New Tests of Relativity with Optical Ion Clocks

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Optical clocks based on atoms and ions probe relativistic effects with unparalleled sensitivity. By performing clock spectroscopy on a single ytterbium ion in a cryogenic environment we have full quantum control over all internal and external degrees of freedom and expect strongly improved coherence times. This makes it possible to realize novel tests of relativity in a regime where superpositions of proper time emerge.