Abstract Submitted
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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 magnetoexcitons 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 α 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

[1] A.O. Govorov et al. Phys. Rev. B 66 081309 (2002); A.O. Govorov et al. Physica E 13, 297 (2002).
[2] E. Ribeiro et al. Phys Rev. Lett. 92 126402 (2004).
[3] R.J. Warburton et al. Nature 405 (6789) 926 (2000).

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