Qian, **J. J. Rocca**, A. A. Shaykin, C. W. Siders, C. Spindloe, S. Szatmari, R. Trines, J. Q. Zhu, P. Zhu, and J. D. Zuegel, "Petawatt and Exawatt Class Lasers Worldwide," *High Power Laser Science and Engineering*, **7**, e54, (2019).
10. F. Zaldivar Escola, N. Míngolo, O. E. Martínez, **J. J. Rocca**, and C. S. Menoni, "Characterization of Absorptance Homogeneity in Thin-Film Coatings for High-Power Lasers by Thermal Lensing Microscopy," *Appl. Opt.*, **58**, 7233-7240, (2019).
11. S. Wang, C.M. Baumgarten, Y. Wang, B.A. Reagan, A.P. Rockwood, H. Wang, L. Yin, K. Wernsing, H. Bravo, B.M. Luther, C.S. Menoni and **J.J. Rocca**, "High-Power Ultrashort Pulse Lasers to Pump Plasma-Based Soft X-Ray Lasers," *IEEE J. Selected Topics in Quantum Electronics*, **25**, 8800515, (2019) (*Invited Paper*).
12. M. Dozieres, G. M. Petrov, P. Forestier-Colleoni, P. Campbell, K. Krushelnick, A. Maksimchuk, C. McGuffey, V. Kaymak, A. Pukhov, M. G. Capeluto, R. Hollinger, V. N. Shlyaptsev, **J. J. Rocca**, and

- F. N. Beg, "Optimization of Laser-Nanowire Target Interaction to Increase the Proton Acceleration Efficiency," *Plasma Physics and Controlled Fusion*, **61**, 065016, (2019).
13. F. Z. Escola, N. Mingolo, O. E. Martinez, **J. J. Rocca**, and C. S. Menoni, "Investigation of Laser Annealing Mechanisms in Thin Film Coatings by Photothermal Microscopy," *Optics Express*, **27**, 354651, 5729-5744, (2019).
  14. H. Chi, C. M. Baumgarten, E. Jankowska, K. A. Dehne, G. Murray, A. R. Meadows, M. Berrill, B. A. Reagan, and **J. J. Rocca**, "Thermal Behavior Characterization of a Kilowatt-Power-Level Cryogenically Cooled Yb:YAG Active Mirror Laser Amplifier," *Journal of the Optical Society of America B-Optical Physics*, **36**, 1084-1090, (2019).
  15. V. Vozda, T. Burian, J. Chalupsky, V. Dedic, V. Hajkova, P. Hlidek, L. Juha, M. Kozlova, M. Krus, J. Kunc, M. Rejhon, L. Vysin, **J. J. Rocca**, and J. Franc, "Micro-Raman Mapping of Surface Changes Induced by XUV Laser Radiation in Cadmium Telluride," *Journal of Alloys and Compounds*, **763**, 662-669, (2018).
  16. L. Vysin, T. Burian, E. Ukraintsev, M. Davidkova, M. E. Grisham, S. Heinbuch, **J. J. Rocca**, and L. Juha, "Dose-Rate Effects in Breaking DNA Strands by Short Pulses of Extreme Ultraviolet Radiation," *Radiation Research*, **189**, 466-476, (2018).
  17. H. Chi, K.A. Dehne, C.M. Baumgarten, H.C. Wang, L. Yin, B.A. Reagan, and **J. J. Rocca**, "In Situ 3-D Temperature Mapping of High Average Power Cryogenic Laser Amplifiers," *Optics Express*, **26**, 5240-5252, (2018).
  18. A. Curtis, C. Calvi, J. Tinsley, R. Hollinger, V. Kaymak, A. Pukhov, S.J. Wang, A. Rockwood, Y. Wang, V.N. Shlyaptsev, and **J. J. Rocca**, "Micro-Scale Fusion in Dense Relativistic Nanowire Array Plasmas," *Nature Communications*, **9**, 1077, (2018).
  19. R. Muller, I. Kuznetsov, Y. Arbelo, M. Trottmann, C.S. Menoni, **J. J. Rocca**, G.R. Patzke, and D. Bleiner, "Depth-Profiling Microanalysis of CoNCN Water-Oxidation Catalyst Using a  $\lambda=46.9$  nm Plasma Laser for Nano-Ionization Mass Spectrometry," *Analytical Chemistry*, **90**, 9234-9240, (2018).
