

Complexity in Molecular Magnets

Dante Gatteschi

INSTM; University of Florence

dante.gatteschi@unifi.it

Beyond being an intrinsically difficult field Magnetism provides many opportunities of observing complex phenomena. By this I mean systems whose properties can dramatically change for small variations of the control parameters. I will work out some example taken from molecular magnetic materials. In fact there are several origins of complexity in this type of materials, one of them being spin frustration. This term designates systems where a set of given spins is under the influence of conflicting interactions. The simplest case is given by a triangle of spins under the influence of an antiferromagnetic coupling. It is a simple exercise to verify that there is no way to have all the spin pairs up-down $\downarrow\uparrow$. The result is a largely degenerate ground state, which is prone to adjust through either phonon or spin-orbit coupling. Examples of this behaviour will be provided starting from V15 and the so-called spin Möbius strip.

Another field of complex behaviour is provided by the so-called Single Chain Magnets, SCM, one dimensional polymers which relax slowly at low temperature. The spin dynamics in some cases conforms to superparamagnetic and sometimes to spin glass behaviour, by subtle variations of the control parameters. Rules for understanding the two limit situations will be provided.

