Abstract Submitted
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One Dimensional Gas of Bosons with Feshbach Resonant Interactions[1] VICTOR GURARIE, University of Colorado — We present a study of a gas of bosons confined in one dimension with Feshbach resonant interactions, at zero temperature. Unlike the gas of one dimensional bosons with non-resonant interactions, which is known to be equivalent to a system of interacting spinless fermions and can be described using the Luttinger liquid formalism, the resonant gas possesses novel features. Depending on its parameters, the gas can be in one of several regimes. In the most interesting of them, it is equivalent to a Luttinger liquid at low density only. At higher density its excitation spectrum develops a minimum, similar to the roton minimum in helium, at momenta where the excitations are in resonance with the Fermi sea. As the density of the gas is increased further, the minimum dips below the Fermi energy, thus making the ground state unstable. At this point the standard ground state gets replaced by a more complicated one, where not only the states with momentum below the Fermi points, but also the ones with momentum close to that minimum, get filled, and the excitation spectrum develops several branches.

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