  20. B.A. Reagan, C. Baumgarten, E. Jankowska, H. Chi, H. Bravo, K. Dehne, M. Pedicone, L. Yin, H.C. Wang, C.S. Menoni, and **J. J. Rocca**, "Scaling Diode-Pumped, High Energy Picosecond Lasers to Kilowatt Average Powers," *High Power Laser Science and Engineering*, **6**, e11, (2018).
  21. A. Rockwood, Y. Wang, S. Wang, M. Berrill, V.N. Shlyaptsev, and **J. J. Rocca**, "Compact Gain-Saturated X-Ray Lasers Down to 6.85 nm and Amplification Down to 5.85 nm," *Optica*, **5**, 257-262, (2018).
  22. A. Rockwood, Y. Wang, S. Wang, V.N. Shlyaptsev, **J. J. Rocca**, and M. Berrill, "Compact Gain-Saturated X-Ray Lasers Down to 6.85 nm," *Optics & Photonics News*, **29**, 37, (2018).
  23. C. Bargsten, R. Hollinger, M.G. Capeluto, V. Kaymak, A. Pukhov, S.J. Wang, A. Rockwood, Y. Wang, D. Keiss, R. Tommasini, R. London, J. Park, M. Busquet, M. Klapisch, V.N. Shlyaptsev, and **J. J. Rocca**, "Energy Penetration into Arrays of Aligned Nanowires Irradiated with Relativistic Intensities: Scaling to Terabar Pressures," *Science Advances*, **3**, e1601558, (2017).
  24. E.A. Domene, D. Schiltz, D. Patel, T. Day, E. Jankowska, O.E. Martinez, **J. J. Rocca**, and C.S. Menoni, "Thin Film Absorption Characterization by Focus Error Thermal Lensing," *Review of Scientific Instruments*, **88**, 123104, (2017).
  25. T. Green, I. Kuznetsov, D. Willingham, B.E. Naes, G.C. Eiden, Z.H. Zhu, W. Chao, **J. J. Rocca**, C.S. Menoni, and A.M. Duffin, "Characterization of Extreme Ultraviolet Laser Ablation Mass Spectrometry for Actinide Trace Analysis and Nanoscale Isotopic Imaging," *Journal of Analytical Atomic Spectrometry*, **32**, 1092-1100, (2017).
  26. R. Hollinger, C. Bargsten, V.N. Shlyaptsev, V. Kaymak, A. Pukhov, M.G. Capeluto, S.J. Wang, A. Rockwood, Y. Wang, A. Townsend, A. Prieto, P. Stockton, A. Curtis, and **J. J. Rocca**, "Efficient

- Picosecond X-Ray Pulse Generation from Plasmas in the Radiation Dominated Regime," *Optica*, **4**, 1344-1349, (2017).
27. **J. J. Rocca**, V. Shlyaptsev, R. Hollinger, C. Bargsten, A. Pukhov, V. Kaymak, R. Tommasini, R. London, J. Park, and M.G. Capeluto, "Compact Ultra-Intense Lasers and Nanostructures Open a Path to Extreme Pressures," *Laser Focus World*, **53**, 21-26, (2017).
  28. D. Schiltz, D. Patel, C. Baumgarten, B.A. Reagan, **J. J. Rocca**, and C.S. Menoni, "Strategies to Increase Laser Damage Performance of Ta2O5/SiO2 Mirrors by Modifications of the Top Layer Design," *Applied Optics*, **56**, C136-C139, (2017).
  29. Y. Wang, S.J. Wang, A. Rockwood, B.M. Luther, R. Hollinger, A. Curtis, C. Calvi, C.S. Menoni, and **J. J. Rocca**, "0.85 PW Laser Operation at 3.3 Hz and High-Contrast Ultrahigh-Intensity Lambda = 400 nm Second-Harmonic Beamline," *Optics Letters*, **42**, 3828-3831, (2017).
  30. V. Aslanyan, I. Kuznetsov, H. Bravo, M.R. Woolston, A.K. Rossall, C.S. Menoni, **J. J. Rocca**, and G.J. Tallents, "Ablation and Transmission of Thin Solid Targets Irradiated by Intense Extreme Ultraviolet Laser Radiation," *Apl Photonics*, **1**, 066101, (2016).
