**A systematic method for constructing a spin-singlet basis for quantum antiferromagnets**[1] VLADIMIR GRITSEV, Department of Physics, Harvard University, JULIEN SUDAN, DIONYS BAERISWYL, Department of Physics, University of Fribourg, Switzerland — We present a new method for constructing a complete orthonormal basis for the singlet states of quantum spin-1/2 lattice systems. Our approach can be used for any dimension and an arbitrary lattice symmetry. In this talk the main group- and graph-theoretical steps are explained. The general theory is then applied to the one-dimensional quantum antiferromagnet. Exploiting the symmetries of closed rings, we can drastically reduce the number of basis states for the different eigenstates of the Hamiltonian (in the singlet sector). The method allows to calculate in an efficient way expectation values of any operator.

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