CURRICULUM VITAE of JOHN ROBERT CARY **January 2019**

Professor
Department of Physics
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Education

Ph. D., Physics, University of California, Berkeley, 1979
(Thesis advisor - Prof. Allan N. Kaufman)
M.S., Physics, University of California, Berkeley, 1975
B.A. cum laude, Physics, University of California, Irvine, 1973
B.A. cum laude, Mathematics, University of California, Irvine, 1973

Employment History

8/96- Professor, Department of Physics, University of Colorado, Boulder, Colorado 80309-0390

2/94- CEO, Tech-X Corporation, Boulder, CO.

7/06-1/07 Director, Center for Integrated Plasma Studies, University of Colorado.

7/99-12/02, 7/06-1/07, 7/09-6/11 Director, Center for Integrated Plasma Studies, University of Colorado.

7/92-6/95 Chairman, Department of Astrophysical, Planetary, and Atmospheric Sciences, University of Colorado, Boulder, Colorado 80309-0391

8/84-6/96 Professor (Associate until 8/91), Department of Astrophysical, Planetary, and Atmospheric Sciences and Department of Physics, University of Colorado, Boulder, Colorado 80309-0391

9/80-8/84 Research Associate (80-83), then Research Scientist (83-84) Institute for Fusion Studies, University of Texas, Austin, Texas 78712

10/78-8/80 Staff Member, Intense Particle Beam Theory Group, Los Alamos National Laboratory, Los Alamos, New Mexico 87545

Professional Interests

Research: Plasma and accelerator physics, especially as analyzed by nonlinear dynamics and advanced computational methods (massively parallel, object oriented). Working on applications to accelerator lattices and instabilities, advanced acceleration concepts, transport in fusion plasma confinement systems, plasma turbulence.

Teaching: Bringing computational tools into the classroom at all levels, developing an understanding of phenomena from a nonlinear dynamics perspective, when appropriate, for upper-division and graduate courses.

Professional Societies

American Physical Society (Divisions of Plasma Physics, Physics of Beams, and Computational Physics)
IEEE
Society for Industrial and Applied Mathematics

Awards

Fellow, American Physical Society

Senior Member, IEEE

NPSS Charles K. Birdsall Award for Contributions to Computational Nuclear and Plasma Sciences (2016)

John Dawson Prize for Numerical Simulation of Plasmas - Lifetime (2015)

Scientific Discovery through Advanced Computation Award for Visualization (2011)

Scientific Discovery through Advanced Computation Award for Visualization (2008)

Buneman award for Best Still Visualization, International Conference on the Numerical Simulation of Plasmas (2007)

Boulder Faculty Assembly Award for Research and Creative Work 1994

Regent's Fellow 1975-1976

President's Scholar 1971-1973

Professional Service

Member, National Academy of Sciences Decadal Study

Chair, Division of Plasma Physics, American Physical Society

Associate Editor, Reviews of Modern Physics (2010-2015)

Member, Executive Committee, Division of the Physics of Beams, American Physical Society (2014-)

Member, Nominating Committee, Division of Physics of Beams, APS (2009-12)

Chair, Nominating Committee, Division of Plasma Physics, APS (2010-11)

Member, Executive Committee, Division of the Physics of Beams, American Physical Society (2008-2011)

Chair, Local Org Comm, International Sherwood Fusion Theory Conference (2008)

Chair, Computational Physics Subcommittee, Program Committee for the 2007 Annual Meeting of the Division of Plasma Physics of the American Physical Society

Executive Committee, International Sherwood Fusion Theory Conference (2003-2006)

Computational Accelerator Physics Working Group Leader, Advanced Accelerator Concepts Workshop (2004)

Member, Organizing Committee, Particle Accelerator Conference (2004-)

Member, Program Committee, Particle Accelerator Conference (2002-2004)

Associate Editor, Physical Review E (2000-2006)

Chair, Public Information Committee, Division of Plasma Physics, American Physical Society (2000-2003)

Chair, Publications Committee, Division of Plasma Physics, American Physical Society (1997-2000)

Associate Editor, Physical Review Letters (1993-96)

Associations with Other Institutes

1993 Lecturer, International Center for Theoretical Physics, Trieste, Italy

1992 Visiting Scientist, High Altitude Observatory, National Center for Atmospheric Research, Boulder, Colorado.

1991 Visiting Scientist, Fermi National Accelerator Laboratory, Batavia, Illinois.

Publicity for professional accomplishments

Arnold labels separatrix crossing as one of the 10 mathematical discoveries of the 1980's. See V. I. Arnold, "Geometric Methods in the Theory of Ordinary Differential Equations," 2nd Edition, Springer Verlag (1988), preface to the second edition.

Above results now part of dynamics text, "Regular and Chaotic Dynamics," by Lichtenberg and Lieberman, who devote a section (5.7) to this.

Nature paper highlighted as first item in press release of the Division of Plasma Physics. See http://www.aps.org/meet/DPP04/baps/vpr/.

Development of the VORPAL code for computational plasma physics gets cover story for the National Energy Research Supercomputer Center in 2004.

Nature work makes top story for LBL research news. http://www.lbl.gov/Science-Articles/Archive/AFRD-laser-wakefield.html

Silver & Gold Record, November 4, 2004, p. 8 highlighted our work on acceleration.

Photonics Spectra highlights our work on p.26 of the November 2004 issue. This can been seen online at http://www.photonics.com/spectra/news/XQ/ASP/pbullid.591/QX/read.htm.

Nature (Nature 432, 943 - 945 (23 December 2004); doi:10.1038/432943a) listed as one of the highlights of 2004 the work on compact accelerators, which we published in Nature in 2004.

