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Updates on the NIST ytterbium optical lattice clock XIAOGANG ZHANG, ROGER BROWN, National Institute of Standards and Technology, MARCO SCHIOPPO, Institut fur Experimentalphysik, Heinrich-Heine-Universitat Dusseldorf, KYLE BELOY, WILLIAM MCGREW, ROBERT FASANO, DANIELE NICOLODI, HOLLY LEOPARDI, TARA FORTIER, ANDREW LUDLOW, National Institute of Standards and Technology — We present a summary of recent developments in an optical lattice clock based on ultracold ytterbium. By combining two lattice-trapped cold-atom systems to realize continuous laser interrogation, we demonstrate an optical clock with a fractional frequency instability of 6×10^{-17} for an averaging time 1 s. The continuous laser interrogation scheme effectively eliminates the deleterious aliasing process which limits most optical clocks. By further decreasing the technical noise, it should be possible to realize quantum-limited stability due to quantum projection noise. We also characterize important systematic effects influencing the frequency uncertainty of the ytterbium optical lattice clock at the 10^{-18} level. Recent experimental studies of high-order lattice Stark shifts, including higher multipolarizabilities from magnetic dipole and electric quadrupole as well as hyperpolarizability, will be reported, together with DC stark effects, background gas shifts, residual Doppler effects, and more.

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