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Coexistence of superfluid and Mott phases of strongly-interacting lattice bosons[1] COURTNEY LANNERT, Wellesley College, ROMAN BARANKOV, SMITHA VISHVESHWARA, UIUC — Recent experiments on strongly-interacting bosons in optical lattices [1,2] have revealed the co-existence of spatially-separated Mott-insulating and number-fluctuating phases in the presence of an external trapping potential. Employing a simple theoretical model [3], we obtain an effective description of the superfluid state trapped between the Mott states. We calculate the collective excitation spectrum of such a superfluid and its critical temperature, and discuss the crossover between two- and three-dimensional behavior of its thermal properties as a function of the lattice parameters.
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[2] G. K. Campbell, J. Mun, M. Boyd, P. Medley, A. E. Leanhardt, L. Marcassa, D. E. Pritchard, and W. Ketterle, Science **313**, 649 (2006).
[3] R. A. Barankov, C. Lannert, and S. Vishveshwara, cond-mat/0611126.

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