VORPAL was one of two computational applications mentioned in the 2005 Report to the President, "Computational Science: Ensuring America's Competitiveness" (http://www.nitrd.gov/pitac/reports/20050609_computational/computational.pdf) by the President's Information Technology Advisory Committee.

First figure in the report, "Scientific Discovery through Advanced Computing: Progress and Opportunities," Department of Energy report Fig. 1, p. 4 (September, 2005).

Buneman award for Best Still Visualization, International Conference on the Numerical Simulation of Plasmas (Austin, TX, 2007) http://workshops.ph.utexas.edu/nsp/awards.php.

SciDAC Review Cover showing VORPAL generated data for article, "Large Fields for Smaller Facility Sources," http://www.scidacreview.org/0903/index.html.

Work on Laser Wake-Field Acceleration highlighted in the Physics 2010 Plasma Decadal Study of the National Research Council, p. 16 for visualization, pp. 99-102 for a more detailed description of the physics.

Course Development

Physics 1240, Sound and Music (1997): new lower-division course for nonscientists on the nature of sound and its perception

Physics 1230, Light and Color (1991): new lower-division course for nonscientists on the nature of light and its perception

APAS/Physics 4150, Plasma Physics (1989): new upper-division course on plasma physics for physical science majors. Covered applications include fusion, space science, and astrophysics

Recent Teaching

Fall 2012: Physics 7810 - Special topics: High Performance Computation with Applications to Plasma Physics

Fall 2006: Physics 1230 - Light and Color

Fall 2005: Intermediate Plasma Physics

Fall 2004: The Physics of Everyday Life

Fall 2002: Physics 5210 – Theoretical Mechanics

Ph. D. Theses Supervised

Adam Higuera, 2018 exp.

Carl Bauer, Physics, 2012, "A computational study of dielectric photonic-crystal-based accelerator cavities,"

Brent Goode, Physics, 2005, "Plasma Response to Waves in Arbitrary Magnetic Field Geometry"

Jinhyung Lee, Physics, 2004, "Cooling of Non-neutral Electron Plasma"

Kiran Sonnad, Physics, 2004. "Nonlinear Focusing in Particle Accelerators: An application and its associated dynamics"

Scott Hendrickson, Physics, 1996, "Design of Adiabatic Wigglers for Recirculating-Beam Free-Electron Lasers and Adiabatic Beam Bunchers"

Peter H. Stoltz, Physics, 1996, "Linear and Nonlinear Theory of Single Wave-Beam Interactions"

William E. Gabella, Physics, 1991, "Numerical Solution of the Hamilton-Jacobi Equation in $2\frac{1}{2}$ Degrees of Freedom"

David Leslie Bruhwiler, APAS, 1990, "Scattering and Diffusion of Particles in Slowly Varying, Large-Amplitude Waves"

Petre Rusu, Physics, 1990, "Quantum Dynamics near a Classical Separatrix"

Master's Advisor for

Brendan Field Jonathan Regele Viktor Przebinda

Postdoc supervisor of

Carson Chow, Weishi Wan, Chet Nieter, Rodolfo Giacone, Greg Werner, Nong Xiang

Recent University Service

2005-: Chancellor's Committee on Conflict of Interest

2004-: Department of Physics Library Committee (chair), Tech Transfer, Undergraduate.

2003: Boulder Faculty Assembly Research and Creative Work Awards Committee

1997-2001: Area Teaching Scholars Mentor

PUBLICATIONS of JOHN ROBERT CARY

A. Refereed Journal Articles

1. Werner, Gregory R., et al. "Speeding up simulations by slowing down particles: Speed-limited particle-in-cell simulation." Physics of Plasmas 25.12 (2018): 123512.
2. Manahan, G.G., Habib, A.F., Scherkl, P., Delinikolas, P., Beaton, A., Knetsch, A., Karger, O., Wittig, G., Heinemann, T., Sheng, Z.M. Cary, J.R., Single-stage plasma-based correlated energy spread compensation for ultrahigh 6D brightness electron beams. "Single-stage plasma-based correlated energy spread compensation for ultrahigh 6D brightness electron beams." Nature Communications, 8, 15705 (2017), http://dx.doi.org/10.1038/ncomms15705.
3. Adam V. Higuera and John R. Cary. "Structure-preserving second-order integration of relativistic charged particle trajectories in electromagnetic fields." Physics of Plasmas 24.5 (2017): 052104, http://dx.doi.org/10.1063/1.4979989.
4. JR Cary, DT Abell, GI Bell. BM Cowan, JR King, D Meiser, IV Pogorelov, GR Werner, "Select Advances in Computational Accelerator Physics", IEEE Trans. Nucl Science **63**, 823 (2016), DOI: 10.1109/TNS.2015.2500686.
5. K. G. Sonnad and J. R. Cary, "Near equilibrium distributions for beams with space charge in linear and nonlinear periodic focusing systems," Phys. Plasmas 22, 043120 (2015); http://dx.doi.org/10.1063/1.4919033.
6. D. A. Dimitrov, D. Smithe, J. R. Cary, I. Ben-Zvi, T. Rao, J. Smedley, E. Wang, "Modeling Electron Emission and Surface Effects from Diamond Cathodes", Journal of Applied Physics 02/2015 117(5):055708.
7. B. Sheehan, D. Estep, S. Tavener, J. Cary, S. Kruger, A. Hakim, A. Pletzer, J. Carlsson, and S. Vadlamani, "The Interaction of Iteration Error and Stability for Linear Partial Differential Equations Coupled through an Interface", Advances in Mathematical Physics, Volume 2015 (2015), Article ID 787198, http://dx.doi.org/10.1155/2015/787198.
8. E. Cormier-Michel, V.H. Ranjbar, D.L. Bruhwiler, J.R. Cary, M. Chen, C.G.R. Geddes, G. R. Plateau, N. H. Matlis, and W.P. Leemans, "Design principles for high quality electron beams via colliding pulses in laser plasma accelerators," Phys. Rev. ST/AB **17**, 091301 (2014).
9. T.M. Austin, J.R. Cary, D.N. Smithe, C. Nieter, "Alternating Direction Implicit Methods for FDTD Using the Dey-Mittra Embedded Boundary Method", The Open Plasma Physics Journal, Vol. 3, pp. 29-35, 2014.
10. Carl A. Bauer, Gregory R. Werner, John R. Cary, "Origin and reduction of wakefields in photonic crystal accelerator cavities", Phys. Rev. ST Accel. Beams 17, 051301 (2014).

