

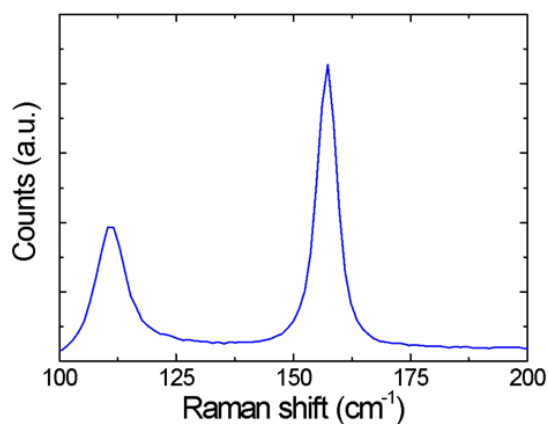
## Supporting Information

### Room temperature evidence of PtTe<sub>2</sub> topological semimetal character

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#### Section S1 – Raman characterization

Raman characterization is performed using a Renishaw Ltd InVia analyzer coupled to a confocal microscope equipped with a 514 nm laser. The Raman spectrum acquired from the PtTe<sub>2</sub> crystal clearly shows the two peaks related to the in-plane ( $E_g$ , located at  $111.1\text{ cm}^{-1}$ ) and out-of-plane ( $A_g$ , located at  $157.2\text{ cm}^{-1}$ ) vibrational modes characteristic of the PtTe<sub>2</sub> 1T-phase.

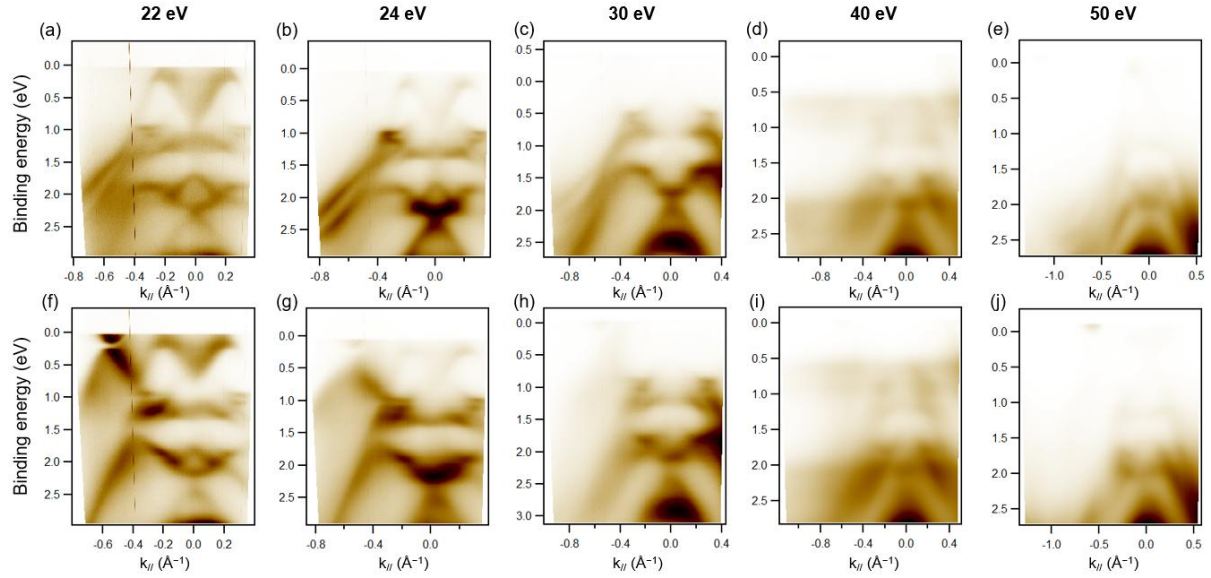


**Figure S1.** Raman spectrum of the PtTe<sub>2</sub> crystal.

#### Section S2 – ARPES photon energy scan

In Figure S2 we show PtTe<sub>2</sub> electronic band dispersions along  $\bar{\Gamma} - \bar{K}$  (a-e) and  $\bar{\Gamma} - \bar{M}$  (f-j) directions acquired at different photon energies. From this set of data, we decided to focus on the spectra

