Mathematical Physics
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I N V I T A T I O N

as part of the Mathematical Physics Theory Seminar

to the talk by

Harold STEINACKER

(University of Vienna)

on

"Quantum Geometry of Data (and Spacetime)"

Abstract:
Quantum geometry provides a suitable framework for a quantum theory of spacetime and gravity defined by matrix models. More recently, the same concept of quantum geometry has been applied in the context of machine learning and data science.
I will describe how "Quantum Cognition Machine Learning" (QCML) encodes data as quantum geometry, by machine learning Her mitian matrices and mapping data points to states in Hilbert space. The quantum geometry description endows the dataset with rich geometric and topological structure, including intrinsic dimension, quantum metric, Berry curvature and Chern numbers. QCML captures global properties of data, while avoiding the curse of dimensionality inherent in local methods. This is illustrated with a number of synthetic and real-world examples. Quantum geometric representation of QCML may help to advance our understanding of cognitive phenomena. (based on arXiv:2507.21135)

Time: Tuesday, 14 October 2025, 2:00 p.m.

Location: Erwin-Schrödinger Lecture Hall, 1090 Vienna, Boltzmanngasse 5, 5th floor

sgd. S. Fredenhagen, M. Sperling