Ultra-cold alkaline-earth atoms in one dimension

Valentin Bois[1,*]

[1] *Laboratoire de Physique Théorique et Modélisation (LPTM, CNRS/UMR 8089), 2 Avenue Adolphe Chauvin, 95 000, Cergy-Pontoise, France*

Fermionic ultra-cold alkaline-earth atomic gases have recently acquired a great interest both experimental [2–4] and theoretical [1]. Recent experiences have shown that at very low energy, interactions between such atoms hardly depend, except *via* the fermionic statistic, on their nuclear spin. This so particular structure provides very high degrees of symetries to these systems, in particular the realisation of a degenerate fermionic gas with an extended SU(N) symmetry, N being the number of nuclear-spin states. In this work, we study, by low-energy approach and by numerical methods, the nature of Mott-insulating phases of these ultra-cold atoms trapped on unidimensional-optical lattices.

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*valentin.bois@u-cergy.fr