

Fractional Exclusion Statistics in the nonstandard Hubbard model with next-nearest-neighbor correlated hopping.

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ABSTRACT

Recent progress in experiments with ultra-cold atomic gases offers possibility of realisation of systems with strong correlated hopping (CH). Such strong CH, together with normal hopping, may lead to complete blocking of certain tunnelling processes – the hallmark of extremal correlations. Recently [1] we have analysed the experimentally motivated problem of fermions on one-dimensional, spin-dependent shifted optical lattices. We have shown that such systems are described by a nonstandard Hubbard model with next-nearest-neighbor CH and solved the model in the limit of extremal correlations by exact mapping it on the effective spinless fermion system in the reduced Hilbert space. In this contribution we study the consequences of Hilbert space dependence on system excitations. We show that those excitations have fractional exclusion statistics. In particular we report a rare example of semionic gas of itinerant fermions.

References

- [1] Ravindra W. Chhajlany, Przemysław R. Grzybowski, Julia Stasińska, Maciej Lewenstein, and Omjyoti Dutta *Hidden String Order in a Hole Superconductor with Extended Correlated Hopping*, Phys. Rev. Lett. **116**, 225303 (2016).