11. Gregory R. Werner, Carl A. Bauer, John R. Cary, "A More Accurate, Stable, FDTD Algorithm for Electromagnetics in Anisotropic Dielectrics," J. Comput. Phys. **255**, (2013) pp 436-455; http://arxiv.org/pdf/1212.4857.

12. Carl A. Bauer, Gregory R. Werner, John R. Cary, "A fast multigrid-based electromagnetic eigensolver for curved metal boundaries on the Yee mesh," J. Comput. Phys., (2013), pp. 524-534, DOI: 10.1016/j.jcp.2013.06.002.

13. Benjamin M. Cowan, David L. Bruhwiler, John R. Cary, Cameron Geddes, "Generalized algorithm for control of numerical dispersion in explicit time-domain electromagnetic simulations," Phys. Rev. ST Accel. Beams **16**, 041303 (2013).

14. A. H. Hakim, T. D. Rognlien, R. J. Groebner, J. Carlsson, J. R. Cary, S. E. Kruger, M. Miah, A. Pankin, A. Pletzer, S. Shasharina, S. Vadlamani, R. Cohen, and T. Epperly, "Coupled core-edge simulations of H-mode buildup using the Fusion Application for Core-Edge Transport Simulations (FACETS) code," Phys. Plasmas 19, 032505 (2012); http://dx.doi.org/10.1063/1.3693148.

15. D Dimitrov, R Busby, J Cary, I Ben-Zvi, T Rao, J Smedley, X Chang, J Keister, Q Wu, E Muller, "Multiscale 3D Simulations of Charge Gain and Transport in Diamond," J Appl Phys, vol. 108, no. 7, (2011) 60093707.

16. N. Xiang and JR Cary, "Decays of electron Bernstein waves near plasma edge," Phys. Plasmas 18, 122107 (2011); http://dx.doi.org/10.1063/1.3662102.

17. A.Y. Pankin, A. Pletzer, S. Vadlamani, J.R. Cary, A. Hakim, S.E. Kruger, M. Miah, T.D. Rognlien, S. Shasharina, G. Bateman, A.H. Kritz, T. Rafiqa, and the FACETS team, "Simulation of anomalous transport in tokamaks using the FACETS code", Computer Physics Communications **182** (1) (2011) 180-184.

18. T. M. Austin, J. R. Cary, S. Ovtchinnikov, G. R. Werner, and L. Bellantoni, "Validation of frequency extraction calculations from time-domain simulations of accelerator cavities," Comput. Sci. Disc. 4 015004 doi: 10.1088/1749-4699/4/1/015004 (2011).

19. E. Cormier-Michel, E. Esarey, C. G. R. Geddes, C. B. Schroeder, K. Paul, P. J. Mullowney, J. R. Cary, and W. P. Leemans, "Control of focusing fields in laser-plasma accelerators using higher-order modes," Phys. Rev. ST Accel. Beams 14, 031303 (2011).

20. C. A. Bauer, G. R Werner, and J. R. Cary, "A second-order 3D electromagnetics algorithm for curved interfaces between anisotropic dielectrics on a Yee mesh," J. Comput. Phys. **230**, 2060-2075 (2011), doi:10.1016/j.jcp.2010.12.005.

21. Baifei Shen, Xiaomei Zhang, Zhengming Sheng, MY Yu, J Cary, "High-quality monoenergetic proton generation by sequential radiation pressure and bubble acceleration", Physical Review Special Topics-Accelerators and Beams **12** (12), 121301 (2009).

22. J. R. Cary and A. J. Brizard, "Hamiltonian Theory of Guiding-Center Motion," Rev. Mod. Phys. 81, 693 (2009); DOI:10.1103/RevModPhys.81.693.

23. K. H. Pae, I. W. Choi, S. J. Hahn, J. R. Cary, and J. Lee, "Proposed hole-target for improving maximum proton energy driven by a short intense laser pulse", Phys. Plasma, 16, 073106 (2009); DOI: 10.1063/1.3174434.

24. Nasr A.M. Hafz, Tae-Moon Jeong, Seong-Ku Lee, Il-Woo Choi, Ki-Hong Pae, Victor V. Kulagin, Jae-Hee Sung, Tae-Jun Yu, John R. Cary, Do-Kyeong Ko, and Jong-Min Lee, "Laser Acceleration of Electron Beams to the GeV-class Energies in Gas Jets," Journal of the Optical Society of Korea Vol. 13, Issue 1, pp. 8-14 (2009);

25. D. N. Smithe, J. R. Cary, and J. A. Carlsson, "Divergence preservation in the ADI algorithms for electromagnetics," J. Comput. Phys. 228, 7289 (2009); doi: 10.1016/j.jcp.2009.06.025.

