Abstract Submitted
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Plasmon enhanced Raman scattering effect for an atom near a carbon nanotube[1] ALEX GULYUK, IGOR BONDAREV, North Carolina Central University — A quantum theory of the resonance Raman scattering is developed for a two-level dipole emitter, two-level system (TLS), coupled to a low-energy inter-band plasmon resonance of a carbon nanotube (CN). This resonance Raman scattering is a manifestation of the general Surface Enhanced Raman Scattering (SERS) effect received much of attention due to a very broad range of its applications in nanophotonics, biochemistry, and medicine. Here[1], the SERS effect comes about as a near-field effect in which strong local-field enhancement occurs due to the inter-band plasmon excitation when the TLS is located near the CN surface and its transition energy matches the plasmon resonance energy of the CN. Raman cross-section derived covers both weak and strong TLS-plasmon coupling, and shows a dramatic increase by a factor $\sim 10^3$ in the strong coupling regime. The effect may be used to detect individual atomic type objects trapped near CNs. More advanced applications, which require further theoretical development, may include highly efficient CN based SERS substrates for single molecule/atom/ion detection, precision spontaneous emission control, and manipulation. – [1]I.V.Bondarev, arXiv1407.5142

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