PAUL SCHERRER INSTITUT

Invitation

LMU-Seminar

Title: **Microscopic parameters of superconductors from μSR spectra. What can we learn from the intermediate state?**

Speaker: **Prof. Vladimir Kozhevnikov**
Tulsa Community College, USA

Time: **Wednesday, November 12, 2014, 10:00**

Place: **WBGB/019**

Abstract:

The measurement of microscopic parameters, viz. the coherence length ξ and the penetration depth λ, is one of the most fundamental problems of experimental superconductivity. Attempts to solve this problem are conducted over more than seven decades. In recent years it was demonstrated that in type-I superconductors both ξ and λ can be deduced from the profile of the penetration field in the Meissner state. In type-II materials ξ can be calculated from Hc2 of the samples with zero demagnetizing factor η that is at high fields; and λ can be measured at the Meissner state (low fields). On the other hand, a potentially universal approach for simultaneous determination of ξ and λ at any field is to deduce them from muSR spectra (or other magnetic properties) of the samples with η close to unity in the intermediate state (IS) for type-I and in the mixed state (MS) for type-II superconductors, provided that quantitatively consistent

Theoretical models of these states are available. As of today the latter condition is not fulfilled, neither for the IS nor for the MS. The IS and MS are two superconducting states with non-zero average induction, meaning that some properties of these states, in particular the field distribution and the domain/vortex shape near the sample surface, can be similar. The near-surface characteristics of the IS and of the MS play a major part in forming an equilibrium magnetic structure and are therefore important for all equilibrium properties of real samples in these states. In this talk I will discuss the recent progress achieved in understanding of the IS[1] and present the most recent results on the near-surface magnetic structure of the IS, directly proving that “There are more things in Heaven and Earth, Horatio, than are dreamt of in your philosophy.” Relevance of these things to type-II superconductors will be discussed as well.

1) V. Kozhevnikov et al., PRB 89, 100503(R) (2014); V. Kozhevnikov and C. Van Haesendonck, PRB 90, 104519 (2014).