Insensitivity of charge ordering instability to screening in the excitonic insulator candidate $TiSe_2$

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Control over materials thickness down to the single-atom scale has emerged as a powerful tuning parameter for manipulating not only the single-particle band structures of solids, but increasingly also their interacting electronic states and phases. A particularly attractive materials system in which to explore this is the transition-metal dichalcogenides (TMDs), both because of their naturally-layered van der Waals structures and the wide variety of materials properties which they are known to host. Yet, how their interacting electronic states and phases evolve when thinned to the single-layer limit remains a controversial question. Here, I will discuss our work integrating monolayer materials growth by molecular-beam epitaxy [1] with electronic structure studies via *in situ* angle-resolved photoemission and ARPES-based microscopy. I will discuss the resulting electronic structure in these systems, with a particular focus on the controversial charge-density wave phase of monolayer $TiSe_2$ [2,3], and the insights we can obtain from controlling its electrostatic environment [4].

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[1] Rajan, Buchberger *et al.*, Advanced Materials 36, 2402254 (2024); [2] Watson *et al.*, 2D Materials 8, 015004 (2021); [3] Antonelli *et al.*, Nano Lett. 24, 215 (2024); [4] Buchberger *et al.*, unpublished.