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Tuning of the spin-orbit interaction and resistance in two-dimensional GaAs holes via strain BABUR HABIB, JAVAD SHABANI, ETIENNE P. DE POORTERE, MANSOUR SHAYEGAN, Department of Electrical Engineering, Princeton University, ROLAND WINKLER, Department of Physics, Northern Illinois University — We report direct measurements, via the Fourier analysis of the Shubnikov-de Hass oscillations, of the spin-orbit interaction induced spin-splitting in modulation-doped GaAs two-dimensional hole systems as a function of strain applied in the sample plane. The data reveal a remarkably strong dependence of the spin-splitting on strain, with up to about 20% enhancement of the splitting upon the application of only about $2\text{x}10^{-4}$ strain. The results are in very good agreement with our numerical calculations of the strain-induced spin-splitting. We also show a remarkable dependence of the anisotropy of the heavy hole band on strain. Its manifestation as a change of resistance with strain implies the use of GaAs 2D holes as a sensitive piezo-resistance sensor at low temperatures.

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