

Abstract Submitted  
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**Interacting vs. free quasiparticle description for the spin-1/2 chain**<sup>1</sup> SEBASTIAN EGGERT, MICHAEL BORTZ, University Kaiserslautern, MICHAEL KARBACH, University Wuppertal, IMKE SCHNEIDER, University Kaiserslautern — We consider the individual excitations of the antiferromagnetic spin-1/2 chain in the Luttinger Liquid formalism. The inclusion of Umklapp scattering and other irrelevant operators introduces an interaction between quasiparticles, which lifts the degeneracy in the linearized spectrum. So far this effect has been systematically understood only for the lowest excited state in each sector. We now show for a number of low lying excitations how rotations in the degenerate subspaces diagonalize the Umklapp term perturbatively. Our results are verified by taking advantage of the Bethe solution of the spin chain to perform an exact finite size scaling analysis for individual excited levels. From this we can identify the correspondence of quantum numbers between the bosonic and Bethe states. We also make contact to the well known quantum numbers at the non-interacting free fermion point.

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