“Optomechanical Sensors”

Dr. Gaurav Bahl, University of Illinois at Urbana-Champaign

In recent years, photonic microdevices have emerged that use extremely subtle optical forces such as radiation pressure, optical electrostriction, and gradient force, to generate radio- and microwave-frequency mechanical vibrations. These "Photonic MEMS" or “Optomechanical Oscillators” are promising tools for building compact frequency references, for fundamental experiments in nonlinear optics and achieving quantum-mechanical ground state, and also for extreme-sensitivity sensor applications (acceleration, displacement, mass, force, and gravity waves). This tutorial will be an introduction to the physics and concepts behind optomechanics and will discuss some of the most prominent work to appear in the field.

Dr. Gaurav Bahl is an Assistant Professor of Mechanical Science and Engineering at the University of Illinois at Urbana-Champaign (UIUC), and an Affiliate Faculty in the Department of Electrical and Computer Engineering. Dr. Bahl received his PhD in Electrical Engineering from Stanford University in 2010, MS Degree in Electrical Engineering from Stanford in 2008, and BEng degree in Electrical Engineering from McMaster University in 2005. He has authored several high-impact papers on optomechanical systems, including the first experimental papers on “Brillouin Optomechanics”. Dr. Bahl also has several years of experience in MEMS and microfabrication, and has designed and built MEMS-based oscillators and sensors. His work on optomechanical Brillouin cooling was featured as a significant development in the ‘Optics in 2012’ special issue of the OSAs monthly Optics & Photonics News magazine in December 2012. Additional commentary by editors and prominent researchers on the significance of his Brillouin optomechanics work has appeared in Nature Physics, Nature Photonics, and many technical news websites.