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Spintronics

DAVID AWSCHALOM, University of California, Santa Barbara

The spin-orbit interaction in the solid state offers several versatile all-electrical routes for generating, manipulating, and routing spin-polarized charge currents in semiconductors. We describe recent experiments that explore several guises of this effect for the nascent field of spintronics. This includes new opportunities - and challenges - for making the transition from fundamental studies to a future spin-based technology for classical and quantum information processing.