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Interactions and collective excitations in a SU(N) Fermi gas[1]
ZEJIAN REN, BO SONG, CHENGDONG HE, ELNUR HAJIYEV, ENTONG ZHAO, QIANHANG CAI, JEONGWON LEE, GYU-BOONG JO, Department of Physics, Hong Kong University of Science and Technology — Ultracold fermions with SU(N >2) symmetry offer a unique opportunity to study quantum dynamics and interaction effects in the large spin systems that have no analogue in condensed matter physics. In this poster, we present a set of experiments on the measurement of contact parameters and collective excitations with a SU(N) Fermi gas of ^{173}Yb atoms. First, we explore the short-range interaction effect via Tan's contact parameters in a multi-component Fermi gas with SU(N >2) symmetry. The s-wave contact parameter is experimentally measured by recording the high-momentum tail of weakly interacting fermions. For a tunable number of spin component N with a fixed number of atoms per component, we verify the linear increase in the contact with N providing experimental confirmation of SU(N) interactions. Furthermore, we explore the momentum distribution of SU(N) fermions at the low momentum regime. Next, we measure collective excitations of a harmonically trapped two-dimensional SU(N) Fermi gas. Various collective modes are investigated with a tunable number of spin component N showing a decrease in the ratio of quadruple and dipole mode with N. Our work will pave the way for the experimental study of interacting SU(N) Fermi gases with large spin.

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