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Probing Lorentz-invariance in $^3\text{He}/^{129}\text{Xe}$ 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 $^3\text{He}/^{129}\text{Xe}$ clock-comparison experiment, where the free precession of the nuclear spins is used to probe Einstein's principle of relativity. In particular, the sidereal variation of the $^3\text{He}/^{129}\text{Xe}$ 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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