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$$i\hbar \frac{d}{dt}\Gamma_{\vec{n}\vec{m}}(t) = i\hbar\delta(t)\left\langle \left[P_{\vec{n}}(t), P_{\vec{m}}^{+}(0)\right] \right\rangle + \Theta(t)\left\langle \left[P_{\vec{n}}(t), H\right] P_{\vec{m}}^{+}(0) - P_{\vec{m}}^{+}(0)\left[P_{\vec{n}}(t), H\right] \right\rangle .$$

In this paper is thereafter represented in detail the defining procedure of Green's functions, calculated from the system of diference equations

$$G_{n_z-1,m_z} + \rho G_{n_z,m_z} + G_{n_z+1,m_z} = K\,\delta_{n_z,m_z}\,; \quad \rho = \frac{\hbar\omega - \Delta}{|X|} + 2\left(\cos ak_x + \cos ak_y\right) \tag{3}$$

and by means of these equations the dispersion law and exciton states distribution is obtained and the relative permittivity for ultrathin films [4] is defined. These results are calculated numerically and tabular and graphically presented.

In addition to the basic task to adapt the Green's functions method to quantum systems, it is shown in this paper that the energy spectra of excitons in thin films are predominantly discrete inside the bulk boundaries. Different from bulk structures, where the continual absorption zone appears in the definite frequency band of externally radiation, the resonant peaks with film structures exist only on some resonant frequencies. As the observed film is thicker, the differences between its properties and the corresponding bulk structure become drastically smaller. All this indicates the existence, and represents the result of the quantum size effect.

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Ilić Jelena **(8)** **Poster**

Sellmeier parameters analysis in optical pulse shaping

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Materials suitable for light pulse propagation control are investigated in this paper. Many of recent papers reported the results of optical properties measurement in broad wavelength ranges for newly developed materials as well as thin films of more or less known materials [1] [2]. After the refractive indices are measured for set of wavelengths they are fitted usually by four-parameter Sellmeier equation, on the basis of which the phase matching curves for second-harmonic generation are calculated. In this paper further analyses of Sellmeier equation for various materials of interest in nonlinear optics are performed.

First, group velocity dispersions are calculated and wavelength regions of specific types of pulse propagation are distincted: regions of constant pulse width around the zero group velocity dispersion, regions of pulse compression possibilities with negative group velocity dispersion and regions of pulse broadening which though usually unwanted can be used for introducing a good quality chirp suitable fore effective pulse compression [3]. Temperature dependences of refractive indices also reported are taken into account [4] [5].

On the other hand, generalized Sellmeier equation which consists of several oscillator terms involve in its parameters more direct information about material such as electronic transitions or resonance wavelengths and average oscillator strengths i.e. oscillators volume concentrations and transition probabilities [6]. Therefore, four parameter Sellmeier equations are transformed by fitting into one-term (or one-oscillator) in order to get more useful information about a material. The necessity of second term introduction indicated by bad fitting are detected for some materials. The conditions for the second term parameters required for negative group velocity dispersion (as it is appropriate in pulse compression) are determined. Finally, correlation of the parameters of Sellmeier equation and some non-optical material properties, including mechanical and thermal, are considered.

The materials chosen for the analyses are rare earth oxides, borates, chalcopyrite crystals some laser host materials and some crystals such as langasite, langanite and langataite [7].

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Isar Aurelian **(7)** **Talk**

Entanglement in open quantum dynamics

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In the framework of the theory of open systems based on completely positive quantum dynamical semigroups, we analyze the possibility of generating the quantum entanglement in a bipartite system during its interaction with an environment. We solve the master equation for two independent harmonic oscillators interacting with the environment and give a description of the induced continuous-variable entanglement in terms of the covariance matrix of the considered subsystem for an arbitrary Gaussian input state. Using Peres-Simon necessary and sufficient criterion for separability of two-mode Gaussian states, we show that for certain classes of environments the initial state evolves asymptotically to an entangled equilibrium bipartite state, while for other values of the coefficients describing the environment, the asymptotic state is separable. We calculate also the logarithmic negativity characterizing the degree of entanglement of the asymptotic state.

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