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Calculation of BEC transition using the Mathieu equation[1] QINQIN LU, Louisiana State University, KELLY PATTON, Seoul National University , DANIEL SHEEHY, Louisiana State University — While most calculations of the properties of bosons in optical lattices focus on the tight-binding Hubbard model regime, generally the single-particle states of bosons in an optical lattice satisfy the Mathieu equation. We have developed a formalism for studying bosons in an optical lattice using the Mathieu equation. The Mathieu equation formalism provides a natural way to explore physics in regimes where the Hubbard model description breaks down. We use this formalism to compute the momentum distribution of bosons in an optical lattice as probed in time-of-flight expansion, as well as finite size effects and signatures of the phase transition.

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