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Evidence of Auger Satellite Lines in Landau-Level Photoluminescence Spectroscopy in a Two Dimensional Electron Gas[1] S.K. LYO, W. PAN, J.L. RENO, Sandia National Laboratories — Landau-level spectroscopy has provided a powerful tool for investigating the electronic structure and the scattering dynamics in a two-dimensional electron gas (2DEG) in the past. In this paper, we present theoretical and experimental evidence for Auger satellite lines in the magnetoluminescence of the Landau-level spectroscopy from a 2DEG under a perpendicular magnetic field B at low temperatures. These new anomalous lines with a weak intensity appear below the energy gap in the form of radial "spokes" with negative slopes in the so-called fan (energy vs. B) diagram, in contrast to the well-known standard spokes of the fan diagrams of the spectral lines which appear above the band gap energy with positive slopes. [S. K. Lyo, E. D. Jones, and J. F. Klem, Phys. Rev. Lett. 61, 2265 (1988)]. Our theoretical predictions yield reasonable agreement with observed low-temperature data from GaAs quantum wells. The satellite lines can be used to determine the conduction (valence) band mass in n-doped (p-doped) systems.

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S. K. Lyo
Sandia National Laboratories

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