Neutron scattering studies of non-metallic low-dimensional quantum antiferromagnets

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I review experiments which probe cooperative phenomena in non-metallic quantum antiferromagnets. Emphasis is placed on systems which because of reduced dimensionality, weak connectivity or frustration have strong magnetic fluctuations even when the thermal energy is far less than the dominant exchange constant $T << J/k_B$. In the first part of the talk I describe the origin of and basic properties of interacting quantum spins in organic magnets and transition metal oxides. Then I describe the experimental techniques which are used to study these systems paying special attention to inelastic magnetic neutron scattering and to the properties of conventional Neél antiferromagnets as probed by these techniques. In the second part of the talk I discuss recent experimental results for S=1/2 and S=1 linear chain antiferromagnets first at T=0 and in zero magnetic field, then at finite temperatures and in a magnetic field. I also discuss results from more complicated one dimensional spin systems such as zig-zag chains, alternating spin chains and spin-ladders. The last part of the talk deals with quantum antiferromagnetism in two and perhaps three dimensions. Emphasis will be on describing recent scattering experiments in triangular and kagomé lattice antiferromagnets and in the insulating parent compounds of high T_c superconductors.