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Direct observation of an out-of-plane spin polarization caused by an in-plane magnetic field in a GaAs 2D hole system LAREINE YEOH, ASHWIN SRINIVASAN, OLEH KLOCHAN, ADAM MICOLICH, Univ of New South Wales, ROLAND WINKLER, Northern Illinois University, MICHELLE SIMMONS, Univ of New South Wales, DAVID RITCHIE, University of Cambridge, MICHAEL PEPPER, University College London, ALEXANDER HAMILTON, Univ of New South Wales — Recent interest in spin-orbit coupling has led to studies of quantum confined, hole based semiconductor devices, which naturally possess strong spin-orbit interaction due to the intrinsic spin-3/2 nature of holes. In general both crystal anisotropies and quantum confinement will affect the spin properties of holes. In high symmetry crystals such anisotropies can be ignored, however in low symmetry crystals this complex interplay between the crystal and the confining potential gives rise to intriguing spin behavior, which has no counterpart in spin-1/2 electron-based systems. Here I will present the first direct observations of an unusual effect where a magnetic field applied in the plane of the 2D hole system generates a spin polarization perpendicular to the 2D plane. This out-of-plane spin polarisation is detected in transport measurements of a symmetrically doped, GaAs 2D hole quantum well in tilted magnetic fields. We are able to extract the sign of this off-diagonal component of the Landé g-factor and show that it is consistent with theory.

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