PSI Center for Neutron and Muon Sciences

Coffee before the colloquium

Invitation
CNM Colloquium – Tenure Track Talk

Friday, May 8, 2026, 1.00 p.m.
WHGA/001

Designer oxide heterostructures for computing and energy

Dr. Nikita Shepelin, Paul Scherrer Institut

Abstract:
With the widespread uptake of artificial intelligence technologies, the energy security for powering such devices is an important challenge that must be addressed. This issue must be tackled from two perspectives: energy efficiency in computing devices and the capability to sustainably source and store energy to power them. From the perspective of the research interests of the Physical Properties of Materials (PPM) group in the Laboratory for Multiscale Materials Experiments (LMX), I will explore strategies to utilize oxide architectures for these applications. The intelligent design of multilayer systems will be addressed, building from the fundamental electronic properties that are governed by the composition. The chemical, electronic and structural considerations will be linked to the functionality for the cases of ferroelectric field effect transistors towards continuing Moore's law scaling, dielectric capacitor systems for short-term energy storage, and photoactive semiconductor anodes for the oxygen evolution reaction. This research will be complemented by an overview of the instrumental infrastructure in the PPM group, including recent developments in measurement capabilities. Finally, I will discuss the ongoing development of autonomous epitaxy towards the growth of perfectly epitaxial crystals to be employed on the materials innovation cluster (MIC) within the upcoming quantum matter and materials center (QMMC).

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