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A Multiplexed Strontium Optical Lattice Clock for Tests of Fundamental Physics[1] XIN ZHENG, BRETT MERRIMAN, HAORAN LI, SHIMON KOLKOWITZ, University of Wisconsin - Madison — Optical lattice clocks are amongst the most accurate and precise devices ever built. Their remarkable stability is now giving rise to a number of novel applications. We are building a multiplexed strontium optical lattice clock, which will enable high precision differential measurements between two ensembles of ultracold strontium atoms confined in independently addressable lattices. In this poster, we will present recent progress in building an ultra-high vacuum chamber reaching pressures of low 10^{-12} Torr and lifetime measurements of strontium atoms magnetically trapped in the $^3P_2$ state in our apparatus. Updates on a two-stage magneto-optical trap for laser cooling to μK temperatures and demonstration of sequential trapping of all stable strontium isotopes will be shared. We will then discuss our plans to study fundamental physics by performing new test of general relativity. We also propose new methods for evaluating clock systematics, studying isotope shifts, and achieving quantum enhanced clocks via Rydberg interactions with our multiplexed clock.

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