PAUL SCHERRER INSTITUT

Invitation

LMU-Seminar

Title: **Unconventional Superconductivity in Noncentrosymmetric Compounds**

Speaker: **Mr Daniel Mayoh, *Department of Physics, University of Warwick, Gibbet Hill Road, Coventry, CV4 7AL***

Time: **Wednesday, March 20th 2019, 13:30**

Place: **WHGA/121**

Abstract:

For all superconductors, the topology of the electronic band structure, along with the underlying crystal structure, play vital roles in determining the superconducting properties of the material. Systems lacking a centre of inversion exhibit a nonuniform lattice potential, giving rise to a Rashba-type antisymmetric spin-orbit coupling which allows for an admixture of singlet and triplet pairs. This gives rise to exotic superconducting band structures, time-reversal symmetry (TRS) breaking and magnetoelectric effects such upper critical fields that exceed the Pauli limit. Broken TRS is still a relatively rare phenomena in noncentrosymmetric superconductors; it been detected in some of the Re-based α-Mn superconductors, $LaNiC_2$, members of the La_7T_3 (T = transition metal) family and Zr_3Ir. The nature of the pairing states in these superconductors continues to be a puzzling and challenging question.

Firstly, we will discuss our recent measurements of the superconducting state in Re_6Zr [1]. We will then discuss our discovery of broken TRS in the superconducting state of polycrystalline La_7Pd_3 [2] along with the results obtained for other members of the La_7T_3 (T = transition metal) family of superconductors. Finally, the discovery of two noncentrosymmetric superconductors with chiral structures, $TaRh_2B_2$ and $NbRh_2B_2$, has added a new twist to an already exciting area of superconductivity. Here we present our recent observation of multigap superconductivity and Pauli limit violation in $TaRh_2B_2$ and $NbRh_2B_2$. [3, 4].

[1] D. A. Mayoh *et al.*, Phys. Rev. B. 96, 064521 (2017)
[2] D. A. Mayoh, A. D. Hillier, G. Balakrishnan and M. R. Lees, In preparation (2019)
[3] D. A. Mayoh *et al.*, Phys. Rev. B 98, 014502 (2018)
[4] D. A. Mayoh *et al.*, In preparation (2019)