→ massless particle in odd dimension

$\gamma^5 \psi_\pm = \pm \psi_\pm$ 2 chiralities

→ propagate parallel / antiparallel to their spin

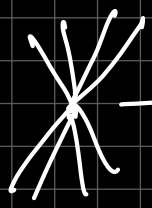
→ come in pairs ⇒ over $\mathbb{BC} = 0$ → BC hotspot

→ must vanish for TRS & IR

→ cond. not realisation ⇒ "due to Band touching"

⇒ Band touching are common ⇒ but we need them to be near fermi energy for a cond. matter system to be interesting.

⇒ vel. along 3 directions are not same



→ Dirac Semimetals

Consequence of Weyl node → ① Chiral anomaly

$n_R + n_L \neq 0$, $n_R - n_L \neq 0$

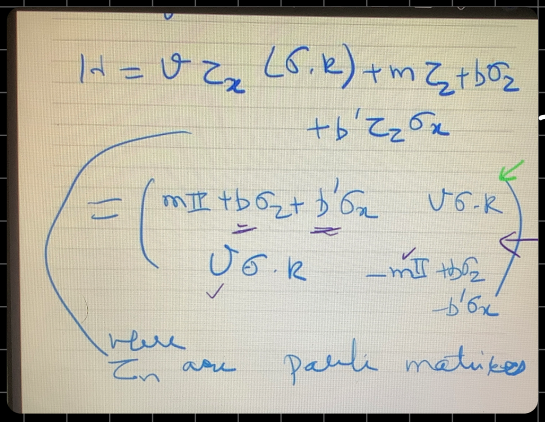
= cons.

→ optical methods available too

Weyl → break IR

→ break TRS (magnetic material)

4 band model of realising Weyl Semimetal



→ tune parameters to see all the 4 pts (see @ armitage & Vishwanath)

Get this code

Topological insulator + Weyl semimetal

↓ band inversion → bulk acc have an insulating system

↳ "surface states"

→ @ 3D

"Both of them have some origins."

if strong soc gaps this out then we get insulator

Expt Consequences of this system

=> review papers

type-II WSM

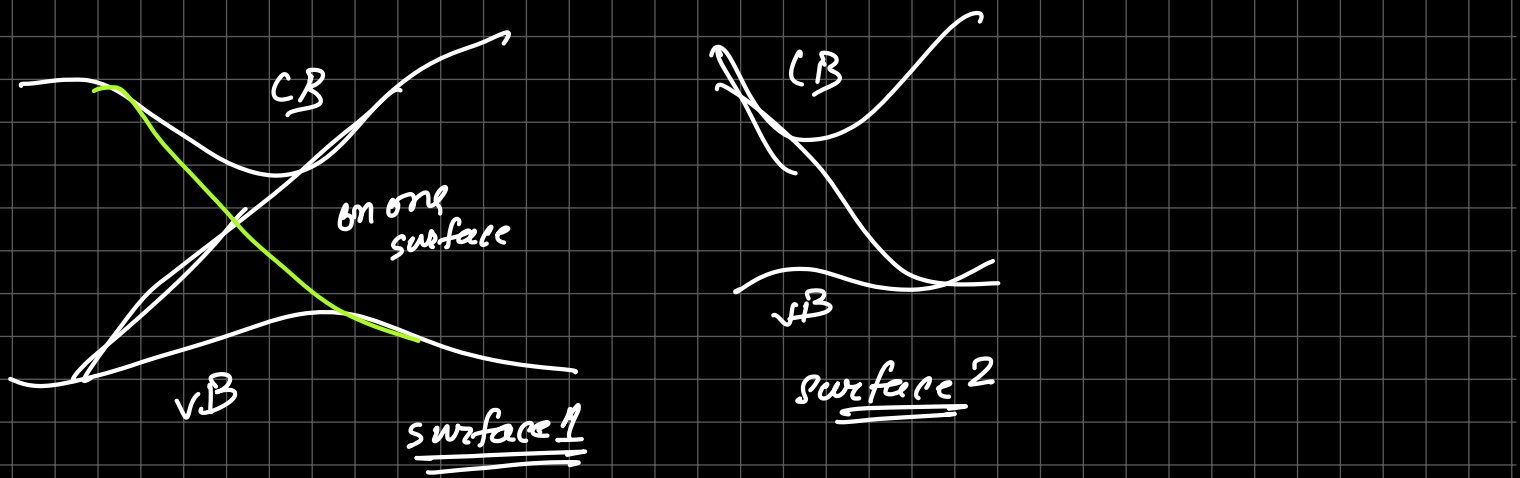
↳ pockets of hole & e⊖ in it.

Unusual surface states → lets locally align $\vec{E}$ & $\vec{B}$ ↓ send a current

$\frac{d(n_+ - n_-)}{dt} \propto \vec{E}\cdot\vec{B}$ → $\vec{E} \perp \vec{B}$ no pumping

→ $\vec{E} \parallel \vec{B}$, ∃ pumping

Smoking gun ⇒ Spect:- STM, ARPES ⇒ forweyl semimetal



Weyl ⇒ bulk & surface both conduct

(did he take extra lectures)

expt
↳ metals with high mobility] see @ 33 mins

Chern insulator ⇒ obeys bulk-boundary correspondence

no such Bulk-Bd → in Weyl Semimetal

averylong expt detail → watch the video

Chern insulator → Kane-mele
↓ ↓
QHall Haldane

Top Ins

Chern ins (Bi_2Se_3)

Weyl

next up Twisted graphene ⇒ has physics of Chern insulator

We'll end with this