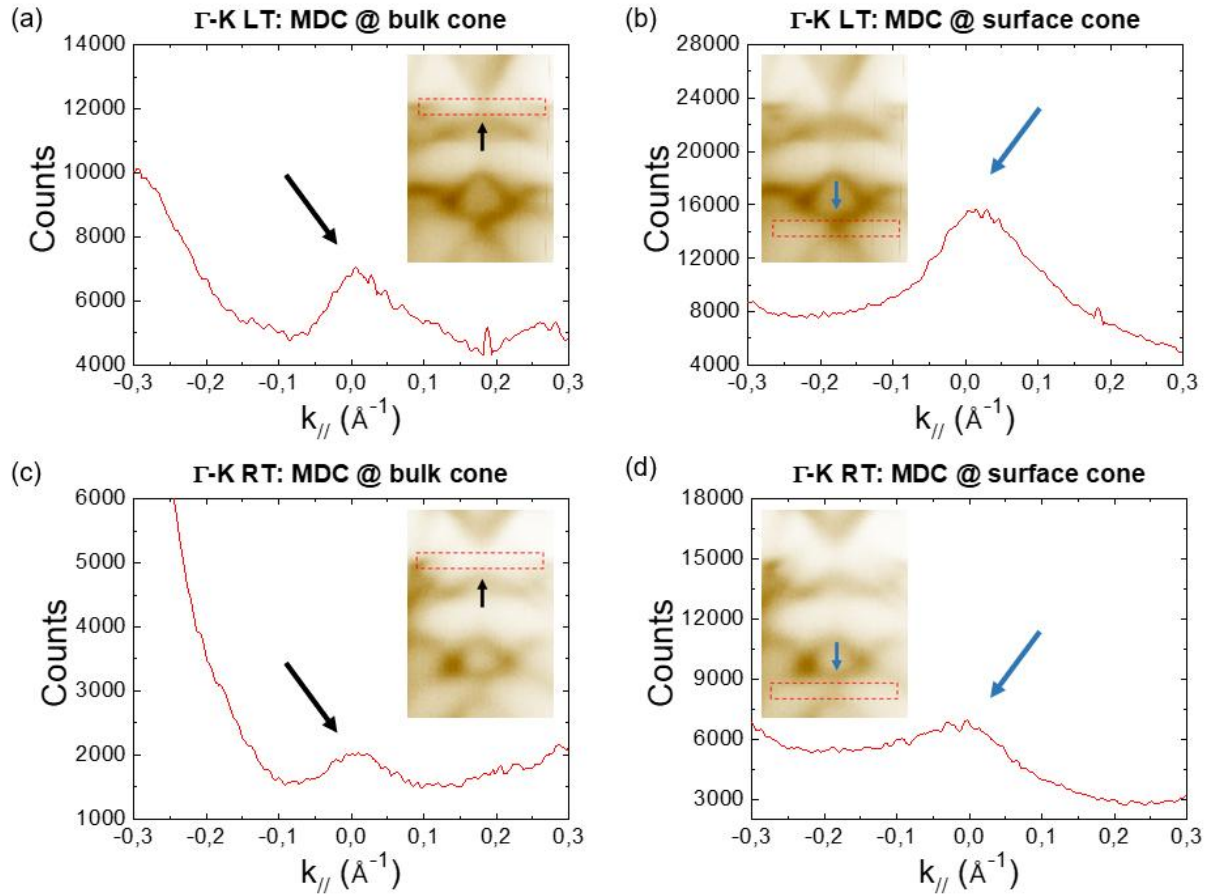
acquired at photon energy 22 eV (a,f) which better highlight the topological features of PtTe<sub>2</sub>, as we described in the main text. By increasing the photon energy, the spectral intensity of the topological features tends to fade.



**Figure S2.** Photon energy scan at cryogenic temperature (20 K) along the  $\bar{\Gamma} - \bar{K}$  (a-e) and  $\bar{\Gamma} - \bar{M}$  (f-j) directions.

### Section S3 – MDC curves extracted from $\bar{\Gamma} - \bar{K}$ ARPES spectra

In Figure S3 we show the MDC curves extracted from  $\bar{\Gamma} - \bar{K}$  ARPES spectra in correspondence with the bulk and surface cones. Figure S3a and Figure S3b show the bulk and surface cones at low temperature, while Figure S3c and Figure S3d show the equivalent curves at room temperature. As for the case of  $\bar{\Gamma} - \bar{M}$  described in the main text, the comparison of the MDCs at the two different temperatures confirms the persistence of PtTe<sub>2</sub> topological states.



**Figure S3.** MDC curves extracted from  $\bar{\Gamma} - \bar{K}$  ARPES spectra in correspondence with the bulk and surface cones for the low temperature (a,b) and room temperature (c,d) cases, respectively. The spectra are reported in inset.