



2026 Helmholtz – OCPC – Programme

for the involvement of postdocs in bilateral collaboration projects

PART A

Title of the project:

Neutron scattering on emergent magnetic materials

Helmholtz Centre and/or institute:

Forschungszentrum Jülich GmbH

Project leader:

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Department: (at the Helmholtz centre or Institute)

Jülich Centre for Neutron Science (JCNS) at the Heinz Maier-Leibnitz Zentrum (MLZ), Garching

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Description of the project (max. 1 page):

Recent theoretical predictions and experimental realizations of exotic quasi-particles and topological excitations in condensed matter, such as magnetic Weyl fermions in topological semimetals and magnetic monopoles in spin ice, have led to tremendous research interests in emergent magnetic materials. As a unique microscopic probe, neutron scattering is ideally suited for the studies of static and dynamic magnetic correlations in these materials. This can be demonstrated by the recent work carried out in the group led by the project leader [1-6]. The overarching theme of the proposed research project is to use advanced neutron scattering techniques, including polarised neutron scattering and inelastic neutron scattering, to investigate magnetic order and collective excitations in emergent magnetic materials, such as magnetic kagome metals, altermagnets, chiral magnets, 2D van der Waals magnets and strongly frustrated spin systems etc., with the aim to elucidate the fascinating interplay between topology, electronic correlation and magnetic frustration. High-quality single crystals of various novel magnetic materials have been successfully grown in the group, which can be naturally used for this project. A particular interesting prospect is to fully exploit the tremendous potential on the studies of emergent magnetic



materials by combining time-of-flight inelastic neutron scattering and wide-angle polarisation analysis at the polarized instrument DNS. Therefore, the potential candidate is also expected to be actively involved in the restart phase of the Germany's national neutron facility MLZ in Garching by contributing to the instrument commissioning and to the development of new scientific application with neutrons.

- [1] M. Braden, X. Wang, A. Bertin, P. Steffens, and Y. Su, Phys. Rev. Lett. **134**, 236702 (2025).
- [2] B. Gao, F. Desrochers, D. W Tam, D. M. Kirschbaum, P. Steffens, A. Hiess, D. H. Nguyen, Y. Su, S.-W. Cheong, S. Paschen, Y. B. Kim, P. Dai, Nat. Phys. **21**, 1203 (2025).
- [3] Y. Zhou, M. K. Lee, S. Hammouda, S. Devi, S. Yano, R. Sibille, O. Zaharko, W. Schmidt, K. Schmalzl, K. Beauvois, E. Ressouche, P. C. Chang, C. H. Huang, L. J. Chang, T. Brückel, and Y. Su, Phys. Rev. Research **6**, 043291 (2024).
- [4] C. Yi, N. Peshcherenko, Y. Zhou, K. Samanta, Q. Yang, S. Roychowdhury, P. Yanda, H. Borrmann, M. G. Vergniory, Y. Zhang, Y. Su, C. Shekhar, C. Felser, Phys. Rev. Research **6**, 043295 (2024).
- [5] F. Zhu, L. Zhang, X. Wang, F. J. Dos Santos, J. Song, T. Mueller, K. Schmalzl, W. F. Schmidt, A. Ivanov, J. T. Park, J. Xu, J. Ma, S. Lounis, S. Blügel, Y. Mokrousov, Y. Su, and T. Brückel, Sci. Adv. **7**, eabi7532 (2021).
- [6] F. Zhu, X. Wang, M. Meven, J. Song, T. Mueller, C. Yi, W. Ji, Y. Shi, J. Ma, K. Schmalzl, W. F. Schmidt, Y. Su, and T. Brückel, Phys. Rev. Research **2**, 043100 (2020).

Description of existing or sought Chinese collaboration partner institute (max. half page):

We are looking for collaboration partners in China who are strongly engaged in condensed matter physics research and neutron scattering from top-ranking universities and the relevant institutes from the Chinese Academy of Science.

Required qualification of the postdoc:

- PhD in experimental condensed matter physics
- Solid knowledge in both theory and experimental aspects in magnetism and strong correlated electrons
- Experience with neutron scattering techniques
- Additional skills in such as X-ray scattering, data analysis and computer programming, materials synthesis would be an advantage
- Language requirement: good English skills