Selected Abstracts from Other Physical Review Journals

Abstracts of papers that are published in other Physical Review journals and may be of interest to Physical Review E readers are printed below.

Accurate and efficient evolution of nonlinear Schrödinger equations Roi Baer *Department of Physical Chemistry and The Lise Meitner Minerva-Center for Quantum Chemistry, The Hebrew University of Jerusalem, Jerusalem 91904, Israel* (Received 25 April 2000; published 13 November 2000)

A numerical method is given for affecting nonlinear Schrödinger evolution on an initial wave function, applicable to a wide range of problems, such as time-dependent Hartree, Hartree-Fock, density-functional, and Gross-Pitaevskii theories. The method samples the evolving wave function at Chebyshev quadrature points of a given time interval. This achieves an optimal degree of representation. At these sampling points, an implicit equation, representing an integral Schrödinger equation, is given for the sampled wave function. Principles and application details are described, and several examples and demonstrations of the method and its numerical evaluation on the Gross-Pitaevskii equation for a Bose-Einstein condensate are shown. [Phys. Rev. A **62**, 063810 (2000)]

Quantum fluctuations in a continuous vectorial Kerr medium model Roberta Zambrini,[1,2] Miguel Hoyuelos,[1,2,] Alessandra Gatti,[2] Pere Colet,[1] Luigi Lugiato,[3] and Maxi San Miguel[1] [1]*Instituto Mediterráneo de Estudios Avanzados, IMEDEA (CSIC-UIB), Campus Universitat Illes Balears, E-07071 Palma de Mallorca, Spain*
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We consider a model for a Kerr medium in a planar resonator, which takes into account the vectorial character of the radiation field. We analyze the spatial behavior of quantum fluctuations around a steady state, with a roll-pattern configuration in the beam cross section, using a Langevin treatment based on the Wigner representation. The spatial distribution of the quantum fluctuations around the roll pattern is dominated by the neutral (or Goldstone) mode, corresponding to rigid spatial displacements of the pattern. The spatial configuration of the field immediately outside the cavity input-output mirror depends on the time window over which fluctuations are averaged: only when the time window is on the order of the cavity lifetime the output field fluctuations are qualitatively similar to that of the intracavity field. The quantum correlations among the fields in play, as described by the full multimode model, turn out to be in good agreement with those predicted by a simple three-mode model. [Phys. Rev. A **62**, 063801 (2000)]

Tuneability of amplified spontaneous emission through control of the waveguide-mode structure in conjugated polymer films A. K. Sheridan,[1] G. A. Turnbull,[1,2] A. N. Safonov,[1] and I. D. W. Samuel[1,2] [1]*Department of Physics, University of Durham, South Road, Durham, DH1 3LE, United Kingdom*[2]*Ultrafast Photonics Collaboration, School of Physics and Astronomy, University of St Andrews, North Haugh, St Andrews, Fife, KY16 9SS, United Kingdom* (Received 7 June 2000)

We show that the position of the amplified spontaneous emission (ASE) in poly[2-methoxy-5-(2′-ethylhexyloxy)-1,4-phenylene vinylene] (MEH-PPV) can be controlled by the effect of the film thickness on waveguide modes. We demonstrate that the ASE can be tuned over 31 nm corresponding to a gain bandwidth of 25 THz. By modeling the waveguide modes we find that the ASE position for films thinner than 76 nm is determined by the cutoff wavelength for the waveguide and is shifted to shorter wavelengths with decreasing film thickness. We also demonstrate a simple method for measuring the cutoff wavelength and show that this correlates well with calculated values. [Phys. Rev. B **62**, 11929 (2000)]

Modified spontaneous emission spectra of laser dye in inverse opal photonic crystals Henry P. Schriemer, Henry M. van Driel, A. Femius Koenderink, and Willem L. Vos *Van der Waals–Zeeman Instituut, Universiteit van Amsterdam, 1018 XE Amsterdam, The Netherlands* (Received 10 August 2000; published 13 December 2000)

We have observed strongly modified spontaneous-emission spectra from laser dye in photonic crystals made of inverse opals in titania (TiO_2). We identify stop bands with large relative widths of 15%, comparable to the dyes' emission spectrum, and 75% attenuation of the emission strength. For a wide range of angles, two stop bands are simultaneously manifested; their angle-dependent frequencies display an avoided crossing that is corroborated by reflectivity experiments. The edges of the stop bands agree well with band-structure calculations, but differ from simple Bragg diffraction as a result of multiple wave coupling. The strongly reduced dispersion of the Bloch modes likely causes a significant change in the density of states. [Phys. Rev. A **63**, 011801 (2001)]