

Plenary Talk PV XI Tue 17:00 HSZ 01
Information and the Foundations of Quantum Mechanics: From Einstein’s Spook and Schroedinger’s Cat to Quantum Information Technology and back — ●ANTON ZEILINGER — Faculty of Physics, University of Vienna — Institute of Quantum Optics and Quantum Information, Austrian Academy of Sciences

Experiments in quantum information science, having emerged from philosophically motivated experiments testing the foundations of quantum physics, are giving rise to both a new information technology and to a renewed debate about just these foundations. Most notably entan-

glement, while dismissed as “spooky” by Einstein, and epitomized in Schroedinger’s cat paradox who also called it “the characteristic trait of quantum mechanics”, emerged both as a central fundamental concept and as crucial for many procedures in quantum information technology including quantum teleportation. Recent results include tests of quantum cryptography networks and the realization of many protocols in quantum computation including quantum simulation. Today entangled states have achieved a technological maturity which again opens up possibilities for new fundamental experiments. The emerging picture is that information itself plays a fundamental role in the foundations of quantum mechanics.