Condensed Matter > Statistical Mechanics

Quantum spin chains of Temperley-Lieb type: periodic boundary conditions, spectral multiplicities and finite temperature

Britta Aufgebauer, Andreas Kluemper

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We determine the spectra of a class of quantum spin chains of Temperley-Lieb type by utilizing the concept of Temperley-Lieb equivalence with the S=1/2 XXZ chain as a reference system. We consider open boundary conditions and in particular periodic boundary conditions. For both types of boundaries the identification with XXZ spectra is performed within isomorphic representations of the underlying Temperley-Lieb algebra. For open boundaries the spectra of these models differ from the spectrum of the associated XXZ chain only in the multiplicities of the eigenvalues. The periodic case is rather different. Here we show how the spectrum is obtained sector-wise from the spectra of globally twisted XXZ chains. As a spin-off, we obtain a compact formula for the degeneracy of the momentum operator eigenvalues. Our representation theoretical results allow for the study of the thermodynamics by establishing a TL-equivalence at finite temperature and finite field.

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