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Extraction of Bose-Hubbard parameters from a 1D microscopic model[1] TOM KRISTENSEN, ANDREA SIMONI, Universit de Rennes 1 — The Bose-Hubbard model is a powerful tool to understand the many-body physics of cold atoms in lattices. The link between its parameters and the underlying microscopic model is therefore of outstanding importance. The standard Bose-Hubbard model assumes that (i) the excited energy bands are neglected, (ii) tunneling is allowed only between nearest neighbors and (iii) the interaction only acts on-site. However it has been shown in Ref. [1] from an exact 2-body 1D calculation that the effective interaction of two cold atoms in a lattice strongly depends on the center-of-mass motion, a behavior not predicted by the standard Bose-Hubbard model. We present here an approach to extract effective Bose-Hubbard parameters from a microscopic two-body model that is based on the solution of the Schrdinger equation in a lattice without approximations. As a crucial intermediate we compute the two-body interacting Green function, expressed in terms of regular and irregular solutions. In order to avoid solution linear-dependence problems, we adapt the algorithm of Ref. [2] to our spectral-element solution approach. [1] H. Terrier *et al.*, Phys. Rev. A **93**, 032703 (2016) [2] S. J. Singer *et al.*, J. Chem. Phys. **87**, 4762 (1987)

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