

Abstract for an Invited Paper
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Exploring New Frontiers of Quantum Optical Science

MIKHAIL LUKIN, Physics Department, Harvard University, Cambridge MA 02138

In this talk we will discuss recent developments involving a new scientific interface between quantum optics and atomic physics, many body physics, nanoscience and quantum information science. Specific examples include quantum manipulation of individual spins and photons using impurities in diamond and control of light-matter interactions using sub-wavelength localization of optical fields. Novel applications of these techniques ranging from implementation of ideas from quantum information science to nanoscale magnetic sensing will be discussed.