Contribution ID: **46** Type: **not specified**

Ambitions and Challanges in Quantum Computing

Quantum computing is often presented as a route to solving classically intractable problems, yet this promise is fundamentally constrained by limited hardware resources. This poster explores how this tension can be addressed across quantum simulation, quantum chemistry, and quantum machine learning.

In quantum simulation, key challenges lie in the efficient preparation of physically relevant many-body states and the reliable estimation of observables. Quantum chemistry represents a distinct and industrially relevant challenge, where accurately modeling molecular systems requires balancing algorithmic design with resource constraints. Similar issues arise in quantum machine learning: While variational approaches are well suited to near-term devices, their performance typically degrades at larger system sizes. A central goal is therefore to identify tasks that may exhibit genuine quantum advantage, such as scalable learning on sets. We present algorithmic strategies designed to exploit quantum hardware while targeting relevant problems.

Primary authors: Mr CUGINI, Davide (University of Pavia); GHISONI, FRANCESCO

Presenters: Mr CUGINI, Davide (University of Pavia); GHISONI, FRANCESCO

Session Classification: Caffè e poster (dal N. 9 al N. 51)