



EINLADUNG

zum Vortrag von

Prof. Dr. Stefan Kowarik

Universität Graz, Institut für Chemie

Enhancing X-Ray Analytics with AI: Efficiency, Precision, and Autonomy

am Dienstag, 11. Juni 2024, um 17:30 Uhr

Ort: Lise-Meitner-Hörsaal, Fakultät für Physik, Universität Wien,
1090 Wien, Strudlhofgasse 4 / Boltzmannngasse 5, 1. Stock

*Barrierefreier Zugang: Boltzmannngasse 5, Lift, 1. Stock rechts über den Gang zum
Hintereingang des Hörsaals*

Abstract:

X-ray analytics, though a well-established standard, often involve complex data analysis that requires substantial expert knowledge, making the analysis of large datasets time-consuming and sometimes impractical. In my presentation, we will explore examples of rapid in operando studies where AI is essential for analyzing tens of thousands of X-ray datasets. I will discuss fast, millisecond measurements of X-ray reflectivity (XRR) data during the spin coating of thin films and illustrate how AI accelerates this process. Additionally, we will showcase live AI analysis of XRR curves, which provides direct feedback to the in operando experiments. Expanding beyond XRR analysis, I will demonstrate how AI-driven deep reinforcement learning can perform XRR measurements up to four times faster than traditional human-planned scans.

Transitioning from reflectometry to diffraction, I will further present recent advancements in analyzing grazing incidence X-ray diffraction (GIXD) data with AI. While GIXD is a very important technique for determining thin film structures, its analysis remains challenging and time-intensive. Through AI, we will demonstrate high-precision determinations of the unit cell of an adsorbate from GIXD data and the retrieval of the adsorbate layer's contact plane. In conclusion, this talk will highlight how cutting-edge AI tools not only enhance the speed and precision of data analysis but also enable autonomous measurements in X-ray analytics.

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