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Enhanced Hall coefficient in InAs/AlSb μ-Hall bars induced by ballistic electron scattering from interfacial impurities[1] GORAN MIHAJLOVIC, JOHN E. PEARSON, AXEL HOFFMANN, SAMUEL D. BADER, Materials Science Division, Argonne National Laboratory, MARK FIELD, GERARD J. SULLIVAN, Teledyne Scientific Company — We fabricated micrometer-sized Hall bar channels of variable width w from an InAs/AlSb quantum-well, two-dimensional electron system and studied their electrical response in perpendicular magnetic fields. For the narrowest channels ($w \sim 1$ μm) at low fields (<0.5 T) and 5 K, we observed that the Hall coefficient increases above its classical value. This increase persists up to temperatures of order 100 K, but its magnitude decreases with increasing channel width and disappears for $w \sim 4$ μm. At the same time, the longitudinal resistance decreases with increasing magnetic field. The strong negative magnetoresistance is present even for the widest channels, suggesting that boundary scattering is only partially responsible for its observation. We show that both results can be explained by a mechanism of large-angle scattering of ballistic electrons from non-ionized impurities residing at the InAs/AlSb interfaces.

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