Quantum coherence, entanglement, and clock: from emergent phenomena to fundamental physics

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Abstract

Precise quantum state engineering, many-body physics, and innovative laser technology are revolutionizing the performance of atomic clocks and metrology, providing opportunities to explore emerging phenomena and probe fundamental physics. Recent advances include measurement of gravitation time dilation across a few hundred micrometers, and employment of quantum entanglement generated with optical cavity quantum-electrodynamics, a field pioneered by Jeff Kimble.