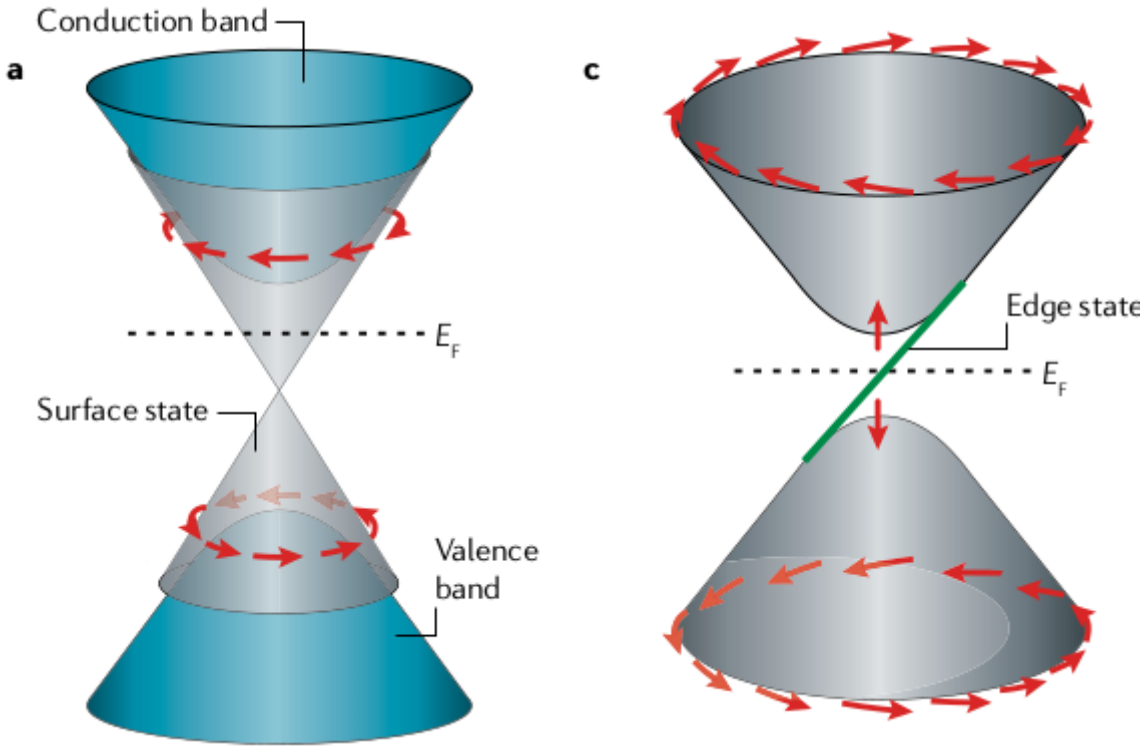
Competing Magnetic Interactions in the Antiferromagnetic Topological Insulator $MnBi_2Te_4$

Phys. Rev. Lett. 124, 167204 (2020)

Magnetic topological insulator



Nature Reviews Physics vol 1, p.126–143 (2019)

$$H = v_F\left(-k_y\sigma_x + k_x\sigma_y\right) + m\sigma_z = \boldsymbol{R}\cdot\boldsymbol{\sigma}$$

