

Curriculum Vitae

R. Joel England
SLAC National Accelerator Laboratory
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pronouns: he/him/his
h-index: 20 (Google Scholar)



Appointments:

- 2010-present SLAC National Accelerator Laboratory, Menlo Park, CA
W. K. H. Panofsky Fellow (2010-2015)
Project Scientist (2015-2016)
Staff Scientist (2017-2020)
- Co-investigator, Technical Group Leader, and Executive Committee Member (2015-present) of multi-institutional “Laser Accelerator on a Chip” program under the Gordon and Betty Moore Foundation.
 - Group leader of the SLAC dielectric laser acceleration (DLA) group. Experimental lead on first demonstrations of novel laser-driven acceleration in dielectric “accelerator on a chip” devices; supervision of graduate students and postdoctoral scholars.
 - Project Manager (2012-2013) of joint program with Stanford University to develop compact laser-powered X-ray sources for field-deployable medical applications under the DARPA AXiS program.
- Lead Scientist (2020 - Present)
- Head of Accelerator Operations - Ultrafast Electron Diffraction Group
- 2008-2010 SLAC National Accelerator Laboratory, Menlo Park, CA
Research Associate - Advanced Accelerator Research Department
- Developed longitudinal shaping techniques and implemented two-bunch (drive/witness) generation mechanism for plasma wakefield experiments at FACET facility.
 - Postdoctoral research in the use of dielectric laser-driven structures for high-gradient acceleration, with focus on the use of hollow-core photonic bandgap (PBG) fibers.
 - Led demonstration experiment showing speed of light TM mode excitation in hollow core fibers by measurement of Cherenkov wakes.
- 1999-2008 University of California Los Angeles, Los Angeles, CA
Graduate Research Associate – Particle Beam Physics Laboratory
- Performed first demonstration of linearly ramped electron bunch generation for high transformer ratio in plasma wakefield accelerators.
 - Designed and constructed a purpose-built demonstration beamline for ramped bunch generation, including magnets, vacuum systems, control system, diagnostics, and a 9-cell X-band deflecting mode RF cavity.
 - Consulting work for SLAC (sextupole corrections for ORION project), LLNL (designed and built the dipoles magnets for PLEIDES), BNL (sextupole corrections on ATF beamline for VISA experiment), and

- Radiabeam LLC (cold-testing of prototype RF deflecting structures).
- Taught discussion sessions for Accelerator Physics Course 150

1997-1998 University of Texas at Austin, Austin, TX
 Teaching Assistant – Physics Department

- Instructed undergraduate laboratory in classical mechanics.
- Taught discussion sessions for undergraduate electrodynamics.
- Assigned and graded homework and exams.

Education:

University of California, Los Angeles, PhD. Physics, 2007
 University of California, Los Angeles, M. S. Physics, 2002
 University of Texas, Austin B. S. Physics, 1998

PhD Dissertation:

Longitudinal Shaping of Relativistic Electron Bunches Generated by an RF Photoinjector,
 University of California Los Angeles, Department of Physics and Astronomy, September 2007.

Special Skills:

Special theory knowledge: electrodynamics, electron beam transport theory, plasma wakefield theory, general charged particle beam optics, photonic structure modelling and design
 General Computing: Unix, LaTeX, LabView, Fortran, Mathematica, Matlab
 Specialized Computing: HFSS, Amperes, RADIA, Poisson, Parmela, Trace3D, Elegant, Lumerical, General Particle Tracer
 Experimental: high-power RF systems and structures, ultra-high vacuum, magnet design, accelerator beamline design and construction, timing and synchronization techniques, ultrafast lasers, optics, and detectors

Selected Talks:

- "Towards an Accelerator on a Chip," invited physics colloquium, University of Hawaii Manoa, April 2 (2020).
- "Laser-Driven Particle Acceleration in Photonic Structures," *invited talk*, Physics Colloquium, University of California Santa Cruz, Nov. 29, Santa Cruz, CA (2018).
- "Applications for a Laser-Driven Accelerator on a Chip," *invited talk*, SPIE Optics and Optoelectronics Workshop on Applications of Laser-Driven Particle Accelerators, April 2-3, Prague, Czech Republic (2019).
- "Making a Particle Accelerator on a Chip: Recent Advances and Potential Applications," *keynote address*, CIRMS Annual Meeting, April 8-10, Gaithersburg MD (2019).
- "Compact Radiation Sources Using Dielectric Laser Accelerators," European Advanced Accelerator Concepts Workshop, Sept 16-20, Elba, Italy (2019).
- "Prospects for Compact Medical Devices Using Dielectric Laser Accelerators," DOE Basic Research Needs Workshop on Compact Accelerators for Security and Medicine," April 6-8, Tysons VA (2019).
- "Transverse Dynamics in Planar Symmetric Dielectric Laser-Driven Accelerators," Advanced Accelerator Concepts Workshop (AAC'18), Breckenridge CO, Aug 16 (2018).

