TUT 2: Tutorial What can Quantum Computers do – and what can't they?

Time: Sunday 15:00–16:30   Location: ZHG105

Tutorial   TUT 2.1   Sun 15:00   ZHG105
What can quantum computers do - and what can't they? —
•Jens Eisert — Dahlem Center for Complex Quantum Systems, Freie
Universität Berlin

Quantum computers - so computers whose fundamental units of information are quantum systems - promise solutions to computational problems that are beyond the reach of classical supercomputers. However, this does not mean they can solve all problems faster. In fact, this advantage seems to apply only to a small number of highly structured problems - those for which a provable separation exists between quantum and classical capabilities.

This tutorial introduces some elementary quantum algorithms, explores more sophisticated ones, and examines both the potential and the limitations of fully fault-tolerant quantum computers. It also serves as an invitation to contribute to this field, as each new class of quantum algorithms has historically begun with a genuinely novel idea.