  31. C. Baumgarten, M. Pedicone, H. Bravo, H.C. Wang, L. Yin, C.S. Menoni, **J. J. Rocca**, and B.A. Reagan, "1 J, 0.5 kHz Repetition Rate Picosecond Laser," *Optics Letters*, **41**, 3339-3342, (2016).
  32. V. Kaymak, A. Pukhov, V.N. Shlyaptsev, and **J. J. Rocca**, "Strong Ionisation in Carbon Nanowires," *Quantum Electronics*, **46**, 327, (2016).
  33. V. Kaymak, A. Pukhov, V.N. Shlyaptsev, and **J. J. Rocca**, "Nanoscale UltraDense Z-Pinch Formation from Laser-Irradiated Nanowire Arrays," *Physical Review Letters*, **117**, 035004, (2016).
  34. L. Yin, H.C. Wang, B.A. Reagan, C. Baumgarten, E. Gullikson, M. Berrill, V.N. Shlyaptsev, and **J. J. Rocca**, "6.7-nm Emission from Gd and Tb Plasmas over a Broad Range of Irradiation Parameters Using a Single Laser," *Physical Review Applied*, **6**, 034009, (2016).
  35. G. Avaria, M. Grisham, J. Li, F.G. Tomasel, V.N. Shlyaptsev, M. Busquet, M. Woolston, and **J. J. Rocca**, "Extreme Degree of Ionization in Homogenous Micro-Capillary Plasma Columns Heated by Ultrafast Current Pulses," *Physical Review Letters*, **114**, 095001, (2015).
  36. I. Kuznetsov, J. Filevich, F. Dong, M. Woolston, W.L. Chao, E.H. Anderson, E.R. Bernstein, D.C. Crick, **J. J. Rocca**, and C.S. Menoni, "Three-Dimensional Nanoscale Molecular Imaging by Extreme Ultraviolet Laser Ablation Mass Spectrometry," *Nature Communications*, **6**, 6944, (2015).
  37. J. Nejdil, I.D. Howlett, D. Carlton, E.H. Anderson, W. Chao, M.C. Marconi, **J. J. Rocca**, and C.S. Menoni, "Image Plane Holographic Microscopy With a Table-Top Soft X-Ray Laser," *Ieee Photonics Journal*, **7**, 6900108, (2015).
  38. E. Novakova, L. Vysin, T. Burian, L. Juha, M. Davidkova, V. Mucka, V. Cuba, M.E. Grisham, S. Heinbuch, and **J. J. Rocca**, "Breaking DNA Strands by Extreme-Ultraviolet Laser Pulses in Vacuum," *Physical Review E*, **91**, 042718, (2015).
  39. A.K. Rossall, V. Aslanyan, G.J. Tallents, I. Kuznetsov, **J. J. Rocca**, and C.S. Menoni, "Ablation of Submicrometer Holes Using an Extreme-Ultraviolet Laser," *Physical Review Applied*, **3**, 064013, (2015).
  40. P.F. Langston, E. Krous, D. Schiltz, D. Patel, L. Emmert, A. Markosyan, B. Reagan, K. Wernsing, Y. Xu, Z. Sun, R. Route, M.M. Fejer, **J. J. Rocca**, W. Rudolph, and C.S. Menoni, "Point Defects in Sc2O3 Thin Films by Ion Beam Sputtering," *Applied Optics*, **53**, A276-A280, (2014).
  41. C. Liberatore, K. Mann, M. Muller, L. Pina, L. Juha, L. Vysin, **J. J. Rocca**, A. Endo, and T. Mocek, "Short-Wavelength Ablation of Polymers in the High-Fluence Regime," *Physica Scripta*, **T161**, 014066, (2014).

42. B.A. Reagan, M. Berrill, K.A. Wernsing, C. Baumgarten, M. Woolston, and **J. J. Rocca**, "High-Average-Power, 100-Hz-Repetition-Rate, Tabletop Soft-X-Ray Lasers at Sub-15-nm Wavelengths," *Physical Review A*, **89**, 053820, (2014).
43. Y. Wang, S. Wang, E. Oliva, L. Li, M. Berrill, L. Yin, J. Nejdil, B.M. Luther, C. Proux, T.T.T. Le, J. Dunn, D. Ros, P. Zeitoun, and **J. J. Rocca**, "Gain Dynamics in a Soft-X-Ray Laser Amplifier Perturbed by a Strong Injected X-Ray Field," *Nature Photonics*, **8**, 381–384, (2014).
