

Milestones of Quantum Technology I

WS20/21

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Wed. 16-18h, via Zoom

<https://tu-berlin.zoom.us/j/61535369088?pwd=NUhCZ0ovV0xSZG9mSnArUW9lczZodz09>

Meeting-ID: 615 3536 9088

Kenncode: 123456

Topics: Quantum communication and quantum computing with atoms, semiconductor quantum dots, and photons

4.11. Introductory meeting

Basic Concepts

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

18.11. *Quantum Rabi Oscillation: A Direct Test of Field Quantization in a Cavity.* M. Brune, F. Schmidt-Kaler, A. Maali, J. Dreyer, E. Hagley, J. M. Raimond, and S. Haroche. *Phys. Rev. Lett.* **76**, 1800 (1996) (J.Wolters)

25.11. *Proposed Experiment to test Local Hidden-Variable Theories,* J. F. Clauser, M.A. Horne, A. Shimony, and R. A. Holt, *Phys. Rev. Lett.* (A. Pappa)

2.12. *Experimental Realization of Einstein-Podolsky-Rosen-Bohm Gedankenexperiment: A New Violation of Bell's Inequalities.* Alain Aspect, Philippe Grangier, and Gérard Roger. *Phys. Rev. Lett.* **49**, 91 (1982) (T. Heindel)

Quantum Communication

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

16.12. *Quantum cryptography with a photon turnstile.* E. Waks et al., *Nature* **420**, 762 (2002) (T. Heindel)

6.1. *Quantum cryptography based on Bell's theorem.* Artur K. Ekert. *Phys. Rev. Lett.* **67**, 661 (1991) (A. Pappa)

13.1. *A semiconductor source of triggered entangled photon pairs* R. M. Stevenson, R. J. Young, P. Atkinson, K. Cooper, D. A. Ritchie & A. J. Shields, *Nature* **439**, 179 (2006) (T. Heindel)

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

27.1. *Towards high-speed optical quantum memories,* K. F. Reim, J. Nunn, V. O. Lorenz, B. J. Sussman, K. C. Lee, N. K. Langford, D. Jaksch & I. A. Walmsley

Nature Photonics **4**, 218 (2010) (J.Wolters)

Quantum Computing

3.2. *The Physical Implementation of Quantum Computation.* David P. DiVincenzo, *Prog. Phys.* **48**, 771 (2000) (A. Pappa)

10.2. *Observation of collective excitation of two individual atoms in the Rydberg blockade regime,* Alpha Gaëtan, et al., *NATURE PHYSICS* **5**, 115 (2009) (J.Wolters)

17.2. *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) (A. Pappa)