ARPES Evidence for Unconventional Topological Superconductivity in the Fermi Arc States of t-$PtBi_2$

Sergey BORISENKO

IFW-Dresden

Email: s.borisenko@ifw-dresden.de

Topological superconductivity is a key ingredient for realizing Majorana fermions, yet intrinsic material platforms remain scarce. Using angle-resolved photoemission spectroscopy (ARPES) [1], we have recently demonstrated that the Weyl semimetal t-$PtBi_2$ hosts superconductivity confined to its topological surface states, the Fermi arcs [2]. This superconductivity is unconventional, with nodal i-wave symmetry and signatures of emergent Majorana modes [3], and can be robustly detected under both laser- and synchrotron-based ARPES conditions [4]. Moreover, t-$PtBi_2$ fulfills the canonical criteria favorable for high-Tc superconductivity, opening the door to tuning and optimizing this exotic state [5]. These findings establish t-$PtBi_2$ as a rare platform where ARPES directly reveals superconductivity of topological surface states, paving the way toward intrinsic realizations of Majorana physics.

[1] S. Borisenko The Role of A in ARPES, Journal of Synchrotron Radiation 33, 3 693 (2026)
[2] A. Kuibarov et al. Evidence of superconducting Fermi arcs, Nature 626, 294 (2024)
[3] S. Changdar et al. Topological nodal i-wave superconductivity in $PtBi_2$, Nature 647, 613 (2025)
[4] A. Kuibarov et al. Measuring superconducting arcs by ARPES, PRB 112, 144518 (2025)
[5] A. Kuibarov et al. Three prerequisites for high-temperature superconductivity in t-$PtBi_2$, arXiv:2509.02178