Apr 15th, 9:00 AM - 10:00 AM

Keynote Speaker - Dr. Mara Prentiss, Department of Physics, Harvard University: "Manipulating Matter with Fields"

KEYNOTE SPEAKER

"MANIPULATING MATTER WITH FIELDS"

Dr. Mara Prentiss, Department of Physics, Harvard University

9:00 a.m. Anderson Auditorium (C101)

Mara Prentiss was born in Cleveland, Ohio on February 9, 1959. She attended Wellesley College for three years, receiving a BA in 1980, with triple major in Physics, Math, and Philosophy. She graduated with high honors, as well as honors in Physics and Math and was selected to Sigma Xi and Phi Beta Kappa and won the Marjorie Wallace Simpson prize in Mathematics. She did her graduate work at MIT under Professor S. Ezekiel, working on a variety of theoretical and experimental projects in optics and atomic physics. Her thesis project was the first observation of channeling in optical standing waves, a process that has lead to many important developments including optical crystals and atom lithography. She was elected to Sigma Xi at MIT and graduated in 1986, when she became a Member of Technical Staff at Bell Laboratories.

While at Bell, she directed the experiment that demonstrated the first Magneto Optical Trap. She also demonstrated the first atom trapping from an uncooled gas, developed a new method of slowing and cooling atomic beams, made the first observation of the force due to Doppleron resonances, and made the first observation of three dimensional confinement in optical standing waves. As she was leaving Bell she realized that standing wave fields could be used to focus atoms into parallel arrays of narrow lines. This idea created the new field of atom lithography. She continued working on the experimental realization of this idea after moving to Harvard in 1991. The successful experimental result was first submitted at the end of 1991.

Since she has been at Harvard she has continued to expand the field of atom lithography. This effort has been greatly aided by the creation of the US Consortium for Light Force Dynamics, a collaboration which has included groups from Harvard, NIST Gaithersburg, the University of Colorado, Colorado State University, and the Institute for Theoretical Atomic and Molecular Physics, and AT&T Bell Laboratories. She directs the collaboration, which has demonstrated that atomic lithography can deposit parallel arrays of lines narrower than 50 nm. Direct Deposition atom lithography has been done in Na, Al, and Cr. In addition, the collaboration has recently developed a resist for neutral atoms based on Self-Assembled monolayers, which has allowed atom lithography to be extended to metastable noble gases, as well as alkali's and has permitted patterns to be transferred into Si. the collaboration has also done pioneering theoretical work on the cooling and trapping of neutral atoms. The collaboration is fabricating novel optical devices including adaptive polymer optics and single mode polymer waveguides, as well using light pressure force to make self-assembling optical devices. One such technique has already received a patent. In addition, she has received three teaching prizes while at Harvard, and she supervised the thesis research for which Arthur Chu was awarded the Apker Prize by the American Physical Society. Finally, she serves on the following committees: JASON, Mentor for the Defense Science Study Group and the Committee on Atomic, Molecular, and Optical Physics of APS.