26. C. Nieter, J. R. Cary, G. R. Werner, D. N. Smithe, and P. H. Stoltz, "Application of Dey-Mittra conformal boundary algorithm to 3D electromagnetic modeling." J. Comp. Phys. 228, 7902 (2009); 10.1016/j.jcp.2009.07.025.

27. G. R Werner, C. A. Bauer, and J. R. Cary, "Wakefields in Photonic Crystal Cavities," Phys. Rev. ST/AB **12**, 071301 (2009); DOI: 10.1103/PhysRevSTAB.12.071301.

28. Paolo Tomassini, A Bacci, J Cary, M Ferrario, A Giulietti, Danilo Giulietti, LA Gizzi, Luca Labate, L Serafini, Vittoria Petrillo, C Vaccarezza, "Linear and nonlinear Thomson scattering for advanced X-ray sources in PLASMONX", IEEE Trans. Plasma Science **36** (4), 1782 (2008).

29. Liangliang Ji, Baifei Shen, Xiaomei Zhang, Fengchao Wang, Zhangyin Jin, Xuemei Li, Meng Wen, and John R. Cary, "Efficient generation of mono-energetic heavy ion bunches with laser induced electrostatic shock," Phys. Rev. Lett. **101**, 164802 (2008); DOI: 10.1103/PhysRevLett.101.164802.

30. C M Roach, M Walters, R V Budny, F Imbeaux, T W Fredian, M Greenwald, J A Stillerman, D A Alexander, J Carlsson, J R Cary, F Ryter, J Stober, P Gohil, C Greenfield, M Murakami, G Bracco, B Esposito, M Romanelli, V Parail, P Stubberfield, I Voitsekhovitch, C Brickley, A R Field, Y Sakamoto, T Fujita, T Fukuda, N Hayashi, G M D Hogeweij, A Chudnovskiy, N A Kinerva, C E Kessel, T Aniel, G T Hoang, J Ongena, E J Doyle, W A Houlberg, A R Polevoi, "The 2008 Public Release of the International Multi-tokamak Confinement Profile Database," Nuclear Fusion **48** (2008) 125001.

31. C. A. Bauer, G. R. Werner, and J. R. Cary, "Truncated photonic crystal cavities with optimized mode confinement," J. Appl. Phys. **4** (105), 053107 (2008); DOI:10.1063/1.2973669.

32. N. Hafz, T. M. Jeong, I. W. Choi, S. K. Lee, K. H. Pae, V. Kulagin, J. H. Sung, T. J. Yu1, K.-H. Hong, H. T. Kim, T. Hosokai, J. Cary, Y.-C. Noh, D.-K. Ko, and J. Lee, "Stable generation of GeV-class electron beams from self-guided laser–plasma channels," Nature Photonics **2**, 571 (2008).

33. C.G.R. Geddes, K. Nakamura, G.R. Plateau, Cs. Toth, E. Cormier-Michel, E. Esarey, C.B. Schroeder, J.R. Cary, and W.P. Leemans, "Plasma density gradient injection of low absolute momentum spread electron bunches," Phys. Rev. Lett. **100**, 215004 (2008).

34. G. R. Werner and J. R. Cary, "Extracting Degenerate Modes and Frequencies from Time Domain Simulations," J. Comp. Phys. 227, 5200-5214 (2008), http://dx.doi.org/10.1016/j.jcp.2008.01.040.

35. Karoly Nemeth, Baifei Shen, Yuelin Li, Robert Crowell, Katherine C. Harkay, and John R. Cary, "Laser driven coherent betatron oscillation in a laser-wakefield cavity," Phys. Rev. Lett. **100**, 095002 (2008), doi:10.1103/PhysRevLett.100.095002, http://link.aps.org/abstract/PRL/v100/e095002.

36. N. Xiang and J. R. Cary, "Second harmonic generation of electron Bernstein waves in an inhomogeneous plasma," Phys. Rev. Lett., **100**, 085002 (2008); doi:10.1103/PhysRevLett.100.085002; http://link.aps.org/abstract/PRL/v100/e085002.

37. J. R. Cary and N. Xiang, "Wave excitation in inhomogeneous dielectric media," Phys. Rev. E **76**, 055401(R) (2007), http://link.aps.org/doi/10.1103/PhysRevE.76.055401.

38. Baifei Shen, Yuelin Li, M. Y. Yu, and John Cary, "Bubble regime for ion acceleration in a laser driven plasma," Phys. Rev. E **76**, 055402 (2007).

39. I. Doxas, C. Nieter, D. C. Radford, K. Lagergren, John R. Cary, "An Approximate Method for Linear Signal Decomposition in Gamma-ray Tracking Detectors," Nuc. Inst. Meth. **580**, 1331-1337 (2007).

40. G. R. Werner and J. R. Cary, "A Stable FDTD Algorithm for Non-diagonal, Anisotropic Dielectrics," J. Comp. Phys. **226,** 1085-1101 (2007), doi:10.1016/j.jcp.2007.05.008.

41. Baifei Shen, Yuelin Li, Karoly Nemeth, Hairong Shang, Robert Soliday, Robert Crowell, Edward Frank, William Gropp, and John Cary, "Triggering wave breaking in a laser plasma bubble by a nanowire," Phys. Plasmas **14**, 053115 (2007).

