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Evidence of universality in the dynamical response of micromechanical diamond resonators at millikelvin temperatures MATTHIAS IMBODEN, PRITIRAJ MOHANTY, Boston University — We report kelvin to millikelvin-temperature measurements of dissipation and frequency shift in megahertz-range resonators fabricated from ultra-nanocrystalline diamond. Frequency shift $\delta f/f_0$ and dissipation Q^{-1} demonstrate temperature dependence in the millikelvin range similar to that predicted by the glass model of tunneling two level systems. The logarithmic temperature dependence $\delta f/f_0$ is in good agreement with such models, which include phonon relaxation and phonon resonant absorption. Dissipation shows a weak power law, $Q^{-1} \sim T^{1/3}$, followed by saturation at low temperature. A comparison of both the scaled frequency shift and dissipation in equivalent micromechanical structures made of single-crystal silicon and gallium arsenide indicates universality in the dynamical response.

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