

Bulk properties of Dirac nodal-line semimetals DySbTe and ErSbTe

Grzegorz Chajewski,¹ Sami Elgalal,¹ Tetiana Romanova,¹ and
Dariusz Kaczorowski¹

¹*Institute of Low Temperature and Structure Research,
Polish Academy of Sciences, Okólna 2, 50-950 Wrocław, Poland*

Building on prior angle-resolved photoemission spectroscopy (ARPES) studies that established the non-trivial topological nature of the nonsymmorphic tetragonal (ZrSiS-type) compounds DySbTe and ErSbTe [1, 2], this work comprehensively explores their bulk thermodynamic and electrical transport properties. In zero magnetic field, DySbTe exhibits two successive antiferromagnetic transitions and semimetallic-type transport characterized by anomalous features within the ordered state, driven by strong spin-orbit coupling and 4f-electron interactions. Similarly, ErSbTe displays two magnetic transitions; however, its electrical resistivity lacks the hump-like feature characteristic of the LnSbTe family (Ln = lanthanide), suggesting distinct charge carrier scattering mechanisms. Under an applied magnetic field, specific heat measurements reveal a rich and complex evolution of the magnetic order in both compounds. These results provide a macroscopic complement to the ARPES data, demonstrating how lanthanide magnetism and square-net lattice symmetry dictate the physical behavior in these magnetic nodal-line semimetals.

References:

[1] N.Valadez, I.B.Elius, D.James, P.Radanovich, T.Romanova, S.Elgalal, G.Chajewski, F.Masple, E.Thompson, K.T.Chu, M.Yankowitz, A.Ptok, D.Kaczorowski, and M.Neupane, *Phys.Rev.B* **112** (2025) 155148.

[2]] I.B.Elius, N.Valadez, D.James, P.Radanovich, S.Elgalal, G.Chajewski, T.Romanova, A.Ptok, D.Kaczorowski, and M.Neupane, *Phys.Rev.Mater.* **9** (2025) 114201.

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