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Probing Lorentz-invariance in 3He/129Xe clock-comparison experiments

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Accurate frequency measurements currently give the strongest bounds on the validity of fundamental theories. We present new results from a 3He/129Xe clock-comparison experiment, where the free precession of the nuclear spins is used to probe Einsteins principle of relativity. In particular, the sidereal variation of the 3He/129Xe frequency induced by Lorentz-violating couplings is measured, from which new upper limits on leading order Lorentz-violation of the bound neutron could be derived. The extreme sensitivity of this "spin-clock" is based on the fact that the oscillator is decoupled from any environmental influences.

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