Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Atomic and nuclear coherence excited by optical pulses YURI ROSTOVTSEV, University of North Texas — Recent progress in ultrashort, e.g. attosecond, laser technology allows researchers nowdays to obtain ultra-strong fields which can be the same order of magnitude as the electric field created by an atomic nucleus. Interaction of such strong and broadband field with atomic systems even under the action of a far-off resonance strong pulse of laser radiation should be revisited and as we have shown that such pulses can excite remarkable coherence on high frequency transitions. We have found and analyzed analitical solutions for various pulse shapes. We discuss possible applications of obtained results to cooperative generation of XUV and nuclear radiation. For a sample with density of atoms or ions of the order of $10^{16} - 10^{19}$ cm^{-3}, the density of excited atoms is $10^{2} - 10^{5}$ cm^{-3}, and all nuclei, that are coherently oscillating in phase produce cooperative burst of gamma ray radiation that is 10-1000 time faster that the relaxation time, 100 ns for ^{57}Fe.

Yuri Rostovtsev
University of North Texas

Date submitted: 22 Jan 2010 Electronic form version 1.4