DIAGONALIZATION OF A BOSONIC QUADRATIC FORM USING CCM: APPLICATION ON A SYSTEM WITH TWO INTERPENETRATING SQUARE LATTICE ANTIFERROMAGNETS

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While the diagonalization of a quadratic bosonic form can always be done using a Bogoliubov transformation, the practical implementation for systems with a large number of different bosons is a tedious analytical task. Here we use the coupled cluster method (CCM) to exactly diagonalise such complicated quadratic forms. This yields to a straightforward algorithm which can easily be implemented using computer algebra even for a large number of different bosons. We apply this method on a Heisenberg system with two interpenetrating square lattice antiferromagnets, which is a model for the quasi 2D antiferromagnet $Ba_2Cu_3O_4Cl_2$. Using a four-magnon spin wave approximation we get a complicated Hamiltonian with four different bosons, which is treated with CCM. Results are presented for magnetic ground state correlations.

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