Contribution ID: **137** Type: **not specified**

Numerical calculation of dynamical structure factor for various total spin quantum numbers using tensor network

Thursday, 28 August 2025 16:54 (3 minutes)

We present a novel approach that combines tensor networks with generating functions to compute the dynamical structure factor of one-dimensional quantum spin chains with spin values S=1/2,1,3/2, and 2. We will compare our results with those from the Lanczos method and linear spin wave theory. Furthermore, we will assess if the obtained spectral shapes and low-energy excitations align with experimental data for 1D materials, discussing the method's applicability to real materials.

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Session Classification: Poster

Track Classification: Poster presentation