- "Dielectric Accelerator and Non-Plasma Accelerator Based Compact Light Sources," *invited talk*, 60th ICFA Advanced Beam Dynamics Workshop on Future Light Sources (FLS), Shanghai, China, March 7 (2018).
- "Applications for a Laser-Driven Accelerator on a Chip," *invited opening plenary*, 25th International Conference on the Applications of Accelerators in Research and Industry (CAARI '18), Grapevine TX, Aug. 12 (2018).
- "Accelerator on a Chip: Particle Acceleration with Laser Light in Photonic Structures," *invited talk*, Commercialization of Nuclear Fusion Summit, SLAC National Accelerator Laboratory, Menlo Park CA, Nov. 14, 2017.
- "Electron source requirements for laser-driven dielectric accelerators," *invited talk* for Photocathode Physics for Photoinjectors Workshop, Newport News VA (2016).
- "Dielectric Laser Acceleration: Accelerator on a Chip," *invited talk* for LINAC 2016, East Lansing MI (2016).
- "Recent Results in Dielectric Laser Acceleration of Electrons," *invited talk* for Physics and Applications of High Brightness Beams Workshop, Havana, Cuba (2016).
- "Prospects for a Compact Radiation Source Based on Dielectric Laser Acceleration," *invited talk* for OSA High Brightness Sources and Interactions Congress, Long Beach, CA (2016).
- "Dielectric Laser Acceleration of Electrons," *invited talk* for Applications of Laser-Driven Particle Accelerators (ALPA), Venice, Italy (2015).
- "Dielectric Laser Acceleration: Results and Perspective," *invited talk* for European Advanced Accelerator Concepts Workshop (EAAC), Isola d'Elba, Italy (2015).
- "Making Accelerators on Microchips," *invited talk* for Years of Services Awards Dinner, SLAC National Accelerator Laboratory, March 19, 2015.
- "Microchip Based Particle Radiation Sources," *invited talk* for Medical Faculty Research Dinner, Stanford University, April 7, 2015.
- "Laser Powered Micro-Accelerators," *invited talk* for High Energy Physics Seminar, University of Michigan, April 7, 2014.
- "Microstructure Based Laser-Driven Particle Accelerators," *invited talk* for High Energy Physics Seminar, Caltech, Feb 3, 2014.
- "Accelerator on a Chip," *invited talk* for Science of SLAC public lecture series, SLAC National Accelerator Laboratory, March 17, 2014.
- "Laser Powered Micro-Accelerators for Compact Radiation Sources," *invited talk* for Optical Society of America, Nov 13-15, 2013.
- "High Transformer Ratio Drive Beams for Wakefield Accelerator Studies," Advanced Accelerator Concepts Workshop, Austin, TX 2012.
- "Cherenkov Wakefield Excitation in Photonic Crystal Fiber Accelerators," Advanced Accelerator Concepts Workshop, Austin, TX 2012.
- "Dielectric Laser Acceleration: Experimental Plans and Recent Results," *invited talk*, SPRC Symposium, Stanford, CA, 2011.
- "Experiment to Demonstrate Acceleration in Optical Photonic Bandgap Structures," *invited talk*, Particle Accelerator Conference, New York, NY, 2011.
- "Laser-Driven Dielectric Accelerators," *invited talk* for Workshop on 5th Generation Light Sources, Catalina, CA, 2010.

Community Service:

- Organizing Committee Member, Advanced Accelerator Concepts Workshop 2020
- Member, Experimental Proposal Review Panel, ARES facility, DESY, 2018-2019
- Member, Advanced Accelerator Concepts Workshop Organizing Committee, 2018
- Group leader for DLA working group, ALEGRO Workshop, CERN, 2018-2020
- Working group co-leader for SLAC 2030 Strategic Planning Committee, 2017
- Co-chair, ICFA Panel on Advanced and Novel Accelerators, CERN, 2017

- Chair of Accelerator Session, Stanford Photonics Research Symposium (SPRC), Stanford, 2016
- Delegate to International Atomic Energy Agency Meeting on Accelerator Technology, 2016
- Co-chair, Accelerator Session, Meeting of the APS DPF, 2015
- Co-chair, Advanced Accelerator Concepts Workshop, 2012
- Organizing Committee, DLA ICFA Mini Workshop, SLAC, 2010
- Co-chair, Accelerator Session, Meeting of the APS DPF, 2011.
- Student Poster Award Selection Committee, Particle Accelerator Conference 2011.

