

**Plenary Talk**

PV I Mon 8:15 U Audimax

**Quantum optics and information science in multi-dimensional photonics networks** — ●CHRISTINE SILBERHORN — Integrated Quantum Optics, Department of Physics, University of Paderborn, Warburger Straße 100, 33098 Paderborn, Germany

Classical optical networks have been widely used to explore a broad range of transfer phenomena based on coherent interference of waves, which relate to different disciplines in physics, information science, and even biological systems. At the quantum level, the quantized nature of light gives rise to genuine quantum effects that can appear completely counter-intuitive.

Photonic quantum systems with many optical modes have been investigated intensively in various theoretical proposals over the last decades. However, their implementation requires advanced setups of high complexity, which poses a considerable challenge on the experimental side. The successful realization of controlled quantum network structures is key for many applications in quantum optics and quantum information science.

Here we present three differing approaches to overcome current limitations for the experimental implementation of multi-dimensional quantum networks: non-linear integrated quantum optics, pulsed temporal modes and time-multiplexing.