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Neutron Depolarisation Imaging Of The Kondo Cluster Glass Formation In CePd(1-x)Rh(x)

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At the neutron imaging beam line ANTARES at FRM II, Munich, we have recently developed the Neutron Depolarisation Imaging (NDI) technique [1,2]. The NDI method, which is a combination of neutron radiography and polarisation analysis, allows mapping of variations of magnetic properties over a sample on a length scale of about 300 μm. These may, for instance, result from variations of the chemical composition of the sample [3]. A closed cycle cryostat in combination with a 3He/4He dilution insert has enabled us to reach temperatures as low as 75 mK in such measurements. A study on the metallurgically inhomogenous Kondo lattice system CePd(1-x)Rh(x) [4,5] has been performed to demonstrate the potential of the NDI technique at such low temperatures. Additional magnetic fields applied at the sample position allowed us to identify spin glass behaviour in CePd(1-x)Rh(x) at low temperatures for moderate Rh concentration x. In our contribution we will discuss the experimental technique as well as its application to disordered, ferromagnetic materials that undergo quantum phase transitions.

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Primary author: SCHMAKAT, Philipp (Physik-Department E21, Technische Universität München, D-85748 Garching, Germany)

Co-authors: PFLEIDERER, Christian (Physik-Department E21, Technische Universität München, D-85748 Garching, Germany); GEIBEL, Christoph (Max-Planck-Institut für Chemische Physik fester Stoffe, D-01187 Dresden, Germany); BRANDO, Manuel (Max-Planck-Institut für Chemische Physik fester Stoffe, D-01187 Dresden, Germany); DEPPE, Micha (Max-Planck-Institut für Chemische Physik fester Stoffe, D-01187 Dresden, Germany); SCHULZ, Michael (Forschungs-Neutronenquelle Heinz Maier-Leibnitz (FRM II), D-85748 Garching, Germany); BÖNI, Peter (Physik-Department E21, Technische Universität München, D-85748 Garching, Germany)

Presenter: SCHMAKAT, Philipp (Physik-Department E21, Technische Universität München, D-85748 Garching, Germany)

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