FONDAZIONE BRUNO KESSLER

ECT*
EUROPEAN CENTRE
FOR THEORETICAL STUDIES
IN NUCLEAR PHYSICS AND RELATED AREAS

# Unraveling and exploiting highly doped transition metal dichalcogenides in misfit layer compounds

**May 10, 2024 at 11:00**

**Ludovica Zullo**

**Misfit layer compounds (MCLs) are heterostructures composed of rocksalts units stacked with few layers transition metal dichalcogenides (TMDs) [1]. The design of misfits' emergent properties is hindered by the lack of a global understanding of the electronic transfer among the constituents. In this work [2], by means of density functional theory, we demonstrate how the charge injection into the TMD layers can be controlled by the chemistry of the rocksalt which always acts as electron donor. We show that misfits behave as a periodic arrangement of ultra-tunable field effect transistors with massive charging. Finally, we establish a strategy to study MLCs emergent properties by highlighting the 2D character of the lattice dynamics of TMDs emerging from bulk misfit.**

**[1] Gerrit Wiegers, Progress in Solid State Chemistry 24, 1 (1996)**
**[2] Ludovica Zullo, Giovanni Marini, Tristan Cren, Matteo Calandra, Nano Lett. 2023, 23, 14, 6658-6663 (2023)**

**General information:**
**The seminar will be held at ECT*, Villa Tambosi, Strada delle Tabarelle 286, Villazzano.**

**To reach Villa Tambosi: take bus number 13 from Povo or bus number 6 from the city center. The bus stops is in front of the Villa.**

**We are going to have a coffee break!**

**In order to organize the coffee break we kindly ask you to confirm your presence through the Google form that you can find scanning the QR code.**

**Contacts: morresi@ectstar.eu - cconstantinou@ectstar.eu - zyao@ectstar.eu**

Incoming Director of the ECT*: Professor Ubirajara van Kolck

The ECT* is part of the Fondazione Bruno Kessler. The Centre is funded by the Autonomous Province of Trento, funding agencies of EU Member and Associated states, and by INFN-TIFPA and has the support of the Department of Physics of the University of Trento.