

Panel discussion on: **“Will the quantum-simulating technologies enable quantum advantage in HEP?”**

Panelists: **Monika Aidelsburger, Ignacio Cirac, Joe Lykken, Tom O’Brien, Martin Ringbauer**

SLACK poll questions:

- Do you currently see a barrier in achieving closer interactions among HEP and quantum information science and technology communities? [Y/N]
- In case you see any, how do you suggest overcoming any existing obstacles in this respect? [open text]
- What lessons HEP scientists can learn from other disciplines such as AMO, CM, and quantum chemistry who embraced quantum and quantum-inspired methods and ideas ahead of HEP? [open text]

1) For each of the leading computing and simulation hardware architectures (atomic platforms, solid-state devices, etc.), what is the number one issue you see in achieving reliable large-scale fault-tolerant computing/simulation?

2) Are there any long-term trends in either quantum hardware or software architecture that HEP users should be accounting for in their development of algorithms and methods?

3) Do you see peculiar features in HEP problems (e.g., quantum simulation of gauge theories or quantum-assisted algorithms for collider-physics experiment) that require special-purpose quantum hardware or particular modalities that need to be incorporated in current devices? Do you see a benefit in hardware and algorithm co-design?

4) Do you currently see a barrier in achieving closer interactions among HEP and quantum information science and technology communities? How do you suggest overcoming any existing barriers?

5) What lessons HEP scientists can learn from other disciplines such as AMO, CM, and quantum chemistry who embraced quantum and quantum-inspired methods and ideas ahead of HEP?