**Joint Lab „Wireless and Embedded Systems Design“**

**IHP-Universität Potsdam**

## Workshop “Quantum Computing”

## Tue 10th October 2017, 10 AM
## Universität Potsdam, Campus Griebnitzsee, Haus 6, Hörsaal 1

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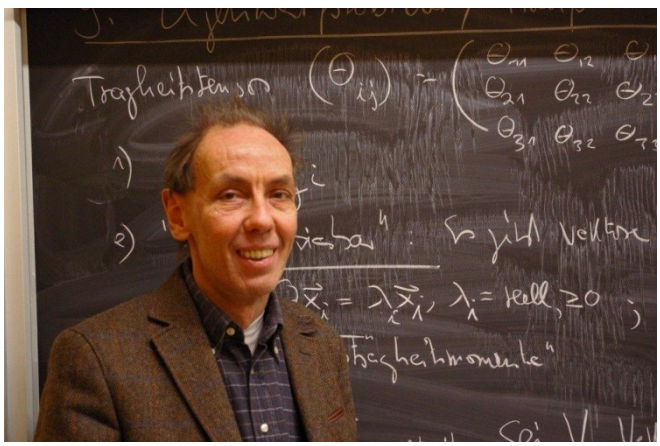
|---|---|---|
| 10:00 | The Basics of Quantum-Information | *Prof. Dr. Martin Wilkens*<br>University Potsdam |
| 11:30 | Quantum computers - models, platforms, and perspectives | *Prof. Dr. Frank Wilhelm-Mauch*<br>Saarland University |
| 12:30 | End of the Workshop | |

### The Basics of Quantum-Information

The lecture introduces the basic concepts of quantum information processing. The qubit and its physical realizations will be introduced, followed by a first application -- the secure quantum key distribution in the BB84 protocol. The principles of the quantum computer will be discussed on the basis of the Deutsch-Josza decision algorithm and its generalization in the Shor algorithm. The lecture concludes with an outlook on the quantum-information roadmap of the European Community and its new flagship initiative.

***Prof. Dr. Martin Wilkens*** *is a professor for quantum optics at the University of Potsdam since 1997. He has studied physics and philosophy in Essen. His current fields of research include quantum optics, atomic and molecular physics, and quantum field theory / statistical field theory.*



**Quantum computers - models, platforms, and perspectives**

Quantum computers offer qualitative speedup to certain computational problems compared to classical computers. How would we build such an elusive scheme and at what point can we expect one?

I will review three paths to quantum computing: Near-term achievement of „quantum supremacy“ by direct operation on registers of about 50 qubits, full fault-tolerant universal quantum computing, and quantum annealing/adiabatic quantum computing. I will describe their status and their potential for applications. As for platforms, I will review the currently leading candidates - trapped ions and superconducting integrated circuits - as well as a number of important runners-up. I will describe global activities to advance the field with a focus on the European QT flagship.

**Prof. Dr. Frank Wilhelm-Mauch**

1991-96 Studies of Physics at Universität Karlsruhe (KIT)

1999 PhD in Physics at Universätit Karlsruhe (KIT) in theoretical condensed matter physics under Gerd Schön

1999-2001 Postdoc at Delft University of Technology (NL) under J.E. (Hans) Mooij, start to work on quantum computing

2001-05 Senior Postdoc at LMU Munich under Jan von Delft

2004 Habilitation in Theoretical Physics

2006-11 Associate Professor, 11-13: Full Professor on leave, 13-16: Adjunct Professor at the University of Waterloo, Canada (Department of Physics and Astronomy and Institute for Quantum Computing)

since 2011 Full Chair Professor, Saarland University

*Notable awards and appointments:*

1993-96: German National Merit Foundation

2010: Distinguised Service Award, University of Waterloo

2015: Google Research Award

since 2015: Executive Secretary of the Virtual Facility of Quantum Control

2011-17: Divisional Associate Editor for Quantum Information at Physical Review Letters