42. D. A. Dimitrov, D. L. Bruhwiler, J. R. Cary, C. G. R. Geddes, R. E. Giacone, E. Esarey and W. P. Leemans, "Particle-in-cell Simulations of Laser Pulse Propagation in Plasma Channels," Phys. Plasmas, **14**, 043105 (2007).

43. N. Xiang, J. R. Cary, D. C. Barnes, and J. A. Carlsson, "Low-noise electromagnetic δf particle-in-cell simulation of electron Bernstein waves," Phys. Plasma **13**, 062111 (2006).

44. A. V. Fedotov, D. L. Bruhwiler, A. O Sidorin, D. T. Abell, I. Ben-Zvi, R. Busby, J. R. Cary, and V. N. Litvinenko, "Numerical Study of the Magnetized Friction Force," Phys. Rev. ST/AB **9**, 074401 (2006).

45. C. G. R. Geddes, Cs. Toth, J. van Tilborg, E. Esarey, C. B. Schroeder, J. Cary, and W. P. Leemans, “Guiding of relativistic laser pulses by preformed plasma channels,” Phys. Rev. Lett. **95**, 145002 (2005).

46. K. Sonnad and J. R. Cary, "Control of beam halo formation through nonlinear damping and collimation," Phys. Rev. ST/AB **8**, 064202 (2005).

47. C. G. R. Geddes, Cs. Tóth, J. van Tilborg, E. Esarey, C. B. Schroeder, D. Bruhwiler, C. Nieter, J. Cary, and W. P. Leemans, “Production of high-quality electron bunches by dephasing and beam loading in channeled and unchanneled laser plasma accelerators,” Phys. Plasmas **12** (5), 056709 (2005).

48. J. R. Cary, R. Giacone, C. Nieter, D. L. Bruhwiler, “Clean beams from optical injection with a cleanup pulse,” Phys. Plasmas **12** (5), 056704 (2005).

49. J. Lee and J. R. Cary, "Longitudinal Cooling of Non neutral Plasma by Energy Exchange," Phys. Rev E **71**, 036406 (2005).

50. D. E. Post, D. B. Batchelor, R. B. Bramley, J. R. Cary, R. H. Cohen, P. Colella, S. C. Jardin, "Report of the Fusion Simulation Project Steering Committee," J. Fusion Energy **23** (1), 1 (2004 journal date but published and © 2005).

51. S. Shasharina, R. Eger, J. Cary, “Data Grid for Fusion Simulations and Experiments,” Comp. Phys. Comm. **164** (1-3), 134-137 (2004).

52. S. Shasharina, R. Eger, J. Cary, “FarSight: Application for Remote Visualization,” Comp. Phys. Comm. **164** (1-3), 402-407 (2004).

53. Ireneuz Szczesniak and John R. Cary, “**`dxhdf5`**: A Software Package for Importing HDF5 Physics Data into OpenDX,” Comp. Phys. Comm. **164** (1-3), 365-369 (2004).

54. Dimitre A. Dimitrov, Richard Busby, John Exby, David L. Bruhwiler and John R. Cary, "Secure Web-based invocation of Large-Scale Plasma Simulation Codes," Comp. Phys. Comm. **164** (1-3), 464-467 (2004).

55. C. G. R. Geddes, Cs. Toth, J. van Tilborg, E. Esarey, C. B. Schroeder, D. Bruhwiler, C. Nieter, J. Cary, and W. P. Leemans, “High-quality electron beams from a laser wakefield accelerator using plasma-channel guiding,” Nature **431**, 538-541 (Sep. 2004).

56. K. Sonnad and J. R. Cary, "Finding a nonlinear lattice with improved integrability using Lie transform perturbation theory," Phys. Rev. E. **69**, 056501 (2004).

57. C. Nieter and J. R. Cary, "VORPAL: a versatile plasma simulation code", J. Comp. Phys. **196**, 448-472 (2004).

58. G. Penn, P. H. Stoltz, J. R. Cary and J. Wurtele, “Boris push with spatial stepping,” J. Phys. G: Nucl. Part. Phys. 29 1719-1722 (2003).

59. David L. Bruhwiler, D. A. Dimitrov, John R. Cary, Eric Esarey, Wim Leemans and Rodolfo E. Giacone, “Particle-in-cell simulations of tunneling ionization effects in plasma-based accelerators,” Phys. Plasmas 10 (2003), p. 2022.

60. P. H. Stoltz, J. R. Cary, G. Penn, and J. Wurtele, "Efficiency of a Boris-like integration scheme with spatial stepping," Phys. Rev. ST/AB **5**, 094001 (2002).

61. D. L. Bruhwiler, R. Giacone, J. R. Cary, J. P. Verboncoeur, P. Mardahl, E. Esarey and W. P. Leemans, "Particle-in-Cell Simulations of Plasma Accelerators and Electron-Neutral Collisions," Phys. Rev. ST/AB **4**, 101032 (2001).

62. W. Wan and J. R. Cary, "Finding Four Dimensional Symplectic Maps with Reduced Chaos," Phys. Rev. ST/AB **4**, 084001 (2001).

63. B. Goode, J.R. Cary, I. Doxas, and W. Horton, "Differentiating between colored random noise and deterministic chaos," J. Geophys. Res. **104**, 21289 (2001).

