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Towards a lattice based neutral magnesium optical frequency standard HRISHIKESH KELKAR, MATTHIAS RIEDMANN, TEMMO WUEBBENA, ANDRE KULOSA, JAN FRIEBE, ANDRE PAPE, SANA AMAIRI, SINA MALOBABIC, KLAUS ZIPFEL, STEFFEN RUEHMANN, ERNST -MARIA RASEL, WOLFGANG ERTMER, Leibniz University Hannover, Institute for Quantum Optics, Welfengarten 1, 30167 Hannover, Germany — Magnesium is a promising candidate for a high performance neutral atom optical frequency standard. It offers a low sensitivity to frequency shifts of the $^1S_0 - ^3P_0$ clock transition by room temperature blackbody radiation and has several isotopes of suitable abundance (two bosonic, one fermionic) to realize an optical clock. We report on recent progress towards creating a lattice clock of magnesium. ^{24}Mg atoms are pre-cooled in two stages. The singlet Magneto Optical Trap (MOT) captures and cools atoms from an atomic beam which are then loaded into a triplet MOT. The triplet MOT has a decay channel to the dark $^3P_0$ state which is used to load atoms into a 1064 nm dipole trap. The cooling stages are on simultaneously and atoms are continuously loaded in the dipole trap. We capture upto 9 10^4 atoms at a temperature below 100 μK. We are exploring different avenues for further cooling which will enable reaching the Lamb-Dicke regime in a magic wavelength lattice.

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