

# Quantum correlations in photon pair, emitted by atom + dielectric microsphere system

V.V. Klimov

*P.N. Lebedev Physical Institute, 53 Leninsky Prospect  
Moscow, 117294, Russia*

The strong resonance interaction of a two-level atom with the continuum of quantized electromagnetic modes falling within the contour of a resonance mode of a dielectric microsphere (whispering gallery modes) is considered within the framework of quantum electrodynamics. As an initial condition, we consider the case where at the initial instant of time the atom is excited and the resonance mode of the microsphere contains a single photon. We have shown that two emitted photons are entangled and have strong energy correlations. This correlation manifests itself in that the energies of the emitted photons are coupled together by the ellipse equation. The spectrum of the two photons emitted substantially depends on the way the microsphere is excited, i.e., on the spatial distribution of the initial photon energy. It allows us to control this spectrum. As a result one can speak about new source of correlated photon pairs and new element of quantum computer.