64. M. Murakami, G.R. McKee, G.L. Jackson, G.M. Staebler, D.A. Alexander, D.R. Baker, G. Bateman, L.R. Baylor, J.A. Boedo, N.H. Brooks, K.H. Burrell, J.R. Cary, R.H. Cohen, R.J. Colchin, J.C. DeBoo, E.J. Doyle, D.R. Ernst, T.E. Evans, C. Fenzi, C.M. Greenfield, D.E. Greenwood, R.J. Groebner, J.T. Hogan, W.A. Houlberg, A.W. Hyatt, R. Jayakumar, T.C. Jernigan, R.A. Jong, J.E. Kinsey, A.H. Kritz, R.J. La Haye, L.L. Lao, C.J. Lasnier, M.A. Makowski, J. Mandrekas, A.M. Messiaen, R.A. Moyer, J. Ongena, A. Pankin, T.W. Petrie, C.C. Petty, C.L. Rettig, T.L. Rhodes, B.W. Rice, D.W. Ross, J.C. Rost, S.G. Shasharina, H.E. St. John, W.M. Stacey, P.I. Strand, R.D. Sydora, T.S. Taylor, D.M. Thomas, M.R. Wade, R.E. Waltz, W.P. West, K.L. Wong, L. Zeng, DIII-D Team, "Physics of confinement improvement of plasmas with impurity injection in DIII-D," Nuclear Fusion **41**, 317-323 (2001).

65. P. H. Stoltz and J. R. Cary, "Nonlinear theory of beam bunching and deceleration due to cavity damping," Physics of Plasma **7** (1), 231-242 (2000).

66. W. Horton, J. P. Smith, R. Weigel, C. Crabtree, I. Doxas, B. Goode, and J. R. Cary, "The solar–wind driven magnetosphere–ionosphere as a complex dynamical system," Phys. Plasmas **6**, 4178 (1999).

67. David L. Bruhwiler, Svetlana G. Shasharina and John R. Cary, "The OptSolve++ Software Components for Nonlinear Optimization and Root Finding," Computing in Object Oriented Parallel Environments, Lecture Notes in Computer Science 1732, 154-163 (1999).

68. Weishi Wan and John R. Cary, "Increasing the dynamic aperture of accelerator lattices," Phys. Rev. Lett. **81**, 3655 (1998).

69. John R. Cary and David A. Alexander, "Reusable Java Components for Physics Education," Computers in Physics **12** (4), 314-318 (1998).

70. P. H. Stoltz and J. R. Cary, "General linear theory of damped, beam-driven oscillations of a single mode," Physics of Plasmas **5** (11) 4084 (1998).

71. John R. Cary and Svetlana G. Shasharina, "Omnigenous Stellarators," Plasma Phys. Reps. **23** (6) 509-511 (1997).

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179. D. A. Dimitrov, R. Busby, J. Exby, D. L. Bruhwiler, and J. R. Cary, "Web Service Model for Plasma Simulations with Automatic Visual Diagnostics Generation," 18th International Conference on Numerical Simulation of Plasmas (Cape Cod, MA, 2003) in press.

180. D.L. Bruhwiler, R. Giacone, J.R. Cary, J.P. Verboncoeur, P. Mardahl, E. Esarey and W. Leemans, "Modeling Beam-Driven and Laser-Driven Plasma Wakefield Accelerators with XOOPIC," in Advanced Accelerator Concepts, AIP Conf. Proc., Vol. 569, ed. P.L. Colestock and S. Kelley (AIP, Melville, NY, 2001), pp. 591-604.

C. Books or Chapters in Books

John R. Cary, "Searching for Integrable Systems," in Statistical Physics and Chaos in Fusion Plasmas, C.W. Horton and L. Reichl, eds. (Wiley and Sons, 1984) pp. 51-56.

D. Invited Talks

JR Cary, "Integrated core-edge-wall simulations," 2013 Plasma Edge Theory Meeting, (Stateline, NV, 2011).

JR Cary, "Computations in Plasma Physics," Seminar, Academia Sinica Institute for Plasma Physics, (Hefei, Nov, 2011).

JR Cary, “FDTD EM computations for accelerator physics,” 2011 meeting, Scientific Discovery through Advanced Computation,

J. R. Cary for the FACETS Team, “The FACETS Project,” Theory Seminar, Princeton Plasma Physics Laboratory, Dec. 2008.

J. R. Cary, “Scientific Discovery by High-Performance Computation: Applications to Plasma Physics and Photonics,” Colloquium, Dept. Physics, U. Colorado (Jan. 21, 2009, Boulder, CO).

J.R. Cary, “Photonic Crystal Cavities with Reduced Wakefields,” X-Band RF Structure and Beam Dynamics Workshop - 44th ICFA Advanced Beam Dynamics Workshop (Daresbury, England, Dec. 3, 2008).

J.R. Cary, “Cavity Performance using High-Performance Computation,” Seminar, (Oak Ridge National Laboratory, Oct. 22, 2008).

J. R. Cary, “Scientific Discovery by High-Performance Computation: Applications to Plasma Physics and Photonics,” Colloquium, Dept. Physics, Lehigh University (Sep. 25, 2008, Bethlehem, PA).

J. R. Cary for the FACETS Team, “FACETS approach to multiscale,” US-Japan Workshop on Multiscale (Nov. 21, 2008, Dallas, TX).

J. R. Cary for the FACETS Team, “The FACETS Project: simulating plasma transport from core to wall,” General Atomics (Aug. 6, 2008).

J. R. Cary, “ASCR role and the FSP,” ASCAC FSP Workshop, (Apr. 30, 2008, Boulder, CO)

J. R. Cary, “EBW harmonic generation in heating and current drive,” Ann. Meeting of the Division of Plasma Physics JI1.00006 (Orlando, FL, 2007).

J. R. Cary et al, “Subspace method for extracting complex frequencies and corresponding eigenmodes,” International Conf. on the Numerical Simulation of Plasmas (Austin, TX, 2007).

