

Plenary Talk

PLV I Mon 9:00 HS 1+2

The Entanglement Frontier in Quantum Networks —

•GERHARD REMPE — Max Planck Institute of Quantum Optics, Hans-Kopfermann Str. 1, 85748 Garching, Germany

Is a large-scale quantum internet realistic? Perhaps not, as quantum physics has been developed for the microscopic world. However, if a quantum internet becomes available, it will open up unimagined possibilities for communication. For example, a quantum search engine will provide answers to questions that even the machine cannot remember. In addition, the development of a quantum internet will provide

us with new technologies to network quantum processors into a larger quantum computer. Perhaps most intriguingly, the pursuit of a quantum internet will lead to a better understanding of the abstract concept of entanglement and its topology in distributed quantum systems with many qubits. Last but not least, in our classical world the realization of a quantum internet, even in its simplest form, constitutes a gigantic challenge that will help us grow and mature. The talk will discuss the quantum optics toolbox and highlight recent experimental achievements that may have brought us a step closer to the grand dream of a quantum internet.