

## **Implementing quantum coordination algorithms with quantum network simulators**

Quantum networks provide communication services whose capabilities extend beyond classical networks, improving scalability of distributed quantum computing, enabling quantum cryptography, and coordination primitives that surpass their classical counterparts in security and performance. For instance, they are essential to novel distributed algorithms providing classically impossible solutions to coordination problems such as consensus and leader election with non-exhaustive list of examples given in [Quantum Protocol Zoo](#).

However, the constraints of quantum mechanics (e.g., no-cloning theorem, measurement postulate) render quantum networks much more fragile than classical ones. Time- and distance-dependent decoherence (degradation) of the quality of quantum state, make quantum communication highly error-prone, invalidating idealistic assumptions made when designing the above algorithms. To evaluate the latter effect in near-term noisy quantum networks, quantum network simulators such as [NetSquid](#) are used to [benchmark](#) (see also [GitHub](#)) the algorithms. Both primitive building blocks and heavier algorithms such as those for Byzantine agreement using [NetSquid](#) or [commercial Aliro simulator](#).

The goal of this project is to implement a network-independent quantum Byzantine agreement protocols in a quantum network simulator so to understand the performance trade offs of the algorithms when executed over a given network, in particular with respect to entanglement generation rate and fidelity.