J. R. Cary et al, “Electromagnetic modeling with complex boundaries and dielectrics,” Applied Math Colloquium (University of Colorado, Boulder, October 2007).

J. R. Cary, “EM Computations with Embedded Boundaries (cut cells),” COMPASS Collaboration Meeting (Fermilab, Sep 2007).

J. R. Cary, “Second harmonic generation in EBW heating and current drive,” Festschrift in honor of Allan Kaufman (Berkeley, October 2007).

J. R. Cary for the FACETS Team, “FACETS: Framework Application for Core-Edge Transport Simulations,” ITER Integrated Modeling Workshop on Component Interfaces (Cadarache, FRANCE, Sep 2007).

J. R. Cary, “FACETS: Framework Application for Core-Edge Transport Simulations,” SciDAC Conference (Boston, June 26, 2007).

J. R. Cary for the FACETS Team, "FACETS: Framework Application for Core-Edge Transport Simulations," Plasma Science Advanced Computing Institute (PSACI) Program Advisory Committee Meeting (Princeton Plasma Physics Lab, June 2007).

J. R. Cary, J. A. Carlsson, "Block Hypersecant (Quasi-Newton) Solver," 12th ITPA Confinement Database & Modeling Workshop (Lausanne, May 2007).

J. R. Cary for the FACETS Team, "FACETS: Framework Application for Core-Edge Transport Simulations," CPES Collaboration Meeting (Las Vegas, April 2007).

J. R. Cary, "Training for Careers at the National Laboratories and Industry" SIAM (Costa Mesa, Feb 2007).

J. R. Cary, "Careers at the National Laboratories and Industry," SIAM (Costa Mesa, Feb 2007).

J. R. Cary for the FACETS Team, " The FACETS Project," SciDAC PIs meeting (Atlanta, Feb 2007).

J. R. Cary for the FACETS Team, "FACETS: Framework Application for Core-Edge Transport Simulations," US-Japan Workshop on the Integrated Simulation of Fusion Plasmas (Oak Ridge, Jan 2007).

J. R. Cary "High-Performance Self-Consistent Electromagnetic Modeling of Beams," Inter. Comp. Accel. Phys. Conf. paper MOAPMP02 (Chamonix, 2006).

J. R. Cary, "Computation Accelerator Physics," APS Four Corners Meeting (Logan, UT, 2006).

J. R. Cary, "Advances in electromagnetic modeling", Advanced Accelerator Concepts Workshop (Lake Geneva, WI, 2006).

J. R. Cary, "Advances in electromagnetic modeling: advanced algorithms, self-consistency, and parallelism," Beam Physics and CASA Seminars, (Thomas Jefferson National Accelerator Facility, 2006).

"Optical injection into laser wake field accelerators", Colloquium, Nevada Terawatt Facility (Reno, Nov. 10, 2005).

"Advances in Self-Consistent Accelerator modeling: status report", Accelerator Department Seminar (Fermi National Accelerator Laboratory, Dec, 2005).

"Flexibility in the development of computational applications: VORPAL", L'Ecole Polytechnique (Paris, Sep. 2, 2005).

"Flexibility in the development of computational applications: Vorpal", The Future of Integrated Modeling (Princeton Plasma Physics Lab, July 19-20, 2005).

J. R. Cary, C. Nieter, D. L. Bruhwiler, R. Giacone, E. H. Esarey, W. P. Leemans, C. G. R. Geddes, "Optical injection into laser wake field accelerators," paper TOPA003, Particle Accelerator Conference (Knoxville, TN, 2005).

C.G.R. Geddes, E. Esarey, C.B. Schroeder, Cs. Toth, J Van Tilborg, W.P. Leemans, J. R. Cary, and C. Nieter, "Mono-energetic beams from laser-plasma interactions," paper TOPA001, Particle Accelerator Conference (Knoxville, TN, 2005).

Kiran G. Sonnad and John R. Cary, "Halo mitigation using nonlinear lattices," paper ROPB008, Particle Accelerator Conference (Knoxville, TN, 2005).

"Multiple scales in laser wake field acceleration," Conference on Multiscale Processes in Fusion Plasmas (UCLA, 2005).

"Computational Challenges in Accelerator Physics", 2004 Annual Meeting of the Division of Particles and Fields, (Riverside, CA, 2004).

"Formation of clean single beams through Optical Injection in a Plasma Channel", 2004 Annual Meeting of the Division of Plasma Physics, Bull. Am. Phys. Soc. 49 (8), 176 (2004).

"Reduction of Chaos in Hamiltonian Systems", conference on Hamiltonian Systems, Control and Plasma Physics (Frejus, France, October 2004).

"Computational Accelerator Physics Working Group Summary", Advanced Accelerator Concepts Workshop, June 2004.

"Quality beams for advanced accelerators through colliding pulse injection," presented at Princeton Plasma Physics Lab, December 2000.

"Quality beams for advanced accelerators through colliding pulse injection," presented at Lawrence Berkeley National Lab, June 2000.

E. Non–refereed Conference Proceedings

Higuera, Adam, and John Cary. "Integrating the Lorentz Force Law for Highly-Relativistic Particle-in-Cell Simulations." 9th Int. Particle Accelerator Conf.(IPAC'18), Vancouver, BC, Canada, April 29-May 4, 2018. JACOW Publishing, Geneva, Switzerland, 2018.

Cary, John, Arturo Dominguez, and Michael Mauel. "Foreword to Special Issue: Papers from the 59th Annual Meeting of the APS Division of Plasma Physics, October 23–27, 2017, Milwaukee, Wisconsin, USA." (2018): 055301.

