

日本物理学会九州支部
特別講演会

九州大学大学院理学研究院
物理学部門第11回談話会

Ground State Tunnelling and Spin Phonon Transitions in Mn_{12} -ac

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日時： 8月28日(月) 5:30 pm
場所： 九州大学理学部物理学科第一会議室(2154号室)

Abstract:

The precise manner in which quantum-mechanical behavior at the microscopic level underlies classical behavior at the macroscopic level remains unclear, despite seventy years of theoretical investigation. Experimentally, the cross over between these regimes can be explored by looking for signatures of quantum-mechanical behavior—such as tunnelling—in macroscopic systems. Magnetic systems (such as small grains, spin glasses and thin films) are often investigated in this way because transitions between different magnetic states can be closely monitored. But transitions between states can be induced by thermal fluctuations, as well as by tunnelling, and definitive identification of macroscopic tunnelling events in these complex systems is therefore difficult. We report the results of low-temperature experiments on a single crystal composed of super-paramagnetic manganese cluster (Mn_{12} -ac), which clearly demonstrate the existence of quantum-mechanical tunnelling of the bulk magnetization. In an applied magnetic field, the magnetization shows hysteresis loops with a distinct 'staircase' structure: the steps occur at values of the applied field where the energies of different collective spin states of the manganese clusters coincide. At these special values of the field, relaxation from one spin state to another is enhanced above the thermally activated rate by the action or resonant quantum-mechanical tunnelling. These observations corroborate the results of similar experiments performed recently on a system of oriented crystallized made from a powdered sample.

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講演会終了後、Barbara教授と夕食会を予定しております。
参加御希望の方は、網代まで御連絡下さい。

尚、この講演会は、日本物理学会九州支部と九州大学大学院理学研究院物理学部門共催です。