

The gapped phases of $O(n)$ quantum spin chains

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The ground state phase diagram of the $O(n)$ quantum spin chains with nearest neighbor interactions, for $n \geq 2$ or larger, shows two gapped phases separated by a critical point often referred to as the Reshetikhin point. One of the phases contains the $SU(n)$ invariant $P^{\wedge}\{(0)\}$ model which has been analyzed using the Temperley-Lieb algebra and, more recently, by a random loop model. These works show the ground state to be dimerized. The other phase contains a special point with exact MPS ground states that generalize the AKLT state (corresponding to the case $n=3$). For even n , that point too is a phase with breaking of the translation invariance down to period 2. We show that it is not dimerized in the usual sense of the term and uncover other interesting new properties (joint work with Michael Ragone).

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