Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Two-dimensional magnetoexcitons in the presence of spin-orbit interactions[1] OLEG OLENDSKI, TIGRAN V. SHAHBAZYAN, Jackson State University — We study excitonic energy spectrum and optical absorption in narrow-gap semiconductor quantum wells in strong magnetic field. We find that, in the presence of an in-plane field, the interplay between Zeeman, Coulomb, and spin-orbit terms leads to a drastic change in the magnetoexciton energy spectrum. When separation between adjacent Landau levels with opposite spins becomes of the order of the magnetoexciton binding energy, the bright and dark exciton dispersions exhibit anticrossing, resulting in a pronounced minimum at finite momentum for the higher-energy eigenstate. With varying in-plane field, the anticrossing moves to zero momentum leading to a spin-orbit-induced splitting of the excitonic absorption spectrum. In the presence of both Rashba and Dresselhaus spin-orbit terms, the spectrum is anisotropic and it depends explicitly on the in-plane orientation of the magnetic field. In particular, by varying the azimuthal angle, the splitting of excitonic absorption peak can be tuned in a wide interval. Experimental implications for InAs and InSb quantum wells are discussed.

[1]Supported by NSF-RUI

Tigran Shahbazyan
Jackson State University

Date submitted: 03 Dec 2004 Electronic form version 1.4