



**DEPARTMENT OF PHYSICS  
OF MATERIALS**  
Faculty of Mathematics and Physics  
Charles University

Prague, March 2, 2026

**INVITATION TO THE DEPARTMENTAL SEMINAR  
AND  
SEMINAR ON PHYSICS OF MATERIALS & FERMION PROJECT**

On Wednesday, **March 4, 2026**,  
the seminar will feature a presentation by

**RNDr. Klára Uhlířová, Ph.D.**

Department of Condensed Matter Physics, Charles University

**“Symmetry breaking and interfacial states in misfit  
layered compounds”**

The seminar will take place in **lecture room F2**, Ke Karlovu 5,  
at **12:15 p.m.**

# Symmetry breaking and interfacial states in misfit layered compounds

Klára Uhlířová

Misfit layered compounds (MLCs) are thermodynamically stable, natural van der Waals superlattices composed of alternating  $MX$  and  $TX_2$  layers (where  $T = \text{Ti, V, Cr, or Ta}$ ;  $M = \text{Sn, Sb, Pb, Bi, or rare earths}$ ; and  $X = \text{S or Se}$ ) stacked along the  $c$ -axis. Within the basal plane, the  $MX$  and  $TX_2$  subsystems are incommensurate due to their different lattice parameters [1]. This incommensurability leads to structurally rich systems where small changes in stacking or symmetry can have a large impact on electronic, magnetic, or ferroelectric behavior.

We present studies of two representative MLCs. The first, non-polar  $(\text{PbS})_{1.11}\text{VS}_2$ , exhibits moiré-like superstructures [4-6] in bulk crystals formed by natural twinning [2,3]. We show that twins preferentially adopt 2H or 3R stacking and that they exhibit small mutual twist angles. Such twins can generate moiré patterns analogous to those in artificially twisted bilayers of hBN, graphene, or transition-metal dichalcogenides [4-6]. In this way, the polar 3R stacking locally induces sliding-ferroelectric interfaces in an otherwise nonpolar system [2].

The second material,  $(\text{BiS})_{1.23}\text{CrS}_2$ , is intrinsically polar and therefore a sliding-ferroelectric compound in bulk form. Preliminary studies, including transmission electron microscopy (TEM), indicate that interactions between ferroelectric domains give rise to a regular array of twins with opposite polarization.

[1] G. Wieggers, Prog. Solid State Chem. 24, 1 (1996).

[2] C. Antunes Corrêa (K.U.) et. al. Phys. Rev. Lett. 134, 056202 (2025).

[3] C. Antunes Corrêa (K.U.) et. al., Phys. Status Solidi RRL 18, 2400189 (2024).

[4] S. Chiodini et. al., ACS Nano 16, 7589 (2022).

[5] M. R. Rosenberger, et. al., ACS Nano 14, 4550 (2020).

[6] D. Zhang et. al., Nat. Rev. Mater. 8, 25 (2023).