Quantum science and atomic clocks

Jun Ye
JILA, National Institute of Standards and Technology and University of Colorado
Boulder, Colorado 80309-0440, USA

Quantum state engineering, many-body physics, and innovative laser technology are revolutionizing the performance of atomic clocks and metrology, providing opportunities to explore emerging quantum phenomena and probe fundamental physics. Recent advances include precise control of atomic interactions to achieve high accuracy, determination of gravitational time dilation across a few hundred micrometers, and employment of spin entanglement for clock comparison.