

WED-ID 5: Quantum Enabling I

Time: Wednesday 14:45–16:45

Location: ZHG105

Invited Talk

WED-ID 5.1 Wed 14:45 ZHG105

Pathways to Maturity for the Quantum Industry — •CLAUDIUS RIEK — Zurich Instruments Germany, Munich, Germany

Quantum technologies are currently transitioning from lab experiments to systems and components useful for society.

A quantum industry supporting this maturation process relies on both an evolution of enabling technologies and a supportive ecosystem: Technological readiness of quantum technologies can only be enhanced when sufficient funding in research and development is leveraged by cross-disciplinary collaboration.

This talk offers a comprehensive overview of pivotal technologies, such as refrigeration, signal delivery, and quantum control systems for optical and electronic control, highlighting their role in driving quantum advancements. These technologies are vital for addressing core challenges like scalability, coherence preservation, and reliable system integration.

Together, we will explore the technological and strategic pathways necessary for quantum technologies from an emerging field to a mature industry, potentially shaping the future of industrial transformation in the coming decades.

5 min. break**Invited Talk**

WED-ID 5.2 Wed 15:10 ZHG105

From Bottlenecks to Breakthroughs: Simplified & Scalable Cryogenics for the Quantum Age — •TOMEK SCHULZ — kiutra GmbH, Munich, Germany

As quantum technologies mature, testing at cryogenic temperatures is becoming a crucial bottleneck limiting the speed, scale, and cost-efficiency of innovation. At kiutra, we address this barrier by offering fast characterization solutions, giving quantum scientists and engineers a speed and cost advantage. Our unique, helium-3-free continuous adiabatic demagnetization refrigeration (cADR) technology enables modular, scalable platforms that support the long-term industrialization of quantum technologies sustainably. This talk will reflect on our journey from academic research to building a globally active hardware startup. It will highlight some of the challenges such as IP transfer, acquiring funding, managing investor expectations, securing first customers, and building a first-of-its-kind production facility. These milestones have helped us define our niche and illustrate what it takes to build a tech champion in quantum. The presentation will conclude with a call to action: To unlock the full potential of quantum, it will require not only scientific progress but also a joint effort from various actors to build better funding instruments, support industry knowledge transfer, as well as removing political barriers.

5 min. break**Invited Talk**

WED-ID 5.3 Wed 15:35 ZHG105

Quantum technologies enabled by Photonic Integrated Circuits — •MICHAEL GEISELMANN — LIGEN-TEC AG, Lausanne, Switzerland

Photonisches Quantencomputing, Quantenkommunikation und Quantensensorik profitieren maßgeblich von photonisch integrierten Schaltkreisen (PICs). Erste Quantencomputer-Prototypen nutzen bereits diese Technologie, die hohe Stabilität, Skalierbarkeit und geringe optische Verluste vereint. In diesem Vortrag gebe ich einen Überblick über aktu-

elle Fortschritte in der Fertigung photonischer Chips mit besonderem Fokus auf Materialien wie Siliziumnitrid und Lithiumniobat, die sich durch exzellente optische Eigenschaften auszeichnen.

LIGEN-TEC entwickelt und liefert Siliziumnitrid-basierte PICs für Industrie, Start-ups und akademische Partner weltweit. Gemeinsam mit einem starken europäischen Ökosystem ermöglichen wir nicht nur die Herstellung, sondern auch die Simulation und Integration der Chips zu kompletten Modulen. Auf diese Weise sichern wir eine zuverlässige europäische Lieferkette von Prototypen bis zur Serienfertigung und leisten einen Beitrag zur technologischen Unabhängigkeit Europas in der Quantentechnologie.

5 min. break**Invited Talk**

WED-ID 5.4 Wed 16:00 ZHG105

Light Modulators Driving Quantum Innovation — •ENRICO VOGT — QUBIG GmbH, Grillparzerstr. 6, 81675 Munich, Germany

Quantum technologies are rapidly advancing, with the potential to revolutionize fields such as secure communication, high-precision sensing, and quantum computing. A key enabler of this transformation is the ability to precisely control laser light using electro-optic (EOM) and acousto-optic modulators (AOM), which manipulate the frequency, amplitude, polarisation and phase of laser beams with high speed and accuracy. Traditionally reliant on bulky, alignment-sensitive setups, these modulators have now been redefined by a breakthrough at QUBIG that makes them compatible with surface-mount device (SMD) technology. This innovation dramatically reduces the size, complexity, and cost of advanced laser systems - paving the way for mass-producible, ultra-compact quantum devices. By bridging cutting-edge photonics with modern manufacturing, this innovation unlocks new opportunities for industrial deployment, global competitiveness, and strategic investment in the rapidly growing quantum economy. In this talk, the policy framework conditions that could promote the successful implementation of this technology in Germany are also mentioned.

5 min. break**Invited Talk**

WED-ID 5.5 Wed 16:25 ZHG105

PicoQuant Insights: Precision and Innovation for Quantum Research and Industry — •UWE ORTMANN, ANDREAS LEHR, MICHAEL WAHL, TORSTEN KRAUSE, TINO RÖHLICKE, and RAINER ERDMANN — PicoQuant GmbH, 12157 Berlin, Deutschland

PicoQuant, a Berlin-based company with nearly 30 years of expertise, is a pioneer in precision timing solutions for quantum research. Our latest FPGA-based time taggers achieve 1 ps digital resolution, 2 ps rms timing uncertainty, and ultra-low dead time across multiple input channels. Flexible trigger methods, including constant fraction discriminators, ensure compatibility with detectors like SNSPDs. A high-bandwidth FPGA interface enables pre-processing of time tags, while White Rabbit synchronization guarantees precise timing over long distances. Our intuitive GUI and Python API support real-time data visualization and analysis.

Beyond time taggers, we offer complete, application-driven solutions for setups like Hanbury Brown and Twiss, Hong-Ou-Mandel effect, quantum key distribution, and quantum sensing. PicoQuant drives innovation in photonics, shaping the future of quantum technologies and positioning itself as a leading partner for talent, thought leadership, and investment in the quantum industry.