Phase Identification and Thermometry of Condensates in 2D Optical Lattices

ERIC DUCHON, The Ohio State University, YASUYUKI KATO, NAOKI KAWASHIMA, Institute for Solid State Physics, Tokyo, NANDINI TRIVEDI, The Ohio State University — Definitive identification of the phases in a periodic optical lattice and an overall confining potential continues to present difficulties. By direct comparison of density images from experiments\(^2\) of bosons on 2D optical lattices to QMC density profile calculations\(^3\), we differentiate between Mott insulator, superfluid and normal phases. Kinks in the compressibility spatially locate the emergence of superfluid order.\(^4\) The temperature is estimated by examining the deviations from integer density of the Mott plateaus as well as from the tails of the density profiles.

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