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# Quantum phases of one-dimensional soft-core systems

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## Résumé

Rydberg-excited atoms have provided an experimental realization of strong repulsive non-local van der Waals interactions [1]. In two and three dimensions, it was showed theoretically that these soft-core interactions can engender exotic phases such as supersolid states.

In the present work, we study the quantum phases of one-dimensional soft-core systems. They can be described by a longer-range extended Hubbard model with frustrating couplings.

The phase diagram of spinless fermions interacting via these finite-range soft-core potentials, exhibits a quantum liquid phase beyond the Tomonaga-Luttinger liquid picture [2]. It involves new features such as cluster-type correlation functions.

We continue the study of this phase diagram and we also introduce a spin degree of freedom.

References:

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