Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Wireless Actuation of Micromechanical Resonators FARRUKH MATEEN, CARSTEN MAEDLER, SHYAMSUNDER ERRAMILLI, PRITIRAJ MOHANTY, boston university — Wireless transfer of power is of fundamental and technical interest with applications ranging from remote operation of electronics, biomedical implants, and device actuation where hard-wired power sources are neither desirable nor practical. In particular, biomedical implants in the body or the brain need small footprint power receiving elements for wireless charging, which can be accomplished by micromechanical resonators. In contrast for fundamental experiments, ultra low-power wireless operation of micromechanical resonators in the microwave range makes low-temperature studies of mechanical systems in the quantum regime possible, where heat carried by the electrical wires in standard actuation techniques is detrimental to maintaining the resonator in a quantum state. We demonstrate successful actuation of micron-sized silicon-based piezoelectric resonators with resonance frequencies from 36 MHz to 120 MHz, at power levels of nanowatts and distances of about 3 feet, including polarization, distance and power dependence measurements. Our demonstration of wireless actuation of micromechanical resonators via electric-field coupling down to nanowatt levels enables a multitude of applications based on micromechanical resonators, inaccessible until now.

farrukh mateen
boston university

Date submitted: 31 Oct 2016 Electronic form version 1.4