Contribution ID: **39** Type: **not specified**

Matrix product state methods for excitations

Wednesday, 27 March 2024 14:00 (20 minutes)

In recent years, matrix product state (MPS) numerics have emerged as the method of choice for examining the low-energy physics of many-body quantum systems in one spatial dimension, as well as small-width 2D systems. While the density matrix renormalisation group (DMRG) algorithm is used to calculate ground states, analysis of the low-lying excitations is typically doing using time-evolution simulations. In this talk, we will look at the MPS excitation ansatz, a complementary approach which efficiently represents low-energy particle-like excitations directly in the thermodynamic limit. We will highlight recent work in finding partlce-like excitations inside of scattering continua, as well as constructing real-space wavepackets to examine particle scattering.

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Session Classification: Symposia talks

Track Classification: Contributed talk