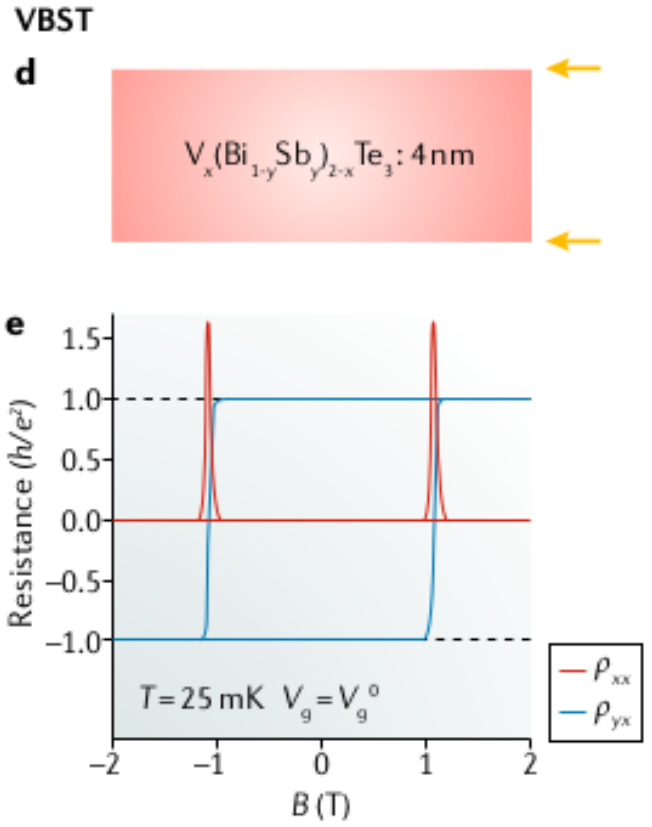
Chern number

$$H = v_{\mathrm{F}}\left(-k_y\sigma_x + k_x\sigma_y\right) + m\sigma_z = \boldsymbol{R}\cdot\boldsymbol{\sigma}$$

$$C = 2\int_{\mathrm{BZ}} \hat{\boldsymbol{R}}\cdot\left(\frac{\partial\hat{\boldsymbol{R}}}{\partial k_x}\times\frac{\partial\hat{\boldsymbol{R}}}{\partial k_y}\right)\frac{dk_x dk_y}{4\pi} = \mathrm{sgn}(m)$$

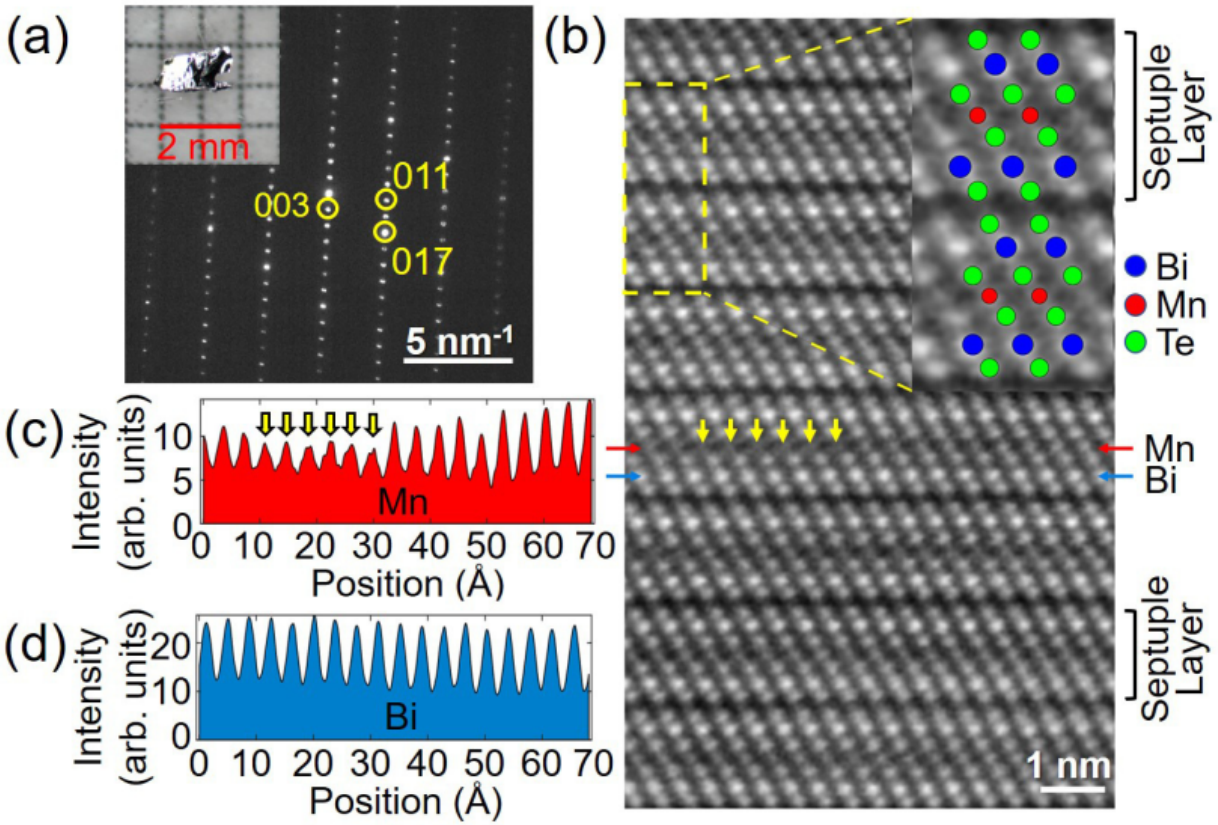
Nature Reviews Physics vol 1, p.126–143 (2019)

