Magneto-optical studies of topological materials

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Infrared and THz magneto-spectroscopy are powerful experimental tools for studying various classes of topological materials. These techniques offer relevant insights into the electronic band structures of diverse topological crystals and are also frequently used to explore intriguing relativistic-like phenomena. In my lecture, I will review recent progress in the field of infrared magneto-spectroscopy applied to topological materials and discuss selected results, including both in-house and collaborative research conducted at the high-field facilities in Grenoble's laboratory. These investigations encompass: (i) bulk and surface states in three-dimensional topological insulators (Sb_2Te_3 [1], $ZrTe_5$ [2], and $BiSbTe_2S$ [3]), with the latter showing peculiar cyclotron resonance absorption on surface electrons visible up to room temperature; (ii) magnetic dichroism induced by the Berry curvature in the antiferromagnetic topological insulator $MnBi_2Te_4$ [4]; (iii) the optical band gap in a dispersive nodal-line in the $NbAs_2$ Dirac semimetal, whose angle-dependence can be interpreted in terms of a Lorentz-boost-driven renormalization [5]; and (iv) the alleged magnetic Weyl semimetal $EuCd_2As_2$ [6].

References

[1] I. Mohelsky et al., Phys. Rev. B **109**, 165205 (2024).
[2] I. Mohelsky et al., Phys. Rev. B **107**, L041202 (2023).
[3] I. Mohelsky et al., to be published (2024).
[4] S.-K. Bac et al., arXiv:2405.15689 (2024).
[5] J. Wyzula et al., Adv. Sci. **9**, 2105720 (2022).
[6] D. Santos-Cottin et al., Phys. Rev. Lett. **131**, 186704 (2023).