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Test of local position invariance using a double-cavity laser system

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Abstract

The results of testing local position invariance, which is a constituent of the Einstein equivalence principle, in a "null" gravitational redshift experiment are reported. The processing of the experimental data collected during the five-month operation of a double-cavity laser system, where one cavity operates in the free generation mode and the frequency of the second cavity is stabilized with the nonlinear ultranarrow absorption resonance of the methane molecule, has confirmed the universality of the gravitational redshift law at a level of 0.9%. This result almost doubly improves the best existing accuracy (1.7%) of testing local position invariance for clocks of different physical natures. © 2010 Pleiades Publishing, Ltd.

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