Aharonov-Bohm Beats in Excitonic Luminescence from Quantum Rings and Type-II Quantum Dots

LUIS DIAS DA SILVA, SERGIO ULLOA, Dept. of Physics and Astronomy, Ohio University, TIGRAN SHAHBAZYAN, Department of Physics, Jackson State University — We study the absorption spectrum of neutral magnetoeexcitons confined in ring-like structures. Despite their neutral character, excitons exhibit strong modulation effects on the energy and oscillator strength in the presence of magnetic fields [1] that have been recently observed [2]. We calculate the absorption coefficient $\alpha$ for neutral excitons confined in circular ring geometries with radii $R_e$ for electrons and $R_h$ for holes. A particularly interesting situation comes about when $R_e \neq R_h$ and a net radial charge polarization arises. In this case, we consider an attractive Coulomb interaction proportional to $(R_e - R_h)^{-1}$ and the excitonic absorption peak shows oscillatory behavior as function of the applied magnetic field both in position and amplitude. Such oscillations strongly depend on the dipole moment $P = e(R_h - R_e)$ of the exciton and on the dielectric constant of the system. Such intensity changes could in principle be experimentally observed with single dot spectroscopy in quantum rings [3]. Supported by the NSF-IMC and NSF-RUI