

What might a quantum computer be good for?

Sevag Gharibian
Department of Computer Science, Paderborn University

Building large-scale quantum computer is one of the foremost engineering challenges of the 21st century. Given this difficulty, a key question is: What might a quantum computer be useful for, crucially in the sense of outperforming current classical computing technology? In this work, we discuss this question from three complementary perspectives: Long-term applications, short-term applications, and seminal milestones. In particular, we will cover a variety of topics, ranging from Shor's celebrated quantum factoring algorithm, to near-term quantum approximate optimization algorithms, to recent "quantum supremacy" milestones on the experimental end. An emphasis will be given to the distinction between theory versus practice, and the pitfalls which arise when transitioning from the former to the latter. No background in quantum computation or computer science is assumed for this talk.