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Magnetotransport investigation of spin-orbit interactions in high-mobility GaN/AlGaN heterostructures. STEFAN SCHMULT, MICHAEL MANFRA, ALEX PUNNOOSE, MICHAEL SERGENT, Bell Laboratories, Lucent Technologies, RICHARD MOLNAR, MIT, Lincoln Laboratory — Spin-splitting in the conduction band of a two-dimensional electron gas (2DEG) in GaN/AlGaN single interface heterostructures with mobilities of $\sim 80,000 \text{cm}^2/\text{Vs}$ is investigated utilizing low field magnetoconductivity measurements. The observation of a distinct anti-localization feature near zero magnetic field signals the presence of significant spin-orbit coupling. A spin-orbit coupling value in the Rashba formalism of $6 \times 10^{-13} \text{eV}\text{\AA}$ is extracted. For a typical 2DEG density of $\sim 10^{12} \text{cm}^{-2}$ this value of the coupling strength corresponds to a spin-splitting energy of 0.3meV at the Fermi edge. The observed value is unexpectedly high for a wide-bandgap semiconductor. This talk summarizes our studies of the carrier density, mobility, and temperature dependence of the magnetoresistance data.

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