Using optical clock to probe quantum many-body physics

JUN YE, JILA, NIST and University of Colorado

The progress of optical lattice clock has benefited greatly from the understanding of atomic interactions. At the same time, the precision of clock spectroscopy has been applied to explore many-body spin interactions including SU($N$) symmetry. Our recent work on this combined front of quantum metrology and many-body physics includes the probe of spin-orbital physics in the lattice clock and the investigation of a Fermi degenerate gas of $10^5$ $^{87}$Sr atoms in a three-dimensional magic-wavelength optical lattice.