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Seminar über Biomedizinische Photonik

Referent/in / speaker**:** Dr. Demeter Turos, Institute of Animal Pathology

Titel / title: Deep learning-based spatial transcriptomics with X-Pression

Spatial transcriptomics technologies currently lack scalable and cost-effective approaches for profiling tissues in three dimensions. Recent advances in microcomputed tomography have enabled non-destructive volumetric imaging of tissue blocks with sub-micron resolution at centimeter scale. Here, we present X-Pression, a deep convolutional neural network framework designed to reconstruct 3D expression programs of cellular niches from volumetric microcomputed tomography data. Trained on a single 2D section from a paired spatial transcriptomics experiment, X-Pression achieves high accuracy and generalizes to out-of-sample examples. We applied X-Pression across multiple cohorts, including a SARS-CoV-2 vaccine-efficacy spatial transcriptomics and micro-CT study involving a live attenuated vaccine, as well as BRCA1;p53-deficient mouse mammary tumors. These applications highlight the advantages of 3D tissue examination and reveal gene-expression programs driving viral replication and tumor heterogeneity. X-Pression provides a cost-effective framework for inferring expression signatures without requiring consecutive 2D sectioning and reconstruction, offering new insights into transcriptomic profiles in three dimensions.

Zeit / time: Wednesday 26.11.2025, 10:15 Uhr

Ort / place: Room A97, ExWi, Sidlerstrasse 5, 3012 Bern