Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Aging and annealing of ultrahigh quality factor silicon resonators[1]

THOMAS METCALF, XIAO LIU, Naval Research Laboratory — At liquid helium temperatures, resonators fabricated from single crystal silicon can have remarkably high quality factors, exceeding 50 million. However, the quality factors are still far from the limits predicted from known loss mechanisms, indicating the possibility of future improvement and increased sensitivity. Measurements of the baseline quality factor after a sequence of annealing and aging steps have shown that there are at least two loss mechanisms that contribute, one of which reappears with megasecond aging. The relation between these loss mechanisms and the resonator fabrication processing steps is considered, with implications for the ultimate sensitivity of resonator-based devices and in the phonon transport properties of silicon-based devices.

[1]Work supported by the Office of Naval Research

Thomas Metcalf
Naval Research Laboratory

Date submitted: 14 Nov 2014 Electronic form version 1.4