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Cold Atomic Strontium: Precision Spectroscopy and Optical Frequency Standards TANYA ZELEVINSKY, TETSUYA IDO, MARTIN BOYD, ANDREW LUDLOW, SEBASTIAN BLATT, JUN YE — Progress toward the neutral strontium frequency standard has been made on several fronts. Robust narrow line cooling on the 689 nm 1S0 - 3P1 transition of bosonic strontium-88 was demonstrated and studied in detail, and precision spectroscopy of strontium atoms at 1 uK was performed in free space. The laser systems needed to realize cooling and trapping of fermionic strontium-87 for developing an optical standard based on a 1 mHz-wide 1S0 - 3P0 transition have been installed, and ultracold atoms have been loaded into a one-dimensional optical lattice operating at a wavelength where the ac Stark shifts of the ground and excited states of the clock transition are equal. A highly stabilized and compact 698 nm laser source was built to serve as the local oscillator for the atomic clock, and preliminary spectroscopic results in the lattice are presented. In addition, work is in progress on a recently proposed EIT clock scheme that operates on the forbidden strontium-88 1S0 - 3P0 transition.

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