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**Effects of a parallel magnetic field on the Fermi-energy in two-dimensional electron systems**[1] Y.D. JHO, NHMFL, FSU, X. WANG, D.H. REITZE, Univ. of Florida, J. KONO, Rice Univ., S.A. CROOKER, NHMFL, LANL, C. KADOW, A.C. GOSSARD, UCSB, M. SEMTSIV, W.T. MASSELINK, Humboldt Univ. — The transport properties in 2DEG systems are determined by the electrons near the Fermi energy, and whether those electrons are localized or delocalized determines the character of the material, be it metallic or insulating. Here, we investigate whether there is any optical process that is sensitive to the conductivity change of the electrons near the Fermi energy, and report results of correlated experimental studies of interband optical spectra and transport properties in a two-dimensional electron gas placed in an in-plane magnetic field up to 45 T. Our magneto-absorption experiments show an initial red shift of the Fermi energy with increasing magnetic field, while photoluminescence strength at the Fermi-energy edge singularity reveals a quenching behavior only at low temperature along with resistivity increment as the multiple electron-electron scattering is being suppressed.

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