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Coupled-channels analysis of Feshbach resonances in a Mott insulator THOMAS SECKER, SERVAAS KOKKELMANS, Eindhoven University of Technology — Ultracold atomic gas experiments have proven to be a versatile ground for studying quantum mechanics, quantum many-body physics, quantum simulation and computation. A precise model for two-body collisions in those systems is essential. Coupled-channels models can accurately describe the two-atom system at ultracold temperatures by detailed interaction potentials that are finetuned by just a few parameters, determined from experiment. We extend such a coupled-channels model to include the situation in a Mott insulator phase of ultracold bosonic atoms, where two atoms are confined to one lattice site. Of particular importance is the specific conversion between the on-site interaction energy, which remains finite in the lattice, and the scattering length around a Feshbach resonance that diverges. Recently spectroscopic techniques allowed for a precise experimental determination of the on-site interaction energy in a system of ^{7}Li atoms [1], we analyze this data with our model to improve the precision of current lithium interaction potentials.

[1]J. Amato-Grill, N. Jepsen, I. Dimitrova, W. Lunden, W. Ketterle, arXiv:1809.06891 [cond-mat.quant-gas] (2018).

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