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Einladung zum Physikalischen Kolloquium

Montag, 05.11.2018
16:15 Uhr in N24/H13

Prof. Dr. Winfried K. Hensinger
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Constructing a trapped ion quantum computer

Quantum computer may be able to solve certain problems that are so complicated that even the fastest supercomputer would take millions of years to provide an answer. Entanglement and superposition are quantum phenomena which can be tamed in order to build such a machine. Optimising financial transactions, machine learning, creating new medicines, understanding protein folding and breaking codes are just some of the problems where the existence of a quantum computer could change everything.

The challenge to build a universal quantum computers has been described as difficult as manned space travel to Mars. By inventing a new method where voltages applied to a quantum computer microchip are used to implement entanglement operations, we have managed to remove one of the biggest barriers traditionally faced to build a large-scale quantum computer using trapped ions, namely having to precisely align billions of lasers to execute quantum gate operations.

In order to be able to build large scale device, a quantum computer needs to be modular. One approach features modules that are connected via photonic interconnect, however, with only very small connection speeds between modules demonstrated so far. We have invented an alternative method where modules are connected via electric fields, allowing ions to be transported from one module to another giving rise to much faster connection speeds.

Incorporating these two inventions, we recently unveiled the first industrial blueprint on how to build a large-scale quantum computer which I will discuss in this talk. I will show progress in constructing a quantum computer prototype at the University of Sussex featuring this technology.

Ab 16.00 Uhr Kaffee, Tee und Kekse vor dem Hörsaal H13
Organisation: **Prof. Dr. F. Jelezko, Tel. 23750**
Host: **Prof. Dr. J. Hecker Denschlag, Tel. 26100, off.: 26101**