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Magnetic Behavior in Magnetocaloric Rare-Earth Nickel Borides, $GdNi_4B$ and $ErNi_4B$

$GdNi_4B$ is currently one of the optimal magnetocaloric materials for hydrogen liquefaction, but the exact theoretical causes for that are unknown. $GdNi_4B$ is a metallic compound exhibiting a ferromagnetic transition at around 50 K, below which they work as a magnetic refrigeration material. Therefore, their ferromagnetic structures should play a key role to determine their optimal magnetic refrigeration performance. Unfortunately, huge neutron absorption of Gd makes it impossible to measure a neutron diffraction pattern. We therefore carried out a muSR experiment on these materials to deduce the magnetic structures with the help of first principles calculations and the muSR data on related materials.

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