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Experiments on Magnetic Deflagration

JAVIER TEJADA, University Barcelona

Magnetic deflagration was first observed in molecular magnets [1,2] and then in glassy magnetic materials like manganites [3,4] and intermetallic systems like Gd_5Ge_4 [5]. The role of the chemical energy is played by the magnetic energy of the material. In the case of a molecular magnet, this is Zeeman energy, while in manganites and Gd_5Ge_4 the free energy is a combination of the Zeeman energy and the energy of the metastable magnetic phase. In molecular magnets both the ignition process and the speed of the flame are assisted by quantum spin reversal [2]. There also exists some evidence of the transition from deflagration to detonation [6]. Various experimental techniques have been used to detect the speed of the magnetic flame. They include SQUID magnetometry, Hall bars and coils. Magnetic deflagration has been ignited by local heating, application of external fields, by surface acoustic waves and microwaves. High frequency EPR measurements of the population of spin levels permitted observation of magnetic deflagration in real time. The talk will review these experiments and their interpretation.

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