

Diploma thesis abstract

The degree work is devoted to the theoretical investigation of the influence of the optical spherical nanoantenna on the quantum properties of the two-level atom situated in the close proximity of its surface. We assume that nanoantenna is spherical and made of a silver.

The quantum properties of the atom's radiation (intensity and the resonance fluorescence spectrum, photon antibunching, quadrature squeezing, statistics of fluorescent photons) depend on magnitude and polarization of the incident electromagnetic wave, the decay rate of the atom, the transition frequency. The key fact is that the nanoantenna strongly modifies the magnitude and the polarization of the local field, the decay rate of the atom and the transition frequency. To study the influence of the nanosphere on the quantum properties of an atom, there have been calculated the distribution of magnitude and polarization of the local field, the distribution of decay rate and transition frequency depending to atom's location near of the nanoantenna. The dipole moment of the atom is directed along the direction of the field in the point of space where the atom is located.

The dependences of the resonance fluorescence spectrum, photon antibunching, squeezing and photon statistics on atom's location, incident wave's detuning and bandwidth are investigated in details.

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