International CRP 2022－Category B

Exploration of Novel Quantum Materials

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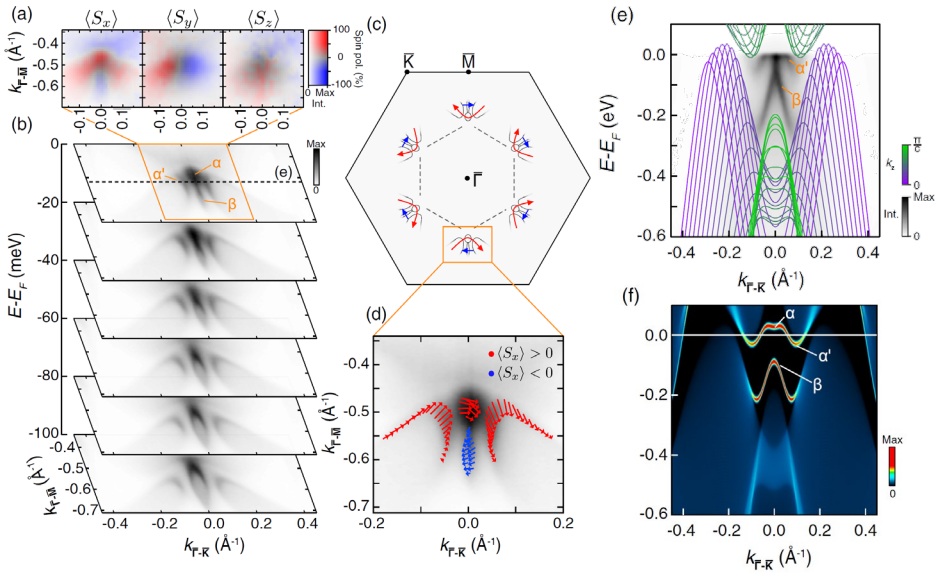
- Aims of Research -

As a promising topological superconductor candidate, the low-energy surface electronic structure of the transition-metal dichalcogenide superconductor $PdTe_2$ was studied by spin- and angle-resolved photoemission, scanning tunneling microscopy, and density functional theory-based supercell calculations.

- Results -

Figures show the Fermi surfaces formed by the topological states which intersect the Fermi level in $PdTe_2$. Our spin-ARPES measurements and DFT calculations reveal that the surface states host a strong spin polarization (experimentally, >70% from fits to ARPES energy distribution curves).

Our findings highlight the importance of k_z-dependent band inversions within a single orbital manifold for generating topological surface states with rich and complex surface Fermi surfaces. Moreover, they demonstrate how these can be effectively tuned by varying interlayer hopping strengths, paving the way to the design of new topological materials.



Web page: https://www.st-andrews.ac.uk/physics/condmat/arpes/index.html

[1] O.J. Clark, K. Okawa, T. Sasagawa, P.D.C. King *et al.*, Phys. Rev. Lett. **120**, 156401 (2018).

[2] M.S. Bahramy, K. Okawa, M. Asakawa, T. Sasagawa, P.D.C. King *et al.*, Nature Materials **17**, 21 (2018).