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Bethe bound states and spin transport

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Spin transport in the paramagnetic XXZ model exhibits simultaneous ballistic and diffusive transport at all non-zero temperatures, which stems from the partial conservation of the local spin current. At $T=0$ the absence of Bethe bound states, or strings, yields purely ballistic spin transport, however investigations at non-zero temperatures suggest that the Bethe strings play a key role. High temperature properties of the non-linear spin transport further supports this idea that the bound states must be understood to account for non-zero temperature transport. This raises many questions about what form a low temperature field theoretical description should take, since standard non-linear Luttinger liquid methods predict a ballistic transport temperature scaling inconsistent with the BA results. This presentation aims to collate different methods and by comparing them suggest future directions for investigation of both ballistic and diffusive transport at all temperature regimes in the XXZ model.

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