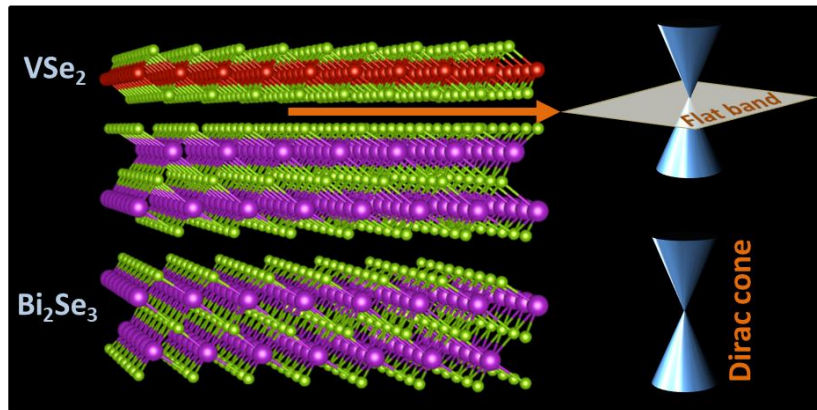


Flat Band Structure Observed in Topological Material



The image shows the vanadium diselenide (VSe_2) bismuth selenide (Bi_2Se_3) heterostructure (left) and a comparison of the electronic structures (right); only through the existence of the interface is the flat band is created.

T. Yilmaz, X. Tong, Z. Dai, J. T. Sadowski, E. F. Schwier, K. Shimada, S. Hwang, K. Kisslinger, K. Kaznatcheev, E. Vescovo, B. Sinkovic. *Commun. Mater.*, 2, 11 (2021)

Work was performed in part at Brookhaven National Laboratory

Scientific Achievement

Scientists observed, for the first time, an emergent flat band electronic structure in the vanadium diselenide (VSe_2) bismuth selenide (Bi_2Se_3) heterostructure.

Significance and Impact

Topological materials could be a path to future quantum devices; however, to fully harness their potential, researchers need to understand which materials exhibit a flat band structure that can be controlled for use in devices. This study discovered a flat band structure that could be used to boost the onset temperature for superconductivity.

Research Details

- The observed emergent character of the flat band is thickness & photon energy dependent; hence, it is dependent on the interface between the layers.
- Used the ARPES and XPEEM stations of the ESM beamline at NSLS-II & the STM and TEM at the CFN to reveal the nature of the electronic structure.