UNIVERSITÀ DI PAVIA
Dipartimento di Fisica "Alessandro Volta"

AVVISO DI SEMINARIO

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Monday 2nd March - 11:00h - Room A103

Processes, operations, causality, and memory in continuous time

Quantum combs efficiently model multi-time processes, where a system can be probed multiple times, without any assumption about underlying system-environment interactions. However, they are restricted to scenarios where any system-environment interaction `halts' when the system is probed, an assumption not always justifiable in realistic scenarios. More foundationally, combs underpin the study of quantum causal structures, but they are limited to discrete models of spacetime, or instantaneous operations in spacetime. I will present a continuous-time version of combs/multi-time quantum processes based on process and operation functionals, which generalize the Feynman–Vernon influence functional and yield a continuous Born rule that cleanly separates processes from operations. Operational continuous-time definitions of causality and Markovianity arise, which characterise, respectively, processes compatible with a fixed causal order and processes without memory. The framework has direct applications to continuous time sensing of dissipative systems and opens the way to extend the study of quantum causal structure to the continuum.