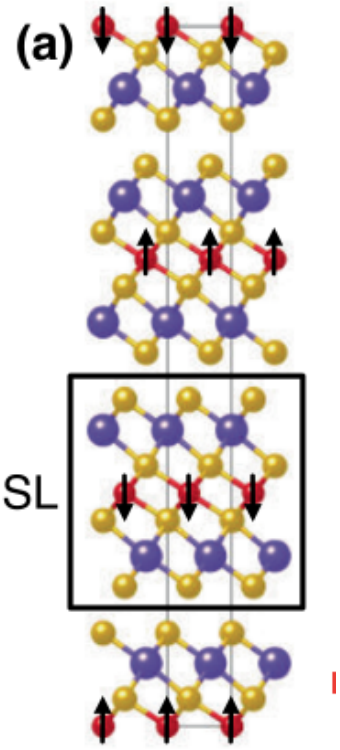
Quantum Anomalous Hall effect



Nat. Mater. 14, 473–477 (2015).

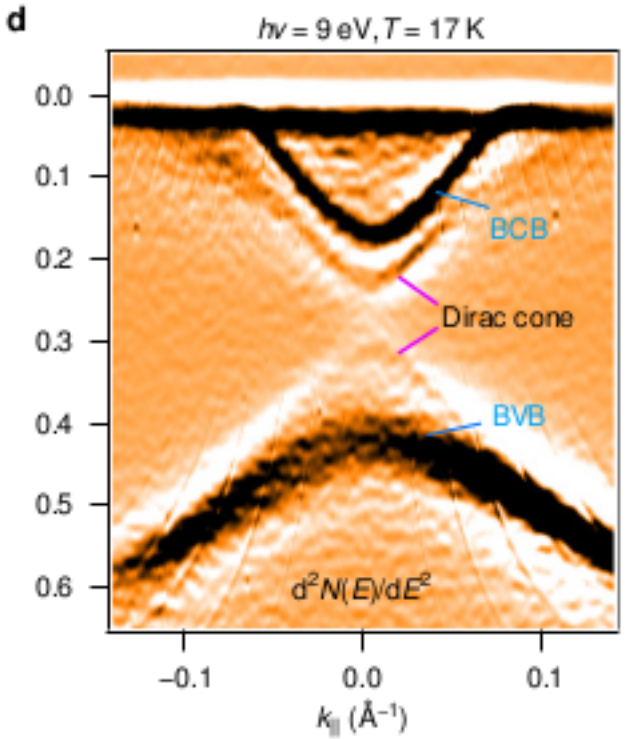
MnBi2Te4



