

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

The magnetized quantum wire: a potential candidate to act as an *active* laser medium MANVIR KUSHWAHA, Rice University — The fundamental issues associated with the magnetoplasmon excitations are investigated in a quantum wire characterized by a confining harmonic potential and subjected to a perpendicular magnetic field. We embark on the charge-density excitations in a two-subband model within the framework of Bohm-Pines' random-phase approximation. Essentially, the focus of our study is the intersubband (magnetoroton) collective excitation which changes the sign of its group velocity twice before merging with the respective single-particle continuum. The computation of the gain coefficient suggests an interesting and important application: the electronic device based on such magnetoroton modes can act as an *active* laser medium. The situation is analogous to the (quasi-two dimensional) superlattices where the crystal can exhibit a negative resistance: it can refrain from consuming energy like a resistor and instead feed energy into an oscillating circuit.

Manvir Kushwaha
Rice University

Date submitted: 18 Nov 2010

Electronic form version 1.4