

CMP Seminar

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Anomalous transport in integrable spin chains

The XXZ spin chain is a canonical model of one-dimensional quantum magnetism. We consider spin transport at nonzero temperature in this model. Spin transport is ballistic in the easy-plane regime, diffusive in the easy-axis regime, and superdiffusive at the isotropic Heisenberg point. Energy transport, by contrast, is ballistic in all cases. The framework of generalized hydrodynamics offers an elementary explanation of these phenomena [1] in terms of the quasiparticle content of the XXZ model. It also predicts new transport anomalies, e.g., in local relaxation in the easy-axis regime in the presence of a magnetic field [2], and in the a.c. conductivity in the easy-plane regime [3]. These anomalies come from the asymptotic behavior of large bound states of many quasiparticles, as we will discuss.

[1] SG, R. Vasseur, PRL 122, 127202 (2019)

[2] SG, R. Vasseur, B. Ware, PNAS 116, 16250 (2019)

[3] U. Agrawal, SG, R. Vasseur, and B. Ware, arXiv:1909.05263

Monday, February 17, 2020 at 4:10 p.m.

Room: 1400 BPS Bldg.

Host: Mohammad Maghrebi