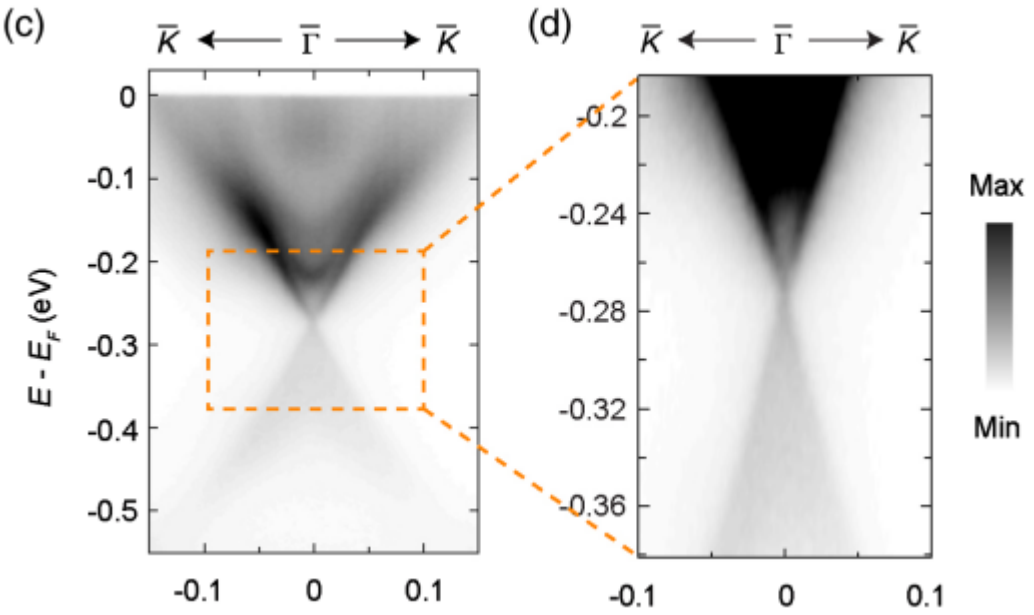


PHYSICAL REVIEW RESEARCH 1, 012011(R) (2019)

Surface states

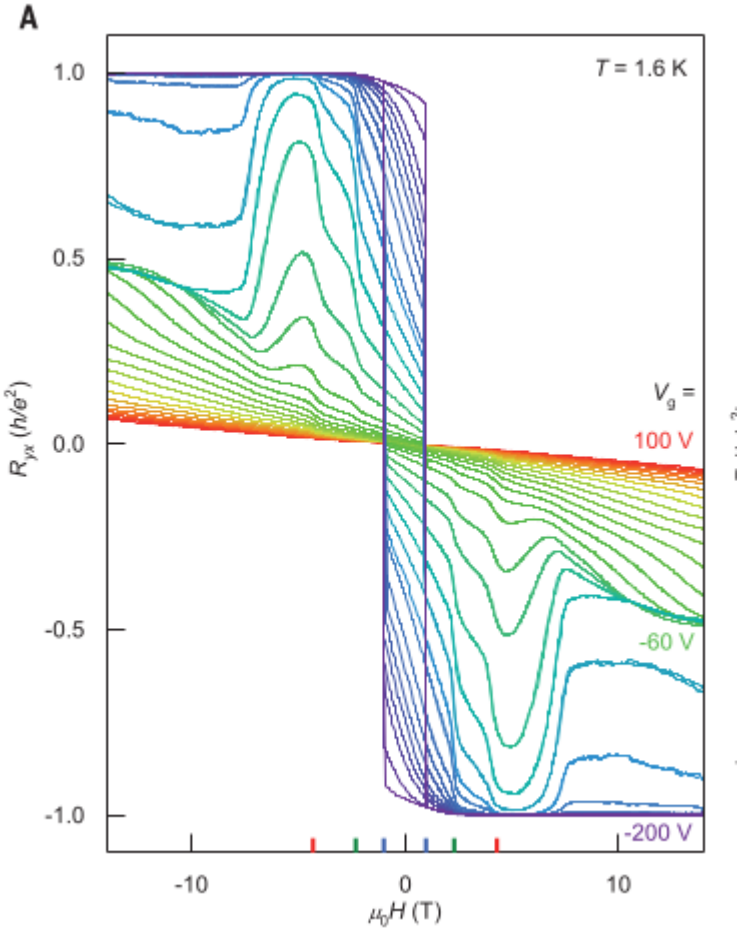


Nature volume 576, pages416–422 (2019)



