Contribution ID: **385** Type: **Oral (Student, In Competition) / Orale (Étudiant(e), inscrit à la compétition)**

Phase transition of the escape rate in dimer model

Tuesday 17 June 2014 16:45 (15 minutes)

We study the phase transition of the escape rate of exchange-coupled dimer
of single-molecule magnets which are coupled either ferromagnetically or antiferromagnetically in a staggered magnetic field and an easy z-axis anisotropy. The Hamiltonian for this system has been used to study dimeric molecular nanomagnet $[Mn_4]_2$ which is comprised of two single molecule magnets coupled antiferromagnetically. We generalize the method of mapping a single-molecule magnetic spin problem onto a quantum-mechanical particle to dimeric molecular nanomagnets. The problem is mapped to a single particle quantum-mechanical
Hamiltonian in terms of the relative coordinate and a coordinate dependent reduced mass. It is shown that the presence of the external staggered magnetic field creates a phase boundary separating the first- from the second-order transition. With the set of parameters used by R. Tiron, *et al* , \prl {\bf 91}, 227203 (2003), and S. Hill, *et al* science {\bf 302}, 1015 (2003) to fit experimental data for $[Mn_4]_2$ dimer we find that the critical temperature at the phase boundary is $T_0^{(c)} = 0.29K$. Therefore, thermally activated transitions should occur for temperatures greater than $T_0^{(c)}$.

Author: Mr OWERRE, Solomon Akaraka (University of Montreal)

Co-author: PARANJAPE, Manu (Université de Montréal)

Presenter: Mr OWERRE, Solomon Akaraka (University of Montreal)

Session Classification: (T3-6) Control of dynamical properties- DCMMP / Contrôle de propriétés dynamiques - DPMCM

Track Classification: Condensed Matter and Materials Physics / Physique de la matière condensée et matériaux (DCMMP-DPMCM)