Quantum Monte Carlo simulations of resonantly interacting ultracold atoms VALY ROUSSEAU, PETER DENTENEER, Universiteit Leiden — A one-dimensional Hubbard-like model with a term describing conversion of two atoms into a bound state ("molecule") is presented. This model is thought to be relevant for ultra-cold atoms in an optical lattice, interacting via a Feshbach resonance. The model is solved exactly by means of Quantum Monte Carlo simulations, which allow for the measurement of physical quantities of interest, such as the superfluid density and (quasi)condensate fraction. The calculated momentum distribution function is directly comparable with experiments. Results are also confronted with mean-field theory which may be expected to give a poorer description of quantum fluctuations, especially for one-dimensional systems.

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