

Abstract Submitted
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Phase diagram of two-species hard-core bosons in a two-dimensional optical lattice¹ KALANI HETTIARACHCHILAGE, VALÉRY ROUSSEAU, KA-MING TAM, MARK JARRELL, JUANA MORENO, Louisiana State University, Baton Rouge, LA — We study the finite temperature phase diagram as a function of doping for strongly correlated two-species hard-core bosons in a two-dimensional optical lattice by using Quantum Monte Carlo simulations. This model contains a repulsive interspecies interaction and different hopping terms between nearest neighbors of the two species. The phase diagram shows several competing phases such as an anti-ferromagnetically ordered Mott insulator, a coexistent, a phase separated, a superfluid and a normal liquid phases. Among them, coexistence of anti-ferromagnetic and superfluid phases near half filling and a phase separated region inside superfluid region away from half filling are of main interests. Mott behaviors of heavy species and Mott and superfluid behaviors of light species at low temperatures create this novel phase separation region. At high temperatures only a normal liquid phase appears.

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Kalani Hettiarachchilage
Louisiana State University, Baton Rouge, LA

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