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Contractor-Renormalization approach to frustrated magnets in a magnetic field ANDREAS ABENDSCHEIN, SYLVAIN CAPPONI, Laboratoire de Physique Theorique, Universite Paul Sabatier, CNRS - Toulouse, France — We propose to use the Contractor Renormalization (CORE) technique in order to derive effective models for quantum magnets in a magnetic field. CORE is a powerful non-perturbative technique that can reduce the complexity of a given microscopic model by focusing on the low-energy part. We provide a detailed analysis of frustrated spin ladders which have been widely studied in the past: in particular, we discuss how to choose the building block and emphasize the use of their reduced density matrix. With a good choice of basis, CORE is able to reproduce the existence or not of magnetization plateaux in the whole phase diagram contrary to usual perturbation theory. Furthermore, we present recent results for other, potentially more interesting geometries like the Heisenberg bilayer where we also address the issue of plateau formation and point out the analogy between non-frustrated strongly anisotropic models and frustrated SU(2) ones. Finally, we investigate the magnetization curve of the Shastry-Sutherland model and, however in absence of a magnetic field, we consider the square lattice with four-spin ring-exchange.

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