Announcement: The 2020 James Clerk Maxwell Prize for Plasma Physics

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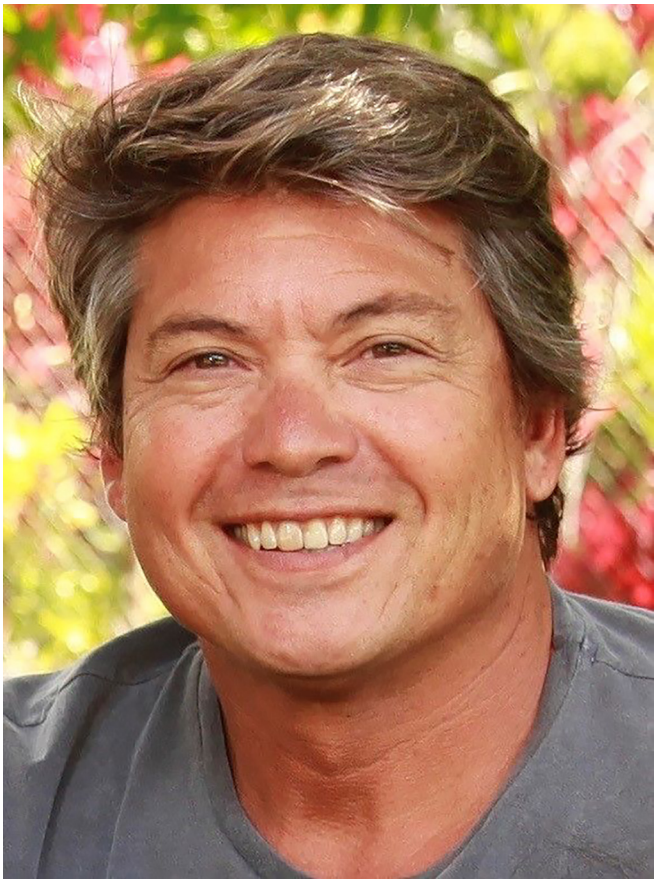

Warren Bicknell Mori is a Distinguished Professor in the Departments of Physics and Astronomy and of Electrical and Computer Engineering at the University of California, Los Angeles and Director of the UCLA Particle-in-Cell (PIC) and Kinetic Simulation Software Center and of the Plasma Simulation Group. Professor Mori received his B.S. degree from the University of California, Berkeley in 1981 and, thereafter, entered graduate school at UCLA. He received his M.S. and Ph.D. degrees from UCLA in 1984 and 1987, respectively, and he has remained at UCLA, to follow his highly productive and distinguished scientific career, ever since. He has worked in the fields of advanced computing, particle-in-cell simulations of plasmas, basic plasma physics, high intensity laser and beam plasma interactions, plasma-based accelerators and light sources, nonlinear optics of plasmas, inertial fusion science, and high energy density science. He served as the Director of the UCLA Institute for Digital Research and Education from 2006 until 2021. In 1995, Mori received the International Center for Theoretical Physics Medal for Excellence in Nonlinear Plasma Physics by a Young Researcher and, in 2016, he received the Advanced Accelerator Concepts Prize for "his leadership and pioneering contributions in theory and particle-in-cell code simulations of plasma-based particle acceleration." Mori is active in both the American Physical Society (APS) and the IEEE, and he was named Fellow of the APS in 1997 and Fellow of the IEEE in 2009.

The citation for the 2020 James Clerk Maxwell Prize for Plasma Physics reads

> *For leadership in and pioneering contributions to the theory and kinetic simulations of nonlinear processes in plasma-based acceleration and relativistically intense laser and beam plasma interactions.*

Professor Warren Mori's lifelong career in plasma simulation, basic plasma physics, laser and beam plasma interactions, and plasma-based accelerators and light sources began at an early age. He worked as a graduate student intern with Dave Forslund and Joe Kindel at the X-1 group at Los Alamos and was advised by Professors John Dawson, Francis Chen, and Chandrashekhar Joshi, all three James Clerk Maxwell Prize recipients, who supervised his doctoral dissertation "Theory and simulations on beat wave excitation of relativistic plasma waves."[1–4] Warren Mori's research continued at UCLA for more than three decades, first as a researcher and then as a professor. Working with fellow plasma, laser, and accelerator physicists from around the world, Mori continued to advance the art of relativistic electromagnetic simulation of plasma and to pioneer the application of these methods to some of the most significant achievements in relativistic particle acceleration and laser–plasma interaction. These included wave-breaking,[5] frequency upconversion[6] and the photon accelerator,[7] the ponderomotive force of electromagnetic waves in time varying media,[8] Raman forward scattering of high-intensity lasers,[9] relativistic plasma wakefields[10] and laser wake-field acceleration,[11] nonlinear optics of short short-pulse lasers,[12] energy doubling of a 42 GeV electron beam in a meter,[13] generating multi-GeV electron bunches using a single stage laser wakefield,[14] and injection and trapping of electrons into laser-produced wakes.[15,16] Under Mori's leadership of the UCLA Plasma Simulation Group, over four state-of-the-art particle-in-cell (PIC) simulation codes, OSIRIS,[17] QuickPIC,[18] QPAD,[19] and the UPIC Framework, have been developed and maintained. These codes are now used by plasma physicists around the world and run on some of the world's fastest computers.

Professor Warren Mori is a frequent contributor to the APS Division of Plasma Physics (DPP), and he has coauthored or authored 20 invited lectures and papers to our annual meetings of the DPP. With coauthors Chandrashekhar Joshi and Sébastien Corde, Mori recently presented a personal perspective on how the field of plasma-based acceleration (PBA) developed and presented applications of PBA research in electron beam radiotherapy, directional but incoherent x-ray beams, near single cycle tunable infrared pulses for spectroscopy, and non-perturbative quantum electrodynamics.[20]

Professor Mori's Maxwell Prize address was titled "Simulations of intense laser and beam plasma interactions and plasma based acceleration: Past, present, and future." Mori spoke of the wide use of simulation in plasma physics, the importance of simulation to understanding nonlinear wave–wave and wave–particle interactions occurring in plasmas, the need for both continuum and discrete descriptions of plasma, and the many applications where simulation has proven successful. Mori spoke of the enormous progress in this field, from early beginnings based on one-dimensional particle-in-call simulations and less powerful processors, extending to today, after decades of improvements in both computational hardware and algorithms, when entire three-dimensional experiments can be simulated using first principles simulation.

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