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## Phase diagram of the J1-J2 quantum Heisenberg model for arbitrary spin

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We use the spin functional renormalization group to investigate the J1-J2 quantum Heisenberg model on a square lattice. By incorporating sum rules associated with the fixed length of the spin operators as well as the nontrivial quantum dynamics implied by the spin algebra, we are able to compute the ground state phase diagram for arbitrary spin  $S$ , including the quantum paramagnetic phase at strong frustration. Our prediction for the extent of this paramagnetic region for  $S = 1/2$  agrees well with other approaches that are computationally more expensive. We find that the quantum paramagnetic phase disappears for  $S > 5$  due to the suppression of quantum fluctuations with increasing  $S$ .

**Author:** RÜCKRIEGEL, Andreas

**Presenter:** RÜCKRIEGEL, Andreas

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