Higuera A, Weichmann K, Cowan BM, Cary JR,. "Mitigating Particle Integration Error in Relativistic Laser-Plasma Simulations." 17th Advanced Accelerator Concepts Workshop (17th Advanced Accelerator Concepts Workshop, July 31, 2016-August 05, 2016), August 02, 2016

Werner GR, Cary JR. "SPEED-LIMITED PARTICLE-IN-CELL (SLPIC) METHOD." 43rd IEEE International Conference on Plasma Science (ICOPS) (43rd IEEE International Conference on Plasma Science (ICOPS), June 19, 2016-June 23, 2016): IEEE, January 01, 2016

Jenkins, Thomas G., John R. Cary, Bradley D. Davidson, Scott E. Kruger, James M. McGugan, Alexei Y. Pankin, Christine M. Roark, David N. Smithe, and Peter H. Stoltz. "Modeling plasma chemistry, sputtering, and RF sheath effects in low-temperature and fusion plasmas." In Plasma Science (ICOPS), 2016 IEEE International Conference on, pp. 1-1. IEEE, 2016.

Estelle Cormier-Michel, David L. Bruhwiler, Eric J. Hallman, Benjamin M. Cowan, John R. Cary, Cameron G. R. Geddes, Jean-Luc Vay, Eric Esarey, Carl B. Schroeder, and Wim P. Leemans, "Low noise particle-in-cell simulations of 10 GeV laser-plasma accelerator stages," AIP Conf. Proc. Volume number 1507, ISBN 978-0-7354-1125-8, p 369.

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S.D. Webb, D.T. Abell, D.L. Bruhwiler, J.R. Cary, V.V. Danilov, A.P. Shishlo, S. Nagaitsev, A. Valishev, "Simulating High-Intensity Proton Beams in Nonlinear Lattices with PyORBIT", 2012 International Particle Accelerator Conference (Shagnhai, 2012) paper WEPPR012.

D.A. Dimitrov, R. Busby, J.R. Cary, D.N. Smithe, I. Ben-Zvi, X. Chang, T. Rao, J. Smedley, Q. Wu, "Simulations of Surface Effects and Electron Emission from Diamond-Amplifier Cathodes," 2011 International Particle Accelerator Conference (San Sebastian, 2011) paper WEPC132.

C.G.R. Geddes, M. Chen, E. Esarey, W. Leemans, N.H. Matlis, D.E. Mittelberger, K. Nakamura, G.R.D. Plateau, C.B. Schroeder, C. Toth (Tóth), D.L. Bruhwiler, J.R. Cary, E. Cormier-Michel, B.M. Cowan, "Colliding Pulse Injection Control in a Laser-Plasma Accelerator," 2011 Particle Accelerator Conference (NY, 2011) paper MOP123.

D.A. Dimitrov, R. Busby, J.R. Cary, D.N. Smithe, I. Ben-Zvi, X. Chang, T. Rao, J. Smedley, Q. Wu, "Modeling and Simulations of Electron Emission from Diamond-Amplified Cathodes," 2011 Particle Accelerator Conference (NY, 2011) paper WEP161.

P. Lebrun, P. Spentzouris, J.R. Cary, P. Stolz, S.A. Veitzer, "Accurate Simulation of the Electron Cloud in the Fermilab Main Injector with VORPAL," 2011 Particle Accelerator Conference (NY, 2011) paper WEP112.

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Paul L. G. Lebrun, Panagiotis Spentzouris, "Accurate Simulation of the Electron Cloud in the Fermilab Main Injector with VORPAL", paper tup015, Proceedings of IPAC'10, Kyoto, Japan.

S.G. Shasharina, D. Alexander, J.R. Cary, M.A. Durant, S.E. Kruger, S.A. Veitzer, “VizSchema - a Unified Visualization of Computational Accelerator Physics Data,” paper tupec069, Proceedings of IPAC’10, Kyoto, Japan.

David L. Bruhwiler, John R. Cary, Benjamin M. Cowan, Kevin Paul, Cameron G. R. Geddes, Paul J. Mullowney, Peter Messmer, Eric Esarey, Estelle Cormier-Michel, Wim Leemans, and Jean-Luc Vay, "New Developments in the Simulation of Advanced Accelerator Concepts," AIP Conf. Proc. Volume 1086, pp. 29-37 Proceedings of the Thirteenth Advanced Accelerator Concepts Workshop; doi:10.1063/1.3080922

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S. Mahalingam, J.R. Cary, P.H. Stoltz, S.A. Veitzer, “Modeling Breakdown In Rf Cavities Using Particle-In-Cell (PIC) Codes,” Proc. European Particle Accel. Conf. (Genoa, Itally, 2008) paper WEPP111.

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I. Ben-Zvi**, J. Alduino, D. Barton, D. Beavis, M. Blaskiewicz, J. Brennan, A. Burrill, R. Calaga, P. Cameron, X. Chang, A. Drees, A. V. Fedotov, W. Fischer, G. Ganetis, D. Gassner, J. Grimes, H. Hahn, L. Hammons, A. Hershcovitch, H-C Hseuh, D. Kayran, J. Kewisch, R. Lambiase, D. Lederle, "Status of the R&D Towards Electron Cooling of RHIC," Particle Accelerator Conference (Albuquerque, 2007) http://cern.ch/AccelConf/p07/PAPERS/WEOCKI03.PDF.

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G. R. Werner and J. R. Cary, "Designing Photonic Crystal Devices for Accelerators," paper TPAE051, Particle Accelerator Conference (Knoxville, TN, 2005).

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