Contribution ID : **121** Type : **Oral**

Ultrahigh-resolution neutron spectroscopy of low-energy spin dynamics in UGe_2

Tuesday, 3 December 2019 11:30 (15)

Studying the prototypical ferromagnetic superconductor UGe_2 we demonstrate the potential of the newly developed longitudinal modulated intensity by zero effort (MIEZE) technique for the study of quantum matter. MIEZE is a novel neutron spectroscopy method with ultrahigh energy resolution of at least 1μeV at the RESEDA beamline at the Heinz Maier-Leibnitz Zentrum in Garching, Germany. Unlike other spin echo techniques, MIEZE encodes the resolution via a modulation of the neutron beam intensity and is insensitive to depolarization at the sample position and can even be combined with magnetic fields. Further, by performing the experiment in small angle neutron scattering (SANS) geometry, this simultaneously allowed us to resolve momentum transfers down to 0.015 $Å^{-1}$. In the case of UGe_2, we reveal purely longitudinal spin fluctuations with a dual nature arising from $5f$ electrons that are hybridized with the conduction electrons. Local spin fluctuations are perfectly described by the Ising universality class in three dimensions, whereas itinerant spin fluctuations occur over length scales comparable to the superconducting coherence length, showing that MIEZE is able to spectroscopically disentangle the complex low-energy behavior characteristic of quantum materials.

[1] F. Haslbeck, et al., Phys. Rev. B 99 014429 (2019)

Speakers Gender

Male

Travel Funding

No

Level of Expertise

Student

Do yo wish to take part in the poster slam

Yes

Primary author(s) : Mr HASLBECK, Franz X. (Physics Department, Technical University of Munich, Germany; Institute for Advanced Study, Technical University of Munich, Germany)

Co-author(s) : Dr SÄUBERT, Steffen (Physics Department, Technical University of Munich, Germany; Forschungs-Neutronenquelle Heinz-Maier Leibnitz (FRMII), Germany; Department of Physics, Colorado State University, Colorado, USA); Mr SEIFERT, Marc (Physics Department, Technical University of Munich, Germany; Forschungs-Neutronenquelle Heinz-Maier Leibnitz (FRMII), Germany); Dr FRANZ, Christian (Forschungs-Neutronenquelle Heinz-Maier Leibnitz (FRMII), Germany); Dr SCHULZ, Michael (Forschungs-Neutronenquelle Heinz-Maier Leibnitz (FRMII), Germany); Dr HEINEMANN, Andre (German Engineering Materials Science Centre at Heinz Maier-Leibnitz Zentrum Garching, Germany); Dr KELLER, Thomas (Max-Planck-Institut für Festkörperforschung, Germany; Max Planck Society Outstation at the Forschungsneutronenquelle Heinz Maier-Leibnitz, Germany); Dr THOMPSON, Joe D. (Los Alamos National Laboratory, New Mexico, USA); Dr BAUER, Eric D. (Los Alamos National Laboratory, New Mexico, USA); Prof. PFLEIDERER, Christian (Physics Department, Technical University of Munich, Germany); Dr JANOSCHEK, Marc (Institute for Advanced Study, Technical University of Munich, Germany; Los Alamos National Laboratory, New Mexico, USA; Laboratory for Scientific Developments and Novel Materials, Paul Scherrer Institut, Villigen PSI, Switzerland)

Presenter(s) : Mr HASLBECK, Franz X. (Physics Department, Technical University of Munich, Germany; Institute for Advanced Study, Technical University of Munich, Germany)

Session Classification : Session 16

Track Classification : Spectroscopy