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Progress toward ^{174}Yb BEC realization for Quantum Simulation

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We report the progress in building our experimental setup for ^{174}Yb BEC. The experimental setup consists of the conventional Zeeman slower and new type of magneto-optical trap(MOT), which we propose and demonstrate for alkaline-earth-metal-like atoms. This new type of MOT, which we call core-shell MOT, utilizes both the broad $^1\text{S}_0 \rightarrow ^1\text{P}_1$ transition and the narrow $^1\text{S}_0 \rightarrow ^3\text{P}_1$ transition in two spatially separated regions. Experimental implementation of this scheme showed both faster loading and high atom numbers, by more than two orders and one order of magnitude respectively, compared to conventional MOT schemes. We plan to further cool and transfer the atomic sample into a science chamber by displacing an optical dipole trap using an optically compensated zoom-lens. The atoms will be loaded into an optical lattice for quantum simulations.

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