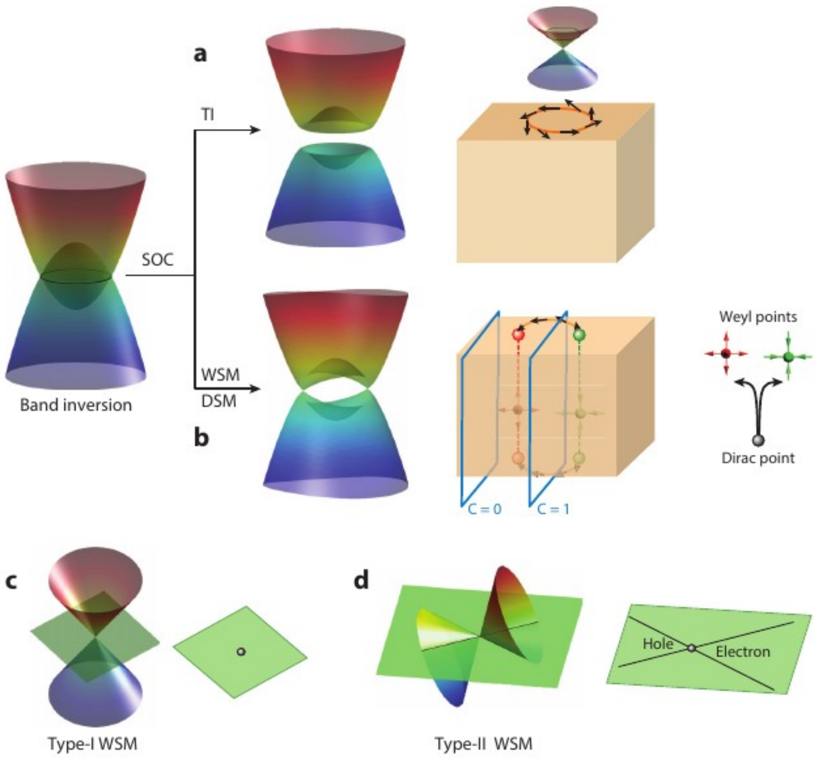
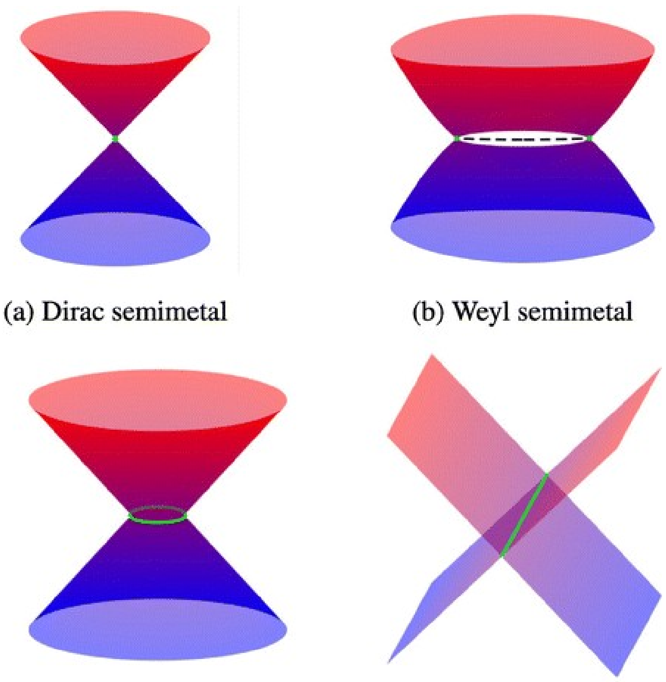
Relation betn top. Mater.



Yan, B., & Felser, C. (2017). Topological materials: Weyl semimetals. Annual Review of Condensed Matter Physics, 8(1), 337-354.

