

## Milestones of Quantum Technology I WS21/22

Organizer: Janik Wolters, Sven Ramelow, Sebastian Heeg

Time: Wed. 16-18h, via Zoom

<https://tu-berlin.zoom.us/j/64518097499?pwd=ZldHU2V6OEduRVFIV3pOQ2RRUWFmdz09>

Meeting-ID: 645 1809 7499

Kenncode: 402580

Topics: Quantum communication and quantum computing with (artificial) atoms and photons

**27.10.** Kickoff meeting

### Historic Fundamentals (3)

**3.11.** *Photon Antibunching in Resonance Fluorescence*. H. J. Kimble, M. Dagenais, and L. Mandel. *Phys. Rev. Lett.* **39**, 691 (1977) (S. Heeg)

Philipp Stammer

**10.11.** *Proposed Experiment to test Local Hidden-Variable Theories*, J. F. Clauser, M.A. Horne, A. Shimony, and R. A. Holt, *Phys. Rev. Lett.* **23**, 880 (1969) (S. Ramelow)

Jonas Kitzinger

**17.11.** *Experimental test of local hidden-variable theories*, S.J. Freedman, J.F. Clauser, *Phys. Rev. Lett.* **28**, 938 (1972) (S. Ramelow)

## Quantum Communication (5)

**24.11.** *Quantum cryptography: Public key distribution and coin tossing*, C. H. Bennett and G. Brassard, *Proc. IEEE Int. Conf. Com.* **175**, 8. (1984) (J Wolters)

**1.12.** *Experimental Demonstration of Free-Space Decoy-State Quantum Key Distribution over 144 km*, T. Schmitt-Manderbach et al., *Phys. Rev. Lett.* **98**, 010504 (2007) (S. Ramelow)

**8.12.** *Experimental Entanglement Swapping: Entangling Photons That Never Interacted*, J.-W. Pan, D. Bouwmeester, H. Weinfurter, and A. Zeilinger, *Phys. Rev. Lett.* **80**, 3891 (1998) (S. Ramelow)

**15.12** *Quantum Repeaters: The Role of Imperfect Local Operations in Quantum Communication*, H.-J. Briegel, W. Dür, J. I. Cirac, and P. Zoller, *Phys. Rev. Lett.* **81**, 5932 (1998) (J.Wolters)

**12.1.** *Single-Photon-Level Quantum Memory at Room Temperature* K. F. Reim, P. Michelberger, K. C. Lee, J. Nunn, N. K. Langford, and I. A. Walmsley *Phys. Rev. Lett.* **107**, 053603 (2011) (S. Heeg)

## Quantum Computing (5)

**19.1.** *The Physical Implementation of Quantum Computation*. David P. DiVincenzo, *Prog. Phys.* **48**, 771 (2000) (J.Wolters)

**26.1.** *Demonstration of a Neutral Atom Controlled-NOT Quantum Gate*, L. Isenhower, et al., *PRL* **104**, 010503 (2010) (J.Wolters)

**2.2.** *Demonstration of an all-optical quantum controlled-NOT gate*. J.L. O'Brien, G.J. Pryde, A.G. White, T.C. Ralph, D. Branning. *Nature* **426**, 264 (2003) (J.Wolters)

**9.2.** *Deterministic strain-induced arrays of quantum emitters in a two-dimensional semiconductor*. A. Branny, S. Kumar, R. Proux, B.D. Gerardot, *Nat. Comm.* **8**, 15053 (2017). (S.Heeg)

**16.2.** *Integration of single photon emitters in 2D layered materials with a silicon nitride photonic chip*. Peyskens, F., Chakraborty, C., Muneeb, M. *Nat. Comm.* **10** 4435 (2019). (S.Heeg)