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New Limits on Coupling of Fundamental Constants to Gravity by Absolute Frequeny Measurements of ^{87}Sr Optical Lattice Clocks SEBASTIAN BLATT, GRETCHEN K. CAMPBELL, ANDREW D. LUDLOW, JAN W. THOMSEN, MICHAEL J. MARTIN, MARTIN M. BOYD, JUN YE, JILA, National Institute of Standards and Technology and the University of Colorado, Department of Physics, University of Colorado, Boulder, CO, 80309 — We have measured the ^{87}Sr ^{1}S$_0$-^{3}P$_0$ clock transition at $\nu_{\mathrm{Sr}} = 429\,228\,004\,229\,873.83 \pm 0.37$ Hz, limited by statistical uncertainty of the Sr/Cs comparison. Three international laboratories agree on the absolute frequency at the 1×10^{-15} (Boulder, Paris) to 4×10^{-15} (Boulder, Paris, Tokyo) level, making ν_{Sr} the best agreed-upon optical frequency to date. We analyze the global Sr frequency record to test Local Position Invariance by obtaining the best limits to date on coupling of fundamental constants to the ambient gravitational potential.

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