Electronic structure of exfoliated mono-, bi- and few-layer 1T'-WTe_2 from microfocus laser-ARPES

Felix Baumberger

Department of Quantum Matter Physics, University of Geneva & Swiss Light Source, Paul Scherrer Institute

Two-dimensional crystals of semimetallic van der Waals materials hold much potential for the realization of novel phases, as exemplified by the recent discoveries of a polar metal in few-layer 1T'-WTe_2 and of a quantum spin Hall state in monolayers of the same material. Understanding these phases is particularly challenging because little is known from experiment about the momentum space electronic structure of ultrathin crystals. In this talk, I will discuss direct electronic structure measurements of exfoliated mono- bi- and few-layer 1T'-WTe_2 by laser-based micro-focus angle resolved photoemission. This is achieved by encapsulating a flake of WTe_2 comprising regions of different thickness with monolayer graphene. Our data support the recent identification of a quantum spin Hall state in monolayer 1T'-WTe_2 and reveal strong signatures of the broken inversion symmetry in the bilayer. We finally discuss the sensitivity of encapsulated samples to contaminants following exposure to ambient atmosphere.