Diploma thesis abstract

Atom interacating with plasmonic nanoparticle in external electromagnetic field: the role of near-field vectorial structure

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Diploma project is devoted to the theoretical studying of the near-field of plasmonic nanostructure and the influence of optical nanoantenna on the fluorescence properties of an atom located in vicinity of prolate metal nanospheroid.

Near-field polarization plays significant role in the interaction of single quantum emitters with plasmonic nanoparticles because atomic transitions are determined by polarization of exciting field. Moreover, the influence of the vectorial near-field structure of plasmonic nanoparticle on radiation properties of the atom, such as resonance fluorescence spectrum and the polarization of fluorescent radiation is significant.

The near-field polarization of the nanospheroid, the decay rate of a two-level atom near nanoparticle in dependence of its location are calculated. The dipole moment of an atom is assumed to be co-direct to electric field vector in the point of its location.

The near-field polarization of a plasmonic nanospheroid, its influence on full decay rate of excited state of the atom, the resonance fluorescence spectrum and the polarization of fluorescent radiation in dependence of the location of the atom and external field parameters are studied.