



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

Prague, March 23, 2026

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

On Wednesday, **March 25, 2026**,
the seminar will feature a presentation by

Dr. João Felipe Queiroz Rodrigues, Ph.D.

Department of Manufacturing and Materials Engineering,
University of Campinas

**“Experimental Approaches to Additive Manufacturing
of Advanced Titanium Alloys: In-Situ Alloying, Hybrid
Structures, and Functionally Graded Materials”**

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

Experimental Approaches to Additive Manufacturing of Advanced Titanium Alloys: In-Situ Alloying, Hybrid Structures, and Functionally Graded Materials

Dr. João Felipe Queiroz Rodrigues, Ph.D.

Additive manufacturing has enabled new possibilities for the development of advanced metallic materials with complex chemical compositions, controlled microstructures, and spatially tailored properties that are difficult to obtain by conventional processing routes. In this seminar, the research activities carried out in Brazil will be presented, with emphasis on experimental approaches for the fabrication and characterization of titanium-based alloys produced by laser-based additive manufacturing.

The presentation will start with a brief overview of the research line focused on additive manufacturing of metastable B-type titanium alloys, followed by a description of the available experimental infrastructure for alloy processing. Different strategies for materials design using additive manufacturing will then be discussed.

First, the in-situ alloying approach will be presented, including the fabrication of Ti-Nb-Sn alloys produced directly during processing in order to control phase stability and mechanical behavior. The concept of hybrid alloys will also be shown, where different feedstock materials are combined during manufacturing, such as Ti-Nb alloys reinforced with high-strength titanium alloys. In addition, the fabrication of heterostructured materials will be addressed, including layered composites where diffusion at the interface and phase transformations play an important role in the final microstructure.

Recent results on functionally graded materials will also be presented, focusing on compositional gradients in Nb- and Ta-containing titanium alloys designed to tailor elastic properties and phase stability. Finally, a brief overview of ongoing experimental work involving complex multicomponent alloys will be shown.

The aim of this seminar is to present the experimental capabilities available in Brazil and to discuss possible opportunities for collaboration in additive manufacturing and advanced titanium-based materials.