DESY
Particle and Astroparticle Physics Colloquium

The quest for a practical quantum advantage.

Or: The importance of applications for quantum computing

Tuesday, 28 March, 2023
Auditorium & Webcast 16:00 h

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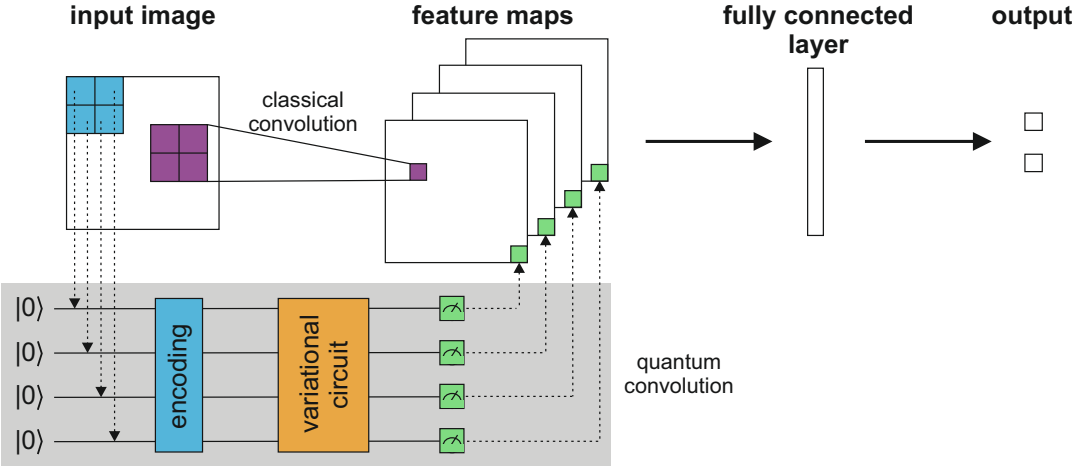
Although the development of quantum computing hardware and software is progressing fast with many papers appearing on arXiv daily, the advantage of using quantum computing for real-life (industry and academic) applications remains unclear. Present quantum computers are relatively limited in the number of qubits, the connectivity and are affected by noise. This makes it impossible to profit from theoretically proven quantum advantages like in Grover‘s or Shor‘s algorithms already today. But are there applications for which the currently available Noisy Intermediate-Scale Quantum (NISQ) devices are already useful now or in the near future? What can we learn from working with NISQ devices? Can we reformulate quantum algorithms such that a practical quantum advantage realizes for certain applications already within the next years? Also, quantum algorithms are unlikely to be used standalone, but will rather require a clever interplay between classical and quantum computers enforcing the need to integrate these different hardware concepts closely.



After an introduction to the essentials of quantum computing, my talk will cover a couple of aspects within this thematic landscape: What is a ‚practical‘ quantum advantage? What are example applications where we might hope to find it? How severe is the problem of noise from the application perspective? And finally: how can we make quantum technology accessible to newcomers?

This is a HYBRID colloquium

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