Hydrodynamic model for spin-polarized transport in semiconductors LEONARDO VILLEGAS-LELOVSKY, FABRICIO M. SOUZA, J. CARLOS EGUES, Instituto de Física de São Carlos, Universidade de São Paulo — We extend the hydrodynamic model of the Boltzmann equation to account for the spin of the carriers to investigate the transient dynamics of a spin-polarized packet of electrons in a n-GaAs sample. The dynamics of the packet as well as the built-in electric field is described by a set of coupled differential equations based on the moments of the Boltzmann equation [1] and the Poisson's equation. Spin-flip and momentum-relaxation processes are taken into account within the relaxation time approximation. Our description goes beyond the usual drift-diffusion type approaches in that we fully account for the temporal evolution of the current densities. The spatio-temporal landscape of the current spin polarization shows a transient region within the hydrodynamic model, not present in the drift-diffusion description. We applied our approach in particular for a (n/n+/n)-GaAs junction that turned out to be an electrostatic trap with enhanced spin polarizations. [1] F. M. Souza and J. C. Egues, Phys. Rev. B **66**, 060301(R) (2002).

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