

Electronic structure of topological altermagnet: CrSb

A. Wadge¹

¹*International Research Centre MagTop,
Institute of Physics, Polish Academy of Sciences,
Aleja Lotników 32/46, PL-02668 Warsaw, Poland*

Altermagnets form a distinct class of collinear magnets that combine vanishing net magnetization with momentum-dependent exchange effects in the electronic structure, providing a route to topological semimetals without conventional ferromagnetism [1]. We present a systematic angle-resolved photoemission (ARPES) study of the altermagnetic Weyl semimetal candidate CrSb, combining energy-dependent spectroscopy and photon-energy tuning to establish a detailed experimental picture of its low-energy electronic structure. High-quality single crystals of CrSb were prepared by the chemical vapor transport method.

High-resolution ARPES spectra resolve multiple dispersive bands in the vicinity of the Fermi level and track their evolution over an extended binding-energy range. Photon-energy-dependent measurements access the out-of-plane momentum k_z and reveal pronounced three-dimensional dispersion for selected states, enabling separation of bulk-derived bands from features with reduced k_z modulation. Dense momentum mapping determines the Fermi-surface topology across the Brillouin zone and its evolution with k_z , identifying the dominant pockets and their connectivity. Polarization-dependent ARPES is used to selectively enhance or suppress key features and support band assignment [2].

The resulting dataset provides experimental benchmarks for comparison with altermagnetic and topological band-structure descriptions and is discussed in the context of Refs. [1–3]. Our results motivate follow-up soft x-ray ARPES and spin resolved measurements aimed at directly tracking altermagnetic band splitting and clarifying the relationship between bulk crossings and possible Weyl-related surface states.

References:

- [1] S. Smejkal *et al.*, *Phys. Rev. X* **12** (2022) 040501.
- [2] C. Li *et al.*, *Commun. Phys.* **8** (2025) 311.
- [3] J. Ding *et al.*, *Phys. Rev. Lett.* **133** (2024) 206401.

This research was partially supported by the “MagTop” project (FENG.02.01-IP.05-0028/23) carried out within the “International Research Agendas” programme of the Foundation for Polish Science co-financed by the European Union under the European Funds for Smart Economy 2021- 2027 (FENG). I also acknowledge the support of the National Science Centre, Poland (NCN), through the MINIATURA 9 with project No. 2025/09/X/ST3/00809.