44. L. Li, Y. Wang, S.J. Wang, E. Oliva, L. Yin, T.T.T. Le, S. Daboussi, D. Ros, G. Maynard, S. Sebban, B.T. Hu, **J. J. Rocca**, and P. Zeitoun, "Wavefront Improvement in an Injection-Seeded Soft X-Ray Laser Based on a Solid-Target Plasma Amplifier," *Optics Letters*, **38**, 4011-4014, (2013).
45. M.A. Purvis, V.N. Shlyaptsev, R. Hollinger, C. Bargsten, A. Pukhov, A. Prieto, Y. Wang, B.M. Luther, L. Yin, S.J. Wang, and **J. J. Rocca**, "Relativistic Plasma NanoPhotonics for Ultrahigh Energy Density Physics," *Nature Photonics*, **7**, 796–800, (2013).
46. B.A. Reagan, W. Li, L. Urbanski, K.A. Wernsing, C. Salsbury, C. Baumgarten, M.C. Marconi, C.S. Menoni, and **J. J. Rocca**, "Hour-Long Continuous Operation of a Tabletop Soft X-Ray Laser at 50-100 Hz Repetition Rate," *Optics Express*, **21**, 28380-28386, (2013).
47. Y. Wang, L. Yin, S. Wang, M.C. Marconi, J. Dunn, E. Gullikson, and **J. J. Rocca**, "Single-Shot Soft X-Ray Laser Linewidth Measurement Using a Grating Interferometer," *Optics Letters*, **38**, 5004-5007, (2013).
48. C. Weninger, M. Purvis, D. Ryan, R.A. London, J.D. Bozek, C. Bostedt, A. Graf, G. Brown, **J. J. Rocca**, and N. Rohringer, "Stimulated Electronic X-Ray Raman Scattering," *Physical Review Letters*, **111**, 233902, (2013).
49. H. Bravo, B.T. Szapiro, P.W. Wachulak, M.C. Marconi, W.L. Chao, E.H. Anderson, C.S. Menoni, and **J. J. Rocca**, "Demonstration of Nanomachining With Focused Extreme Ultraviolet Laser Beams," *Ieee Journal of Selected Topics in Quantum Electronics*, **18**, 443 - 448, (2012).
50. F. Brizuela, I.D. Howlett, S. Carbajo, D. Peterson, A. Sakdinawat, Y.W. Liu, D.T. Attwood, M.C. Marconi, **J. J. Rocca**, and C.S. Menoni, "Imaging at the Nanoscale With Practical Table-Top EUV Laser-Based Full-Field Microscopes," *Ieee Journal of Selected Topics in Quantum Electronics*, **18**, 434 - 442, (2012).
51. S. Carbajo, I.D. Howlett, F. Brizuela, K.S. Buchanan, M.C. Marconi, W. Chao, E.H. Anderson, I. Artioukov, A. Vinogradov, **J. J. Rocca**, and C.S. Menoni, "Sequential Single-Shot Imaging of Nanoscale Dynamic Interactions with a Table-Top Soft X-Ray Laser," *Optics Letters*, **37**, 2994-2996, (2012).
52. B.A. Reagan, A.H. Curtis, K.A. Wernsing, F.J. Furch, B.M. Luther, and **J. J. Rocca**, "Development of High Energy Diode-Pumped Thick-Disk Yb:YAG Chirped-Pulse-Amplification Lasers," *Ieee Journal of Quantum Electronics*, **48**, 827 - 835, (2012).
53. B.A. Reagan, K.A. Wernsing, A.H. Curtis, F.J. Furch, B.M. Luther, D. Patel, C.S. Menoni, and **J. J. Rocca**, "Demonstration of a 100 Hz Repetition Rate Gain-Saturated Diode-Pumped Table-Top Soft X-Ray Laser," *Optics Letters*, **37**, 3624-3626, (2012).
54. N. Rohringer, D. Ryan, R.A. London, M. Purvis, F. Albert, J. Dunn, J.D. Bozek, C. Bostedt, A. Graf, R. Hill, S.P. Hau-Riege, and **J. J. Rocca**, "Atomic Inner-Shell X-Ray Laser at 1.46 Nanometres Pumped by an X-Ray Free-Electron Laser," *Nature*, **481**, 488–491, (2012).
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