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Core-Shell Magneto-Optical Trap for Alkaline-Earth-Metal-Like Atoms[1] JEONGWON LEE, JAE HOON LEE, JIHO NOH, JONGCHUL MUN, KRISS — We propose and demonstrate a new type of magneto-optical trap (MOT) for alkaline-earth-metal-like (AEML) atoms where the narrow intercombination ${}^1S_0 \rightarrow {}^3P_1$ transition and the broad ${}^1S_0 \rightarrow {}^1P_1$ transition are spatially arranged into a core-shell configuration. Our scheme resolves the main limitations of previously adopted MOT schemes, leading to significant increases in both the loading rate and the steady state atom number. We apply this scheme to ^{174}Yb atoms and compare it with the conventional intercombination MOT, where we observe more than two orders of magnitude improvement in the loading rate and ten-fold improvement in the steady state atom number. The increase in loading rate and trapped atomic number can lead to enhancement of the statistical sensitivity in many different types of precision experiments using cold AEML atoms, such as lattice clock experiments and the electric dipole moment experiments.

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