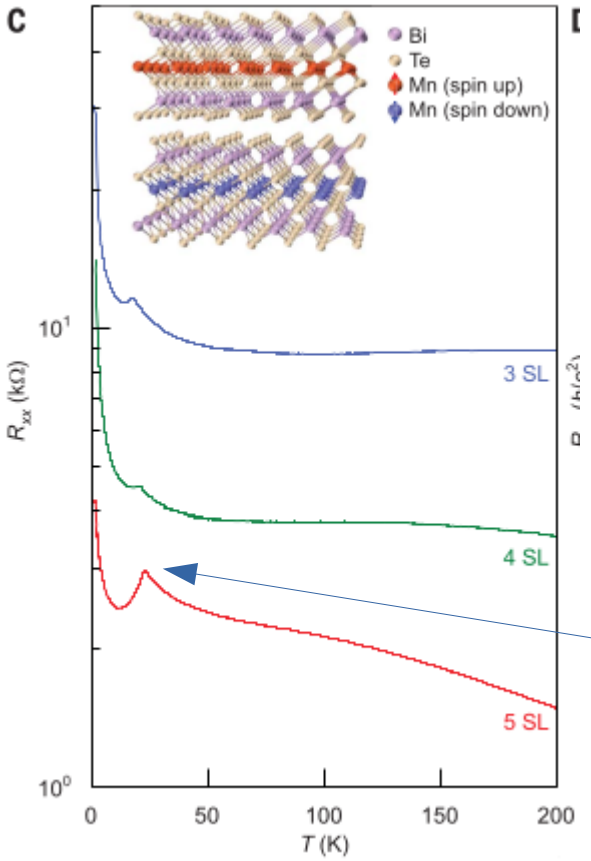
PHYS. REV. X 9, 041040 (2019)

Quantum Anomalous Hall effect



Deng et al., Science 367, 895–900 (2020)

