

Strong correlation effects in confined materials

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Strong electronic interactions in solid state systems lead to exotic phenomena such as superconductivity, metal-insulator transition etc. For instance vanadium dioxide is an exemplary system that displays a metal-insulator transition of 5 orders of magnitude in conductivity upon cooling below 65 C in bulk. Yet, it is unclear what happens when the free-standing crystals are in a few unit cells limit. In this presentation I will be discussing the methods we developed to mill free-standing VO₂ nanocrystals below 5 nm thickness and our observations[1]. Also I will be discussing our studies on the charge density wave and superconducting properties of NbS₂ in the monolayer limit.

[1] M. M. Fadlilmula, E. C. Surmeli, M. Ramezani, T. Serkan Kasirga, Nano Lett., 2017, 17 (3), pp 1762–1767