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# Quantum Computing: A Brief Introduction

mit **Prof. Dr. Frank Leymann** (Universität Stuttgart)

**Wann?** 10. Dezember, ab 15:00 Uhr

**Wo?** Hörsaal 3 (HS3), Fakultät für Informatik  
Währinger Straße 29  
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## Abstract

We start by briefly reminding the notion of uncertainty and superposition from quantum physics. Based on this, the concept of a quantum bit, the role of measurements, as well as the fundamental structure of a quantum algorithm are introduced. Next, quantum registers and entanglement are discussed. Operators to manipulate quantum registers are presented. The problem of decoherence is sketched. Next, the algorithm of Deutsch-Jozsa reveals the potential of exponential speedup of quantum algorithms. Algorithms to speedup unstructured search (Grover) and factorization (Shor) are sketched. A glimpse on quantum information follows. Finally, the possible mid term use of quantum computers is discussed.

**Note:** The talk assumes background knowledge in linear algebra.

## Bio

**Frank Leymann** is a full professor of computer science at University of Stuttgart, Germany. His research interests include service-oriented architectures and associated middleware, workflow- and business process management, cloud computing and associated systems management aspects, and patterns. Frank Leymann is co-author of more than 400 peer-reviewed papers, about 70 patents, and several industry standards. He is elected member of the Academy of Europe.