

Dieter Suter
TU Dortmund

Quantum Computers: Promise, Problems and Possible Solutions

The "digital revolution" that is transforming our lives and our economy is based on the ubiquity of information-processing devices whose processing power increased exponentially, following Moore's law. As this trend is approaching fundamental physical limits, new directions are explored for even more powerful computational devices based on quantum mechanical systems. Such devices can solve problems that will remain out of reach for conventional computers. The main difficulty for their implementation is the fragility of information stored in coherent superpositions of quantum mechanical eigenstates. This talk will highlight some aspects of the potential offered by quantum computers, as well as the difficulties that must be overcome to realise this potential. Our current work concentrates on finding solutions for some of these problems.