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Validity of Spin Wave Approximation for the Quantum Heisenberg Ferromagnet

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We consider the quantum ferromagnetic Heisenberg model in three dimensions, for all spins $S \geq \frac{1}{2}$. We report on a rigorous proof of the validity of the spin-wave approximation for the excitation spectrum, at the level of the first non-trivial contribution
to the free energy at low temperatures. Our proof comes with explicit,
constructive upper and lower bounds on the error term. Such estimates are obtained combining the bosonic Holstein-Primakoff representation of the Heisenberg model with localization bounds and operator inequalities.
Joint work with A. Giuliani (Roma 3) and R. Seiringer (IST Austria).

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