

SEMINAR: Measurement-enabled online quantum processing with amplitude encoding

PERE MUJAL

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12:00 to 13:00

Seminar Room

We introduce a quantum reservoir computing online protocol that realizes amplitude encoding on quantum hardware. Our scheme combines mid-circuit measurement and reset operations to implement the partial-trace dynamics underlying amplitude encoding, while an indirect measurement scheme provides access to reservoir observables without interrupting temporal processing. In contrast to other approaches, our method preserves online operation, avoids input buffering, and keeps the runtime linear in the number of time steps. We present the theoretical formulation of the protocol and a proof-of-principle implementation on quantum hardware, and we evaluate its performance on two standard benchmark tasks. Our results show that the reservoir dynamics can be monitored through both direct measurements of the input qubits and indirect measurements of the memory qubits, enabling observation of the full system while isolating the internal evolution of the reservoir. This work provides a practical route toward scalable hardware implementations of amplitude-encoded quantum reservoir computing and opens the door to systematic experimental studies of complex quantum reservoirs.

Hosted by: Prof. Dr. Antonio Acín