
SEMINAR: Quantum process tomography at high energies

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February 11, 2025

12:00 to 13:00

Seminar Room

The quantum process tomography is an experimental procedure allowing to reconstruct an unknown quantum process, characterised by the Choi matrix, from the measurement data. It is typically engaged to test the quality of a constructed quantum circuit. However, it can also be employed to design new foundational tests of the quantum theory itself. In my talk, I will show how to implement quantum process tomography at high-energy colliders. It is based on recent breakthrough measurements of quantum entanglement at the Large Hadron Collider in CERN and the possibility to prepare high-energy polarised beams of particles at present and future colliders. As an illustrative example, I will discuss the theoretical prediction and a suitable experimental procedure, to reconstruct the spin dynamics in the process of top-quark pair production from polarised electron-positron collisions. The talk is based on the recent works: [arXiv:2103.12000](https://arxiv.org/abs/2103.12000) [quant-ph], [arXiv:2412.01892](https://arxiv.org/abs/2412.01892) [hep-ph].

BIO:

Michał Eckstein is an assistant professor of theoretical physics at the Jagiellonian University in Krakow, Poland. He worked in various different fields of physics and mathematics, including operator algebras, quantum information, general relativity and particles physics. His primary interest are the foundations of physics.

Hosted by: Prof. Dr. Maciej Lewenstein