Abstract

This work describes the production and initial characterization of a metastable helium Bose-Einstein condensate with a large number of atoms. Compared to two previously reported $^4\text{He}^*$ BEC realizations, the number of condensed atoms is at least a factor of 25 higher. The experimental setup and steps towards quantum degeneracy are discussed. A number of laser cooling techniques, applied to optimize the starting conditions prior to evaporative cooling, are experimentally realized and compared. Various methods used to detect and probe the condensate include absorption imaging, time-of-flight measurements on a microchannel-plate detector and ion counting to monitor the formation and decay of the condensate.