Relation between Top. Semimetals



(a) Dirac semimetal (b) Weyl semimetal

(c) Nodal line semimetals

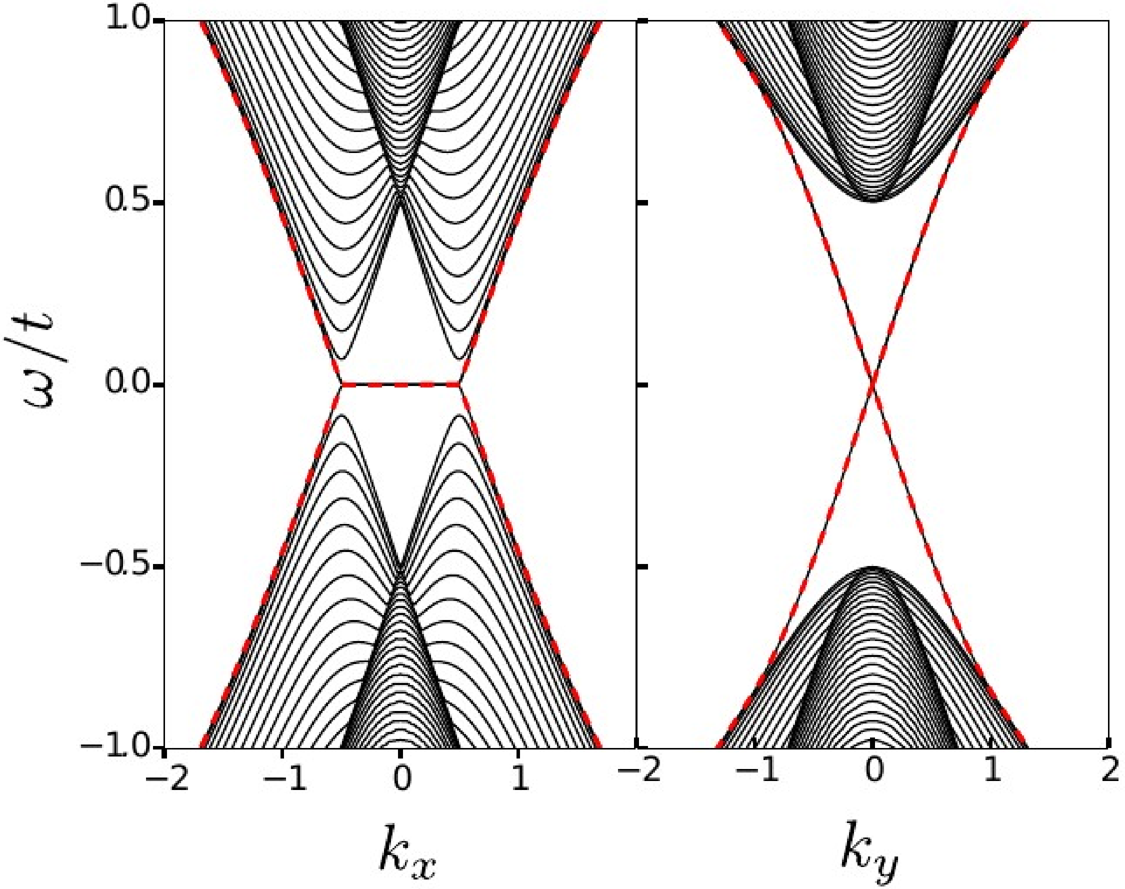
$$H_{\mathrm{C}} = \epsilon \sum_j \psi_j^\dagger \tau_x \psi_j - t \sum_{\langle ij \rangle} \psi_i^\dagger \tau_x \psi_j + \text{ h.c.}$$

and $$H_{\mathrm{SO}} = i\lambda_{\mathrm{SO}} \sum_j \psi_j^\dagger \tau_z \left(\sigma_x \psi_{j+\hat{y}} - \sigma_y \psi_{j+\hat{x}} \right) + i\lambda_z \sum_j \psi_j^\dagger \tau_y \psi_{j+\hat{z}} + \text{ h.c.}$$

$\|\epsilon\| > \|6t\|$	$\nu_\mu = (0;0,0,0)$	Ordinary Insulator
$\|6t\| > \|\epsilon\| > \|2t\|$	$\nu_0 = 1$	Strong Topological Insulator (STI)
$\|2t\| > \|\epsilon\| > 0$	$\nu_0 = (0;1,1,1)$	Weak Topological Insulator (WTI)

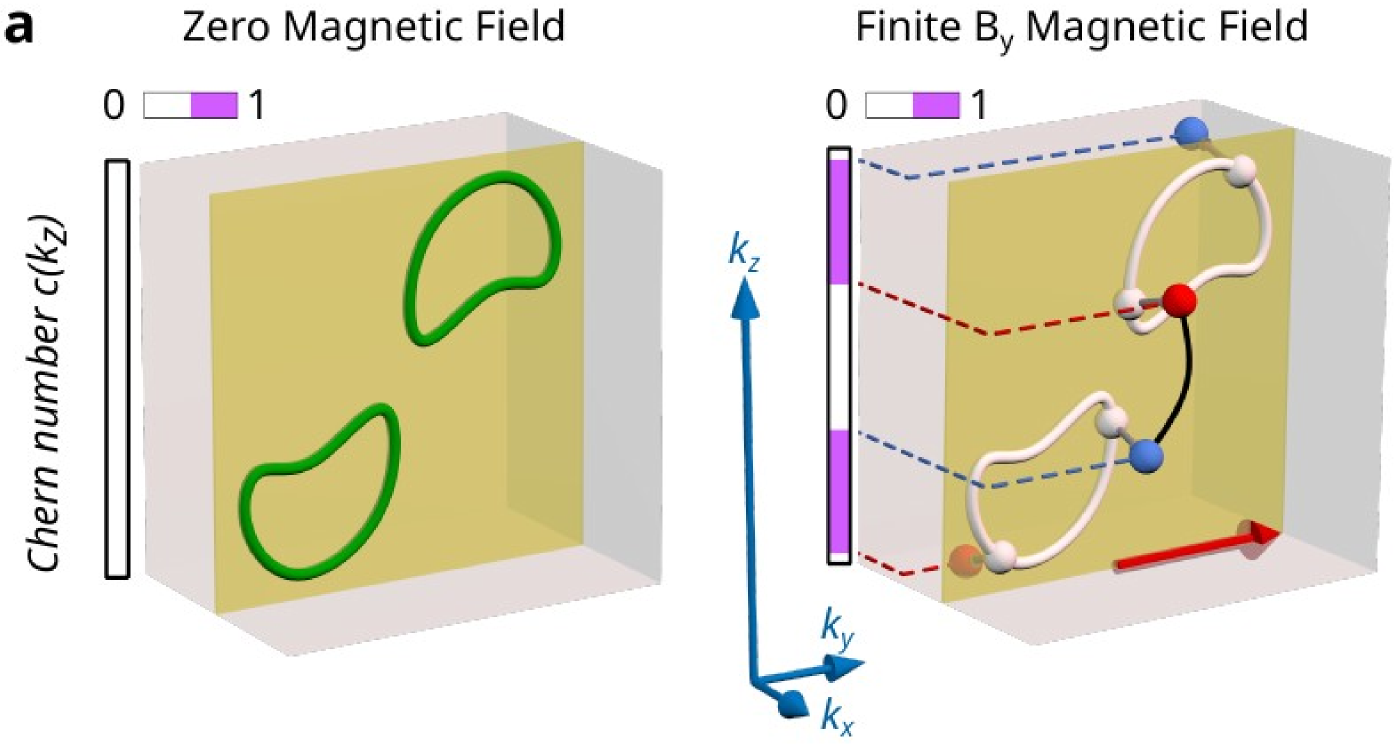
$$H_{\mathrm{E}} = \sum_j \psi_j^\dagger \left(b_0 \tau_y \sigma_z - b_x \tau_x \sigma_x + b_y \tau_x \sigma_y + b_z \sigma_z \right) \psi_j \ .$$

