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Inhomogeneously-doped semiconductor junctions as a source of spontaneous spin polarization[1] YUNONG QI, MICHAEL FLATTÉ, University of Iowa — The dynamics of electric-field-driven packets of spin polarized carriers passing through an n+/n semiconductor junction have been studied. We find that spin packets that are initially very weakly spin polarized can have their polarization significantly amplified within the junction. The nonlinear spin transport and amplification is due to a spin-polarization dependent mobility originating from the Pauli exclusion principle that also gives rise to the spin Gunn effect. The spin polarization amplification we describe here is driven by the inhomogeneous doping density, and thus does not require the large applied electric field of the spin Gunn effect. Hence it may apply to situations at low electric fields and low temperatures in which spontaneous spin polarization has been seen experimentally. We further believe that these studies provide a direct way to study the spin-polarization dependent mobility in semiconductors.

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