

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Open Optomechanical Whispering Gallery Mode Resonators

DAVID AVELINE, LUKAS BAUMGARTEL, NAN YU, Jet Propulsion Laboratory, California Institute of Technology — We have investigated open cavity Whispering Gallery Mode Resonators (WGMR) suitable for optomechanical coupling, and we present our initial demonstrations of structurally modified WGMR using microfabrication techniques. There has been strong interest in WGMR technology due to its extremely high optical quality and its compact robust nature. These monolithic optical resonators offer many advantages over mirror-based Fabry-Perot cavities that typically require special optical coatings. Standard WGMR, however, are constrained because only a tiny portion of the mode volume is externally accessible, limited to the perimeter of the disk where the evanescent field exists slightly outside the resonator. We have applied focused ion beam milling to augment WGMR discs with open structure, which allows direct access to the internal optical fields. By incorporating a mechanical cantilever inside the cavity, the coupled optomechanical system can yield extremely high sensitivity to displacement and acceleration, which would be well suited for miniature accelerometers and gyroscopes. This novel open cavity WGMR scheme could lead to many innovative applications that are unviable within the closed structure of conventional WGMR, including inertial sensors, trace gas detection, and laser sources.

David Aveline
Jet Propulsion Laboratory, California Institute of Technology

Date submitted: 19 Jan 2012

Electronic form version 1.4