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All-Optical Production of Degenerate Fermi Gas toward Optical Lattice Experiments YASUHISA INADA, TAIZO MIYATO, The University of Tokyo, SHUTA NAKAJIMA, Tokyo Institute of Technology, MAKOTO KUWATA-GONOKAMI, The University of Tokyo, MASAHITO UEDA, Japan Science and Technology Agency and Tokyo Institute of Technology, TAKASHI MUKAIYAMA, Japan Science and Technology Agency — Atomic Fermi gases with tunable interactions offer possibilities to study strongly correlated systems, and have attracted much interest experimentally and theoretically. Fermionic atoms in optical lattices are analogous to electrons in crystals and are expected to form quantum phases, which may allow us to more deeply understand superfluidity and magnetism. In this poster, we report on the all-optical production of a degenerate gas of ^{6}Li. To eliminate bulky coils for a magnetic trap and have a better optical access for optical lattice experiments, we captured and cooled atoms in an all- optical way. We set up a cavity to build up the intensity of a 1064 nm laser for the optical trap, to get 1 mK in trap depth with a beam waist of 260 μm. This cavity-enhanced optical trap enabled us to recapture 15 % of atoms in the MOT. We then transferred the atoms into a focused beam dipole trap and evaporatively cooled the atoms to reach $T/T_F \sim 0.1$ with 4×10^5 atoms.

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