

Self-induced spin glass phase in dhcp Nd

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One of the most intriguing phases of magnetic order is manifested by the spin glass state. These systems exhibit glassy dynamics, including ageing and memory effects. Their peculiar dynamics can be explained from an energy landscape with several local minima combined with larger energy barriers resulting in non-ergodic behavior. Such energy landscapes have historically been associated with disorder and thus spin glass dynamics have been expected to only occur in chemically disordered materials, such as transition metal alloys.

Here we will present recent theoretical and experimental findings [1] of glassy dynamics in a material with limited chemical disorder: thick films of elemental crystalline Nd. In bulk, Nd crystallizes in the dhcp structure and earlier studies have indicated the existence of several non-collinear states across its phase diagram. We will discuss our interpretation that the low temperature state of dhcp Nd can in fact be described as a self-induced spin glass and how the exchange interactions in the material can cause the energy landscape that drives the glassy dynamics.

References:

[1] U. Kamber, A. Bergman, A. Eich, D. Iuşan, M. Steinbrecher, N. Hauptmann, L. Nordström, M. I. Katsnelson, D. Wegner, O. Eriksson, and A. A. Khajetoorians, *Science* 6757 **368** (2020)