Contribution ID: **45** Type: **Oral contribution**

muSR study of unconventional superconductors

Sunday, 16 April 2023 10:40 (30 minutes)

In this talk, I will introduce the muon spin rotation/relaxation (muSR) method in application to study superconducting materials. I will also present our experimental results obtained on several unconventional superconducting systems, including Sr2RuO4, Ba1-xKxFe2As2 and FeSe, under various experimental conditions (in zero and applied magnetic field, under hydrostatic and uniaxial pressure) down to mK temperatures [1-5]. In this study, we mainly focused on studying one of the most unusual properties of unconventional superconductivity is the possibility of generating superconducting currents spontaneously while cooling the samples below the superconducting transition temperature. The related spontaneous magnetic fields are tiny and can be as small as fractions of Oersted. Therefore, most of the existing experimental techniques are not capable of detecting these currents. Here I will show how these small magnetic fields can be observed by muSR.

1. Vadim Grinenko et al., μSR measurements on Sr2RuO4 under ⟨110⟩ uniaxial stress, Physical Review B, 2023, 107: 024508.
2. Vadim Grinenko et al., Split superconducting and time-reversal symmetry-breaking transitions in Sr2RuO4 under stress, Nature Physics, 2021, 17(6): 748-754.
3. Vadim Grinenko et al., Unsplit superconducting and time reversal symmetry breaking transitions in Sr2RuO4 under hydrostatic pressure and disorder, Nature Communications, 2021, 12(1).
4. Vadim Grinenko et al., Superconductivity with broken time-reversal symmetry inside a superconducting s-wave state, Nature Physics, 2020, 16(7): 789-794.
5. Vadim Grinenko et al., Low-temperature breakdown of antiferromagnetic quantum critical behavior in FeSe, Physical Review B, 2018, 97(20): 201102.

Primary author: GRINENKO, Vadim (TD Lee institute)

Presenter: GRINENKO, Vadim (TD Lee institute)

Session Classification: Muon Physics Topic 6

Track Classification: Muon applications