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ARPES in 1D CDW systems: taking a fresh look at an old problem

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Improved experimental conditions at state-of-the-art synchrotron ARPES facilities enable more accurate measurements that reveal new and interesting aspects of the electronic structure of paradigmatic quasi-1D charge-density wave (CDW) materials. With micro-ARPES (SOLEIL) we could select and measure high-quality hair-like single crystals of NbSe3. By varying the light polarization we observe two sets of linearly dispersive features, previously undetected and not predicted by band structure calculations, suggestive of spin-charge separation in this compound. In (TaSe4)2I an extensive band mapping (at the ALS) clarifies the effect of transverse coupling. The ARPES data indicate sizeable 2D interactions, and an antiphase arrangement of the CDW on neighboring chains. The corresponding wiggled Fermi surface is well nested by a transverse wave vector, supporting the Peierls mechanism of the metal-insulator transition.

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