



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

Prague, April 7, 2026

INVITATION TO THE DEPARTMENTAL SEMINAR /
SEMINAR ON PHYSICS OF MATERIALS
and
FERRMION PROJECT

On Wednesday, **April 8, 2026**,
the seminar presentation will be given by

Dr. Jan Čapek

Department of Physics of Materials,
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*“TRIP in Steels and Titanium Alloys: From 2D Synchrotron
Data to Texture and Phase-Resolved Mechanics”*

The seminar will take place in **the lecture room F2**, Ke Karlovu 5,
at **12:30 p.m.**

ABSTRACT

Transformation-induced plasticity (TRIP) is a key strain-hardening mechanism in metastable austenitic steels and in selected titanium alloys, where deformation- or stress-assisted transformations improve the strength-ductility balance. Although the governing crystallography is broadly known, quantitative interpretation of in-situ 2D synchrotron X-ray diffraction (SXR) during deformation strongly depends on data processing choices—especially when phase fractions and texture evolve simultaneously.

This seminar outlines a practical workflow for extracting reliable, phase-resolved information from 2D SXR patterns in (i) austenitic steels ($\gamma \rightarrow \epsilon/\alpha'$) and (ii) titanium alloys ($\beta \rightarrow \alpha'/\alpha''$). Core steps and common pitfalls are highlighted for azimuthal integration (“caking”) and peak overlap, with emphasis on what is lost when reducing 2D data to 1D profiles. The approach enables quantification of evolving phase fractions, lattice strains and stress partitioning, peak broadening linked to defect content, and texture evolution expressed via pole figures and ODFs. MTEX-based analysis is used to connect measured textures to loading mode and to test variant-selection assumptions against diffraction and EBSD results.