

Colloquium Notice

Vladimir Chaldyshev

Ioffe Physico-Technical Institute, St. Petersburg, Russia

Optical spectroscopy of a semi-insulating GaAs/AlGaAs multiple quantum well system near double exciton-polariton and Bragg resonance

The results of study of the optical reflection and contactless electroreflection from a periodic system of multiple GaAs/AlGaAs quantum wells will be presented. The quantum well width was 15 or 20 nm and the barriers were 104 nm thick. In this system, the electromagnetic resonance of the Bragg reflection occurs at the frequency that coincides or is close to the frequency of the exciton-polariton resonance in the wells. The optical measurements were made at various temperatures, angles of the light incidence and polarization. The optical reflection spectra have been found to be a result of the interplay of three different contributions, namely (i) the reflection from the air/semiconductor interface, (ii) the Bragg reflection due to periodic modulation of the background indices of refraction being different for the wells and barriers, and (iii) the resonant reflection from the periodic system of exciton-polaritons in quantum wells. The latter contribution was separately studied by contactless electroreflection technique in the spectral range covering ground states of the heavy-hole and light-hole excitons. A quantitative analysis of the experimental contactless electroreflection line shape has been done along with quantum-mechanical calculations, which revealed the characteristic energies and broadening parameters for different exciton-polariton levels. In particular, the systems of four and thirty two quantum wells exhibit spectral features with the characteristic broadening of 1.8 meV and 2.2 meV at 17 K, respectively. By comparison with theoretical calculations, we discuss the radiative and non-radiative contributions to the total broadening.

Monday

November 19, 2007

Starts at 12:15 PM

Coffee at 12:00 PM

Physics Conference Room, SB B326