Here b0 and b are parameters that break inversion and TR symmetry respectively and separate the Dirac point of the TI into two Weyl points, with the separation being in energy and in momentum space respectively



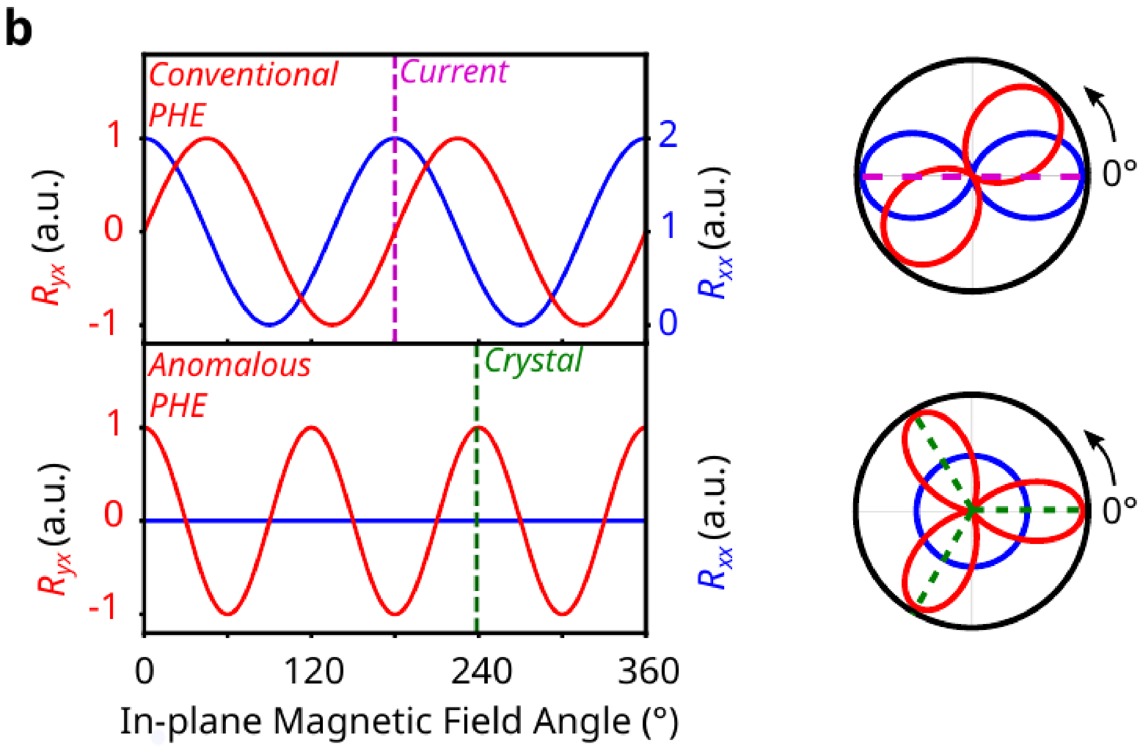
1.0
0.5
0.0
−0.5
−1.0
ω/t
−2
−1
0
1
2
k_x
k_y

Generation of Weyl points in Top. Nodal line semimetals



arXiv: 2410.02353)

APHE and CPHE in PtBi2



Symmetry of PtBi2