QL3 Quantum LifeLong Learning

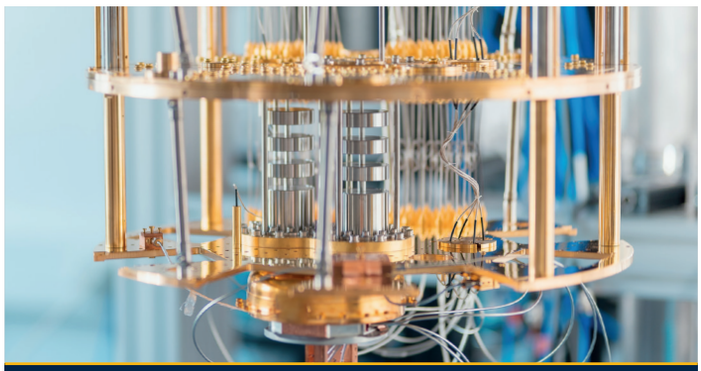
A project of the Munich universities funded by the Federal Ministry of Education and Research

LMU Ludwig-Maximilians-Universität München

Technische Universität München

QUANTUM COMPUTING – AN INTRODUCTORY COURSE

Kick-off day on campus:
January 12, 2023: 09:00 am – 06:00 pm in Munich
Online Sessions:
January 19, 26, February 2, 9, 16, 2023 from 05:00pm – 08:00 pm
Optional review session: February 23, March 2, 2023 from 05:00pm – 08:00 pm
Final day on campus:
March 10, 2023: 09:00 am – 06:00 pm in Munich
Blended-learning: Online & on campus: Munich
Language: English



Program fees: 3,500 €*

*Partially funded price of **2,850 €** in 2023 for the organizations of the QL3 Advisory Board, TUM & LMU alumni.
10% discount for members or employees of our strategic cooperation partners.

Content

The QL3 introductory course 'Quantum Computation' introduces the phenomena and mathematical description of quantum mechanics and their application to the realm of quantum computation. Quantum mechanical effects are reviewed in a basic quantum mechanics module and applied in hands-on single-photon experiments, with references to quantum computing being made from the outset. With this understanding, the following modules address different layers of quantum computation applications:

- (I) concepts, potentials, and limitations of quantum algorithms;
- (II) realizations of quantum computers: hardware, errors and their correction, and advanced concepts like
- (III) quantum simulations and quantum machine learning.

Target Group

This program is designed for people preferably with a natural or computer science background, such as software developers, physicists or chemists. No prior experience in quantum technologies is required.

Access Requirements

Participants should have basic knowledge of linear algebra and a programming language, although no expert knowledge is required. Self-paced refresher courses on linear algebra and Python are offered additionally; if needed.

Why this program?

Quantum technologies are a firmly established and strongly growing scientific research field with great application potential for industry. The current challenge facing Germany and Europe is to transfer the knowledge and technological expertise on quantum systems from university laboratories and research institutes to the private sector. Experts and executives in high-tech industry will play a key role, as they must recognize and implement the specific potential of quantum technologies for their respective companies. Didactics experts introduce complex topics with hands-on quantum mechanics experiments, visualizations, and VR applications. Programming exercises and project work, partly executed on real quantum devices, bridge the gap from theory to applications. Real-world use cases and prototypical realizations from the Munich area serve as examples. We offer additional networking events after the end of the course.

Academic Responsibility

Prof. Dr. Alexander Holleitner
Walter Schottky Institut and Physics Department, Chair of Nanotechnology and Nanomaterials, Technical University of Munich

Prof. Dr. Jan von Delft
Chair of Theoretical Solid State Physics, Department of Physics, Ludwig-Maximilians-Universität München

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About the TUM Institute for LifeLong Learning

The TUM Institute for LifeLong Learning supports international experts and leaders from science, business and society to meet the challenges of the 21st century.

Therefore, the Institute offers innovative continuing education courses and thus facilitates scientifically-based and technology-supported professional and leadership development.