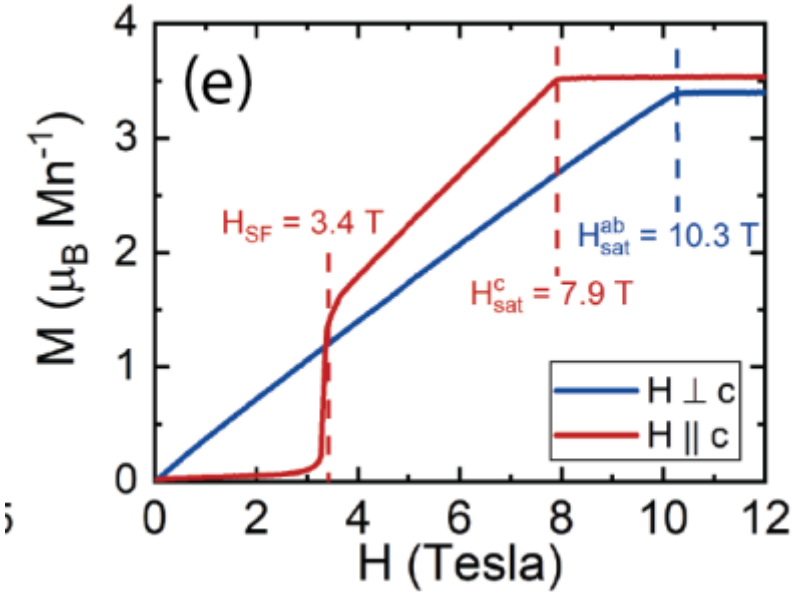
Magnetic structure

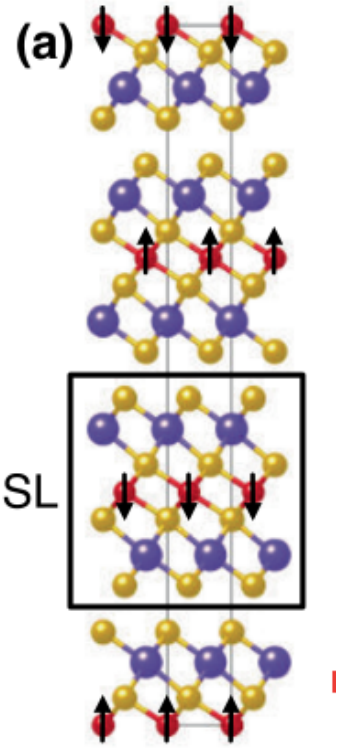


TN=25K

Deng et al., Science 367, 895–900 (2020)

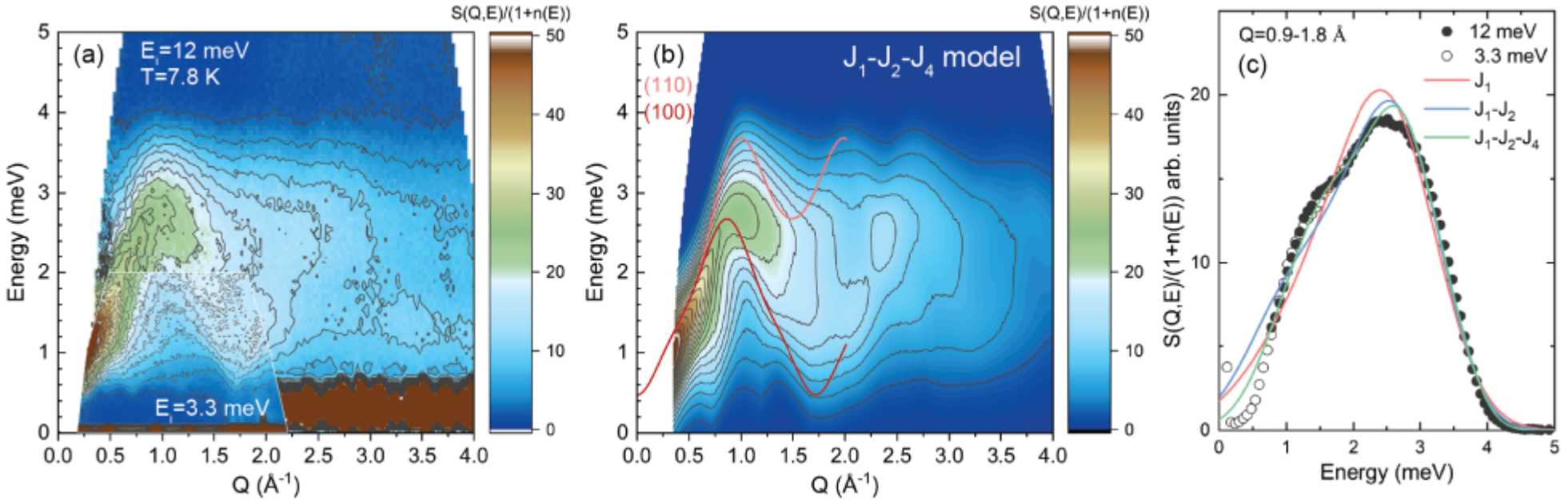
Magnetic structure





Phys. Rev. Lett. 124, 167204 (2020)

Neutron scattering



$$H = -\sum_{ij||} J_{ij}\mathbf{S}_i \cdot \mathbf{S}_j - J_c \sum_{\langle ij\rangle\perp} \mathbf{S}_i \cdot \mathbf{S}_j - D\sum_i S_{i,z}^2$$

J_1-J_2-J_4	0.30(2)	-0.083(9)	0.023(8)	-0.055	0.12

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Proximity to other phases

|J2/J1|~0.3