

# International Conference

## *The Application of High Magnetic Fields in Semiconductor Physics*



WÜRZBURG, AUGUST 22-26, 1988

presented at the International Conference on "The Application of High Magnetic Fields in Semiconductor Physics," Wurzburg, Aug. 22, 1988.

### Cyclotron Resonance in GaAs/Al<sub>x</sub>Ga<sub>1-x</sub>As Heterojunctions\*

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The Generalized Quantum Langevin Equation approach<sup>1</sup> is developed to study the cyclotron resonance (CR) of interacting two dimensional electronic systems. Analytical forms for the memory functions, which are free from the divergence encountered in conventional theories, are obtained from first principles.<sup>2</sup> The elimination of the divergence is achieved by the inclusion of the effects of the fluctuation of the center of mass. In our theory (which has already been shown<sup>2</sup> to give good agreement with the experimental results in the Si-MOS system<sup>3</sup>) there exist two resonance peaks in the CR absorption spectrum: the conventional magnetoplasmon absorption peak at the frequency  $\omega > \omega_c$ , and another peak at  $\omega < \omega_c$  due to the fluctuation effect. The positions, amplitudes, and the relative spacing of these two peaks depend mainly on the magnetic field, the electron density, the mobility of the sample and the temperature. Our results for the CR spectrum are consistent with the experiments of Schlesinger et al. (Phys. Rev. B 30, 435 (1984)). In addition, using only one parameter (diffusion constant), our theory gives a very good fit to the experimental results of Muro et al. (Suf. Sci. 142, 394 (1984)), in all respects such as the line shape, and its dependence on the magnetic field and the electron density.

\*Supported by the U.S. Office of Naval Research

1. G.Y. Hu and R. F. O'Connell, Phys. Rev. B 36, 5798 (1987).
2. G.Y. Hu and R. F. O'Connell, Phys. Rev. B in press.
3. R. J. Wagner, T. A. Kennedy, B. D. McCombe, and D. C. Tsui, Phys. Rev. B 22, 945 (1980).

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April 12, 1988

Prof. Dr. G. Landwehr  
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Universität Würzburg  
Am Hubland  
D-8700 Würzburg  
West Germany

Dear Professor Landwehr:

Please find enclosed a completed registration form plus 3 copies of the abstract of the paper I propose to present at the Würzburg conference.

Sincerely yours,

Robert F. O'Connell  
Boyd Professor of Physics

RF0:lg

Enclosures

Please mail to:

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I plan to attend the International Conference

"The Application of High Magnetic Fields in Semiconductor Physics",  
August 22-26, 1988 in Würzburg.

Name: R. F. O'CONNELL

Affiliation: LOUISIANA STATE UNIVERSITY

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I intend to present a paper:

Title:

Cyclotron Resonance in GaAs/Al<sub>x</sub>Ga<sub>1-x</sub>As Heterojunctions

Accompanying persons:

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(Signature) R. F. O'Connell