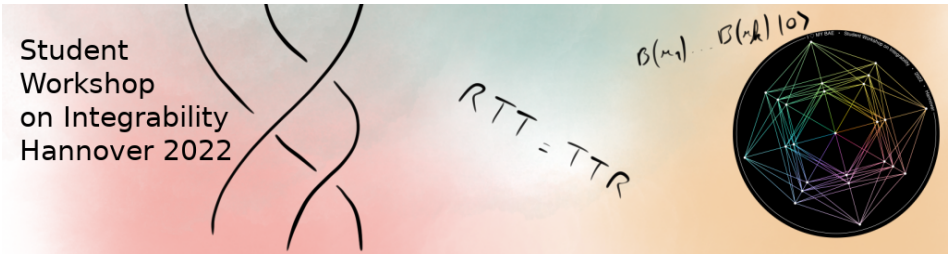


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# Ballistic Fluctuation theory: correlation functions and entanglement entropy

*Wednesday, 30 March 2022 09:00 (1 hour)*

In integrable models when an operator couples to a conserved charge its decay will be algebraic along rays in spacetime due to few-body scattering processes giving rise to 'sound waves' ballistically propagating. There are example of operators that do not produce these waves but still encode fundamental information. Remarkable examples are the so called twist fields, present whenever there is an internal symmetry. Twist fields are responsible for exponential decay of order parameter dynamical correlation functions in spin chains and are directly related to entanglement entropy. Ballistic Fluctuation Theory(BFT) is the theory of large deviations for ballistic transport. When a conserved charge is transported through the system, Euler equations for macroscopic densities and currents give a hydrodynamic description of the quasi-particle excitations. For integrable models BFT provides an exact expression of current fluctuations which in turn determine the spacetime behavior of correlations of the aforementioned twist fields. As a simple demonstration, I will show the application of these ideas to two cases: the calculation of dynamical correlation functions of order parameters in the XX model and computation of entanglement entropies in free theories. If time allows I will sketch the more complicated situation of interacting theories.

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