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Spin ladders, BEC, Luttinger liquids and beyond

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Effects of interactions change drastically with dimension. In particular, in one dimension, the canonical description of interacting systems, namely the Fermi liquid theory, is replaced by the so called Luttinger liquid, with drastically different properties. Hunting for Luttinger liquids, despite the ever growing number of one dimensional systems, is a very challenging task. I will review the important properties of such systems, and will show how recently examined spin ladder system offer a unique opportunity to test for such a Luttinger liquid physics. I will also show how these systems present the challenge of going from the one dimensional world, where spins behave essentially as fermions, to the three dimensional one where they behave essentially as bosons and can lead to Bose-Einstein condensation.