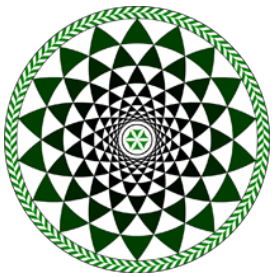

Contribution ID: **54** Type: **oral presentation**

Probing temperature changes in magnetocaloric molecular matter

Thursday, July 6, 2017 9:00 AM (40 minutes)

Many molecular materials have been proposed for low-temperature magnetic refrigeration, due to the high magnetic degeneracies that can be built in by the appropriate choice of the metal ion and a favourable exchange coupling scheme. Almost all these studies have relied on calculating the magnetocaloric effect (MCE) from magnetization and/or heat capacity experimental data, which are analysed to predict some maximum magnetic entropy change for a maximum field change. Such indirect measurements of the MCE can give impressive headline figures but are blind to the structure and true beauty of the isentropes that are a function of the magnetic interactions. Recently, we have developed an experimental method to measure directly the MCE by following the temperature evolution induced by continuous field variations over magnetization-demagnetization cycles under controlled quasiadiabatic conditions, down to sub-Kelvin temperatures [1,2,3]. Our results show that it is possible to design the cooling properties of molecular materials by choosing an appropriate topology of magnetic couplings between the interacting spins, hence exploiting the great control of the latter given by molecular coordination chemistry.

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Session Classification: Molecular Magnets & Conductors

Track Classification: Molecular magnets and nanomagnets