

Editorial

Special Issue: “Selected Papers Presented at the 2006 Spring Meeting of the Quantum Optics and Photonics Section of the German Physical Society”

Dedicated to the memory of the late Herbert Walther

Quantum optics and photonics are among the most rapidly developing hot areas of physics in recent years. The whole area, in a sense, was rewarded a Nobel Prize in October 2005 for the development of laser-based precision spectroscopy as well as the quantum theory of optical coherence, with the recipients being distinguished researchers in the field: John Hall, Theodor Hänsch and Roy Glauber. The Spring Meeting of the German Physical Society, which took place at Johann Wolfgang Goethe University Frankfurt, from March 13th to 17th 2006 and was perfectly organized by Horst Schmidt-Böcking and his team, reflected that spirit of the Nobel Prize in a very active way and has proven again how actual and expanding the field is. The growing number of contributions is a clear indication of this as well as several fascinating symposia, invited talks and plenary talks.

The present special issue of Applied Physics B presents several of the highlights of this meeting selected by chairmen and chairwomen of various sessions. We would like to thank all the authors for their excellent papers and all referees for helpful and fast responses. It is their involvement that made it possible to publish this special issue with such a high quality.

The issue starts with fundamental problems, and presents a beautiful result of D. Gross concerning the positivity of one of the most ‘popular’ objects of quantum optics theorists: the Wigner function, but this time in finite dimension. Quantum information is represented by the contribution of M. Kleinmann et al. on purifying and reversible quantum operations.

Several contributions concern the physics of ultra-cold atoms: A. Lengwenus et al. present a paper that bridges quantum information and cold atoms in a recent progress of coherent manipulation of atomic qubits in microtraps. A theory of non-exponential decay of Bose–Einstein condensates is discussed by P. Schlagheck and S. Wimberger, whereas M. Köhl et al. present recent experimental results on cavity QED-based atom counting in atom laser beams or thermal beams. Bose condensation and strongly correlated states of Bose gas in disorder potential are discussed by P. Navez et al.

The contribution by B. Terhalle et al. establishes the connection between non-linear optics and physics of Bose condensates and discusses discrete solitons in photonic lattices. Soliton content of arbitrary light pulses in a fiber is studied by M. Böhm and F. Mitschke.

Finally, the last group of papers belong to the applied area of photonics. R. Gehlhaar et al. discuss dual-wavelength laser emission from an organic microcavity, B. Bartal et al. present first steps toward generation of mJ-range sub-ps THz pulses by optical rectification, while L. Fu et al. analyze metamaterials using transmission-line models.

It was another great year for quantum optics and photonics, but it was also a year of a very sad event. In July 2005, one of the fathers of quantum optics and photonics in Germany, former founder and director of the Max Planck Institute for Quantum Optics in Garching, Herbert Walther, passed away. We would like to dedicate this special issue to his memory.

Last but not least, this special issue would have been impossible without the professional and intensive work of the editor-in-chief Frank Träger and Daniela Schiller at the University of Kassel.