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**Rydberg entanglement and clock operation in alkaline-earth atom arrays** [1] ADAM SHAW, IVAYLO MADJAROV, JACOB COVEY, JOONHEE CHOI, ANANT KALE, HANNES PICHLER, ALEX COOPER, Caltech, VLADIMIR SCHKOLNIK, JASON WILLIAMS, JPL, MANUEL ENDRES, Caltech — Alkaline-earth atoms individually trapped in optical tweezers have gained prominence in recent years for their potential to combine quantum metrology, simulation, and computation in a single platform. Here we present our recent results in these directions with a dynamically reconfigurable 1D array of strontium atoms, showing both high-fidelity entanglement and detection of Rydberg states, and separate development of an atomic-array optical clock. Both results exploit the clock state, which we use as a metastable groundstate to achieve single-photon Rydberg excitation and commensurately high Rabi frequencies. We observe both non-blockaded and blockaded Rabi oscillations with high-fidelity (>0.99) and detect the Rydberg state with similarly high fidelity through auto-ionization of the Rydberg electron. These results set the stage for current investigations into many-body physics and the development of quantum gates.

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