Bachelor diploma abstract

Nonlinear optical transformation of ultrashort laser pulses in photonic-crystal fibers for generation quantum states of light

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Nonlinear phenomena following propagation of ultrashort laser pulses in photonic crystal fiber are theoretically and experimentally investigated. The main attention is focused on nonlinear four wave mixing process leading to generation of signal and idler spectral sidebands, that can be treated as nonclassical light. To predict spectral transformations of pump femtosecond in classical regime the nonlinear Schrödinger equation for pulse envelope is solved numerically. Conditions for efficient generation of correlated photon pairs in factorable and not factorable states in photonic crystal fibers are considered in details. Basic experimental setup for registration of correlated photon pairs is established and tested on measurement of $g^{(2)}$ correlation function of photons, generated in nonlinear BBO crystal in the process of spontaneous down conversion. Achieved results provide a base level for future fruitful research in the area of quantum optics, in particular, for construction of fiber single photon source.