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Title: How to build a Quantum Accelerator

Abstract:

While working for many years with quantum physics colleagues, we were forced to address some of the quantum problems they have not yet resolved. However, Quantum Computing depends on the physics community to solve a lot of the many fundamental challenges before we will have high quality qubits with which we can build operational quantum devices. I prefer to speak of quantum accelerators rather than quantum computers as it is more evident what an accelerator involves. Therefore, building a quantum accelerator involves much more than merely the development of good qubits, irrespective of what qubit technology will be chosen at some point. It is also important to reformulate many objectives such that other scientific, non-physics-oriented fields can focus on multiple aspects of such a quantum accelerator. The focus to do that in an integrated way of interconnected layers is one potential direction. I define in this talk what those different layers are starting at the quantum applications down to the execution on a quantum simulator. This way, we can collaborate towards the development of operational quantum accelerators that will be a future driving force in the world, most likely in 10-15 years from now and not much sooner.