ABSTRACT

We have used ultrafast optics to study the propagation of spin in n-doped GaAs quantum wells, over lengths as small as 250 nm and times on the order of picoseconds. We have explored the effect of spin-orbit coupling and electron-electron collisions on the transport of spin. Interaction between spin-orbit couplings of different symmetries produces anisotropic spin transport and a long-lived spin helix at finite wavevector. Electron-electron collisions give rise to a "spin Coulomb drag" effect, which damps the counter-propagation of spin populations.