University of Stuttgart
Institute for Theoretical Physics III

SIRPOL Seminar

Rukmani Bai

(Physical Research Laboratory, Ahmedabad, India)

Tuesday
March 19, 2019
14:00 h
NWZ II,
Pfaffenwaldring 57
Room 5.331

Bosonic quantum Hall states in optical lattices

Quantum Hall (QH) states are robust and good choice form numerous potential applications and to study the physics of topological effects. QH states have been observed experimentally in condensed matter systems. However, the observation of fractional quantum Hall (FQH) states is difficult in these systems due to the requirement of high magnetic fields (~10 T or more). In this respect, ultracold atoms trapped in the optical lattices are clean and appropriate systems as synthetic magnetic fields equivalent to 100 T or more can be generated using laser fields.

In this talk, I will dicuss our recent results of quantum Hall (QH) states and competing superfluid (SF) states in optical lattices. For this, we solve Bose-Hubbard model (BHM) with synthetic magnetic field using cluster Gutzwiller mean field (CGMF) and Exact diagonalization (ED) methods. As a possible experimental signature, we calculate the two-point correlation function to distinguish the QH and SF states in CGMF. While in the case of ED method, we identify the QH and SF states based on the Penrose-Onsager criterion and von Neumann entropy.

Institute for Theoretical Physics