

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Single shot imaging of trapped Fermi gas - Pauli crystals

MARIUSZ GAJDA, JAN MOSTOWSKI, TOMASZ SOWINSKI, MAGDALENA ZALUSKA-KOTUR, Institute of Physics of Polish Academy of Sciences — Atomic gas microscopes allow for direct monitoring of atoms with a resolution of the order of hundreds of nanometers. Inspired by this experimental achievements we study on a theoretical ground a single-shot picture of a two-dimensional ideal Fermi gas in a harmonic trap. We show that identical fermions arrange themselves in spectacular geometric structures although no mutual interaction is present. This is because the indistinguishability of fermions prevents them from being at the same location. These unexplored geometric structures, Pauli crystals, emerge repeatedly in single-shot pictures of the many-body system. To observe the Pauli crystals one has to detect positions of all N particles. Such a detection, however, will never correspond to the pure geometry of the Pauli crystal because of quantum fluctuations. We show how to extract the pattern from a collection of the measured noisy structures.

Mariusz Gajda
Institute of Physics of Polish Academy of Sciences

Date submitted: 10 Nov 2016

Electronic form version 1.4