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Experimental search for violations of Newtonian gravity at short ranges JOSH LONG, SIMON KELLY, EVAN WEISMAN, TREVOR LESLIE, ANDREW PECKAT, Department of Physics, Indiana University Bloomington — We report on our ongoing experimental search for deviations from the Newtonian gravitational inverse-square law at short ranges (50 microns). This experiment permits us to place constraints on theories predicting new forces at sub-millimeter range, including models with compact extra dimensions and gravitationally-coupled scalar fields. The experiment is performed by measuring the force between a planar source mass oscillating at a frequency (1 kHz) tuned to one of the mode frequencies of a planar detector mass. Electrostatic and acoustic background forces are mitigated by separating the source and detector masses with a conducting, 10 micron-thick Copper-Beryllium membrane stiffened by stretching, while the Newtonian background is minimized with the nominally null planar test mass geometry. We search for a signal above the limiting detector thermal noise after integration times on the order of 1 day.

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