Scientific Peer Review:

- Reviewer for DOE SBIR/STTR and HEP Programs, 2013-2020
- Reviewer for Los Alamos LDRD program, 2017-2019
- Reviewer for Nature Physics, Scientific Reports, Optica, Applied Physics Letters, European Physical Letters, Journal of Electromagnetic Waves and Applications, Journal of Physics, Nuclear Instruments and Methods A, Physical Review X, Phys. Rev. Accel. Beams, Journal of Optical Society of America B

Press and External Recognition:

Radio interview, NPR's All Things Considered - "Tiny Particle Accelerator-On-A-Chip Could Transform Medicine," July 18, 2018

Forbes science feature, "A Particle Accelerator Between Your Fingertips," Aug 12, 2018

IEEE Spectrum Press Article and Video Interview - "Nanofabrication Enables Particle-Accelerator-on-a-Chip Technology," April 3, 2017

DOE Web Feature - "Accelerator on a Chip," Feb 4, 2014

Gizmodo News Article - "This Particle Accelerator is Barely Bigger Than a Grain of Rice," Oct 1, 2013

Selected Collaborators & Co-Editors:

Robert L. Byer; Department of Applied Physics, Stanford University, Stanford, CA, USA

Benjamin Cowan; Tech-X Corporation, Boulder, CO, USA

Jay Dawson; Lawrence Livermore National Laboratory, ^[1] Livermore, CA, USA

Peter Hommelhoff; Department of Physics, Friedrich Alexander University, Erlangen, Germany

Yen-Chieh Huang; Dept. of Electrical Engineering, National Tsing Hua University, Taiwan

Minghao Qi; College of Engineering, Purdue University, West Lafayette, IN, USA

Levi Schachter; Department of Electrical Engineering, Technion Institute of Technology, Israel

Pietro Musumeci; University of California Los Angeles, Los Angeles, CA, USA

Jacob Scheuer, Electrical Engineering Dept., University of Tel-Aviv, Israel

Graduate Students Supervised: 10

C. M. McGuinness, B. Montazeri, E. Peralta, K. Soong, J. McNeur, A. Tafel, A. Hanuka, C. Lee, A. Ody, N. Cohen

Undergraduate Students Supervised: 5

M. Arildsen, J. Straker, C. Keola Kala, L. Lukaczyk, A. Kwiatkowski

Postdoctoral scholars sponsored: 2

Z. Wu, K. Wootton

Selected Publications
(Full List Available Upon Request)

N. Supra, K. Y. Yang, D. Vercruysee, K. J. Leedle, D. S. Black, R. J. England, L. Su, R. Trivedi, Y. Miao, O. Solgaard, R. L. Byer, and J. Vuckovic, "On-chip laser driven particle acceleration through inverse design," *Science* **367** (6473), 79 (2020).

D. Cesar, S. Custodio, J. Maxson, P. Musumeci, X. Shen, E. Threlkeld, R. J. England, A. Hanuka, I.V. Makasyuk, E. Peralta, K.P. Wootton, and Z. Wu, "Nonlinear response in high field dielectric laser accelerators," *Communications Physics* **1**(4), 1-7 (2018).

D. Cesar, J. Maxon, P. Musumeci, X. Shen, R. J. England, K. P. Wootton, and S. Tan, "Enhanced energy gain in a dielectric laser accelerator using a tilted pulse front laser," *Opt. Exp.* **26** (22), 29216 (2018).

K. P. Wootton, Z. Wu, B. M. Cowan, A. Hanuka, I. V. Makasyuk, E. A. Peralta, K. Soong, R. L. Byer, and R. J. England., "Demonstration of acceleration of electrons at a dielectric microstructure using femtosecond laser pulses," *Optics Letters* **41** (12), 2672 (2016).

R. J. England, R. J. Noble, et al., "Dielectric laser accelerators," *Reviews of Modern Physics* **86**, 1337 (2014).

M. Litos, E. Adli, W. An, C. I. Clarke, C. E. Clayton, S. Corde, J. P. Delahaye, R. J. England, A. S. Fisher, J. Federico, S. Gessner, S. Z. Green, M. J. Hogan, C. Joshi, W. Lu, K. A. Marsh, W. B. Mori, P. Muggli, N. Vafaei-Najafabadi, D. Walz, G. White, Z. Wu, V. Yakimenko, and G. Yocky, "High-efficiency acceleration of an electron beam in a plasma wakefield accelerator," *Nature* **515**, 92-95 (2014).

K. Soong, E. Peralta, R. J. England, et al., "Electron beam position monitor for a dielectric microaccelerator," *Optics Letters* **39** (16), 4747-4750 (2014).

E. A. Peralta, K. Soong, R. J. England, et al., "Demonstration of Electron Acceleration in a Laser-Driven Micro-Structure," *Nature* **503**, 91-94 (2013).

R. J. England, J. B. Rosenzweig, and G. Travish, "Generation and Measurement of Relativistic Electron Bunches Characterized by a Linearly Ramped Current Profile," *Phys. Rev. Lett.* **100**, 214802 (2008).

P. Musumeci, J. T. Moody, R. J. England, J. B. Rosenzweig, T. Tran, "Experimental Generation and Characterization of Uniformly Filled Ellipsoidal Electron-beam Distributions," *Phys. Rev. Lett.* **100**, 244801 (2008).

R. J. England, J. B. Rosenzweig, G. Andonian, P. Musumeci, G. Travish, and R. Yoder, "Sextupole Correction of the Longitudinal Transport of Relativistic Beams in Dispersionless Translating Sections," *Phys. Rev. ST-AB*, **8**:12801 (2005).