Extending the (H,T) space to high fields for better understanding of exciting phenomena

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Neutron spectroscopy has been one of the key techniques for understanding the origin of fascinating phenomena in strongly correlated electron systems, including lanthanide and actinide compounds. Rich (H,T) phase diagrams and exotic ground states do not only provide fields for curiosity driven science. The investigation of field-induced phase transitions and the character of the related phases finally allows to learn about the basic origins of (partially long-known or newly observed) phenomena, and therefore opens chance for tuning interactions and couplings to realise desired properties.

The availability of magnetic fields far above 20$\dot{\text{T}}$ for macroscopic properties combined with enhanced modelling exceeds former limits now. Magnetic fields can modify the CEF levels, change the topology of Fermi surfaces, and influence magnetic and superconducting properties. Examples for Ce- and U-based compounds will be discussed where the study of high-field phases gives systematically more insight into their physical properties.

Furthermore, increasing the magnetic field amplifies the splitting of (inelastic) signals, too, and therefore either leads to reliable results, or could give first hints to weak effects like crystallographic superstructures or weak anisotropy.