INTERNSHIP PROPOSAL

(One page maximum)

Laboratory name: Laboratoire Léon Brillouin
CNRS identification code: UMR 12
Internship director'surname: McClarty
e-mail: paul.mc-clarty@cnrs.fr Phone number: -
Web page: https://iramis.cea.fr/llb/
Internship location: CEA Saclay

Thesis possibility after internship: NO
Funding: YES If YES, which type of funding: M.ERA

Title Altermagnetism and its generalizations

Summary *An M2 internship in theoretical condensed matter is available to work at Laboratoire Léon Brillouin at CEA Saclay on the physics of altermagnets with close ties to experimental work within the project consortium.*
The field of altermagnetism is one of the most active in condensed matter physics. Altermagnets are relatives of simple antiferromagnets : both have microscopic magnetic moments that are equal and opposite so that the net magnetization is zero. But in altermagnets, the band structure of magnons and electrons are spin-split in an anisotropic manner in momentum space. This has important implications for various observable properties some of which may have important implications for spintronics applications.
At LLB we have a record of theoretical and experimental work on altermagnets. On the experimental side, we have pioneered new approaches to studying altermagnets using polarized neutron scattering. For example, we have used inelastic polarized neutron scattering to image the altermagnetic chirality of magnon modes in MnF2. We have also made the first measurement of the altermagnetic local multipolar order parameter in the same material using polarized elastic scattering. On the theoretical side, we have unified insights into altermagnetism using Landau theory, demonstrated the universality of certain multipolar order and developed the group theory of symmetries in the limit of weak spin-orbit coupling that is relevant to altermagnets.
This is a theoretical project that will connect to ongoing and future experimental work. Our main interest is in non-collinear generalizations of altermagnets and, in particular, making predictions of their distinctive experimental signatures.

Please, indicate which speciality(ies) seem(s) to be more adapted to the subject:

Condensed Matter Physics: YES/NO Soft Matter and Biological Physics: YES/NO
Quantum Physics: YES/NO Theoretical Physics: YES/NO