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**D'yakonov-Perel' spin relaxation in the interacting electron gas in doped semiconductors**[1] MATTHEW MOWER, GIOVANNI VIGNALE, University of Missouri — D'yakonov-Perel' spin relaxation describes spin precession limited by collisions, an effect studied by many authors. It is of fundamental importance in spintronics as it controls spin polarization decay times. The spin relaxation rate is expressed as $1/\tau_s = \langle \Omega_{\mathbf{k}}^2 \tau_k^* \rangle$, where $\Omega_{\mathbf{k}}$ is the spin precession frequency due to spin-orbit interaction, and $\tau_k^*$ is an effective momentum relaxation time quite different from that in electrical conductivity or the quasiparticle lifetime ($\langle\,\rangle$ denotes an average over the classical or quantum momentum distribution). An explicit quantitative study of $\tau_k^*$ in three dimensional degenerate electron liquids has not yet been provided. In this study we adapt the classic Abrikosov-Khalatnikov theory of transport in Fermi liquids to the calculation of $\tau_k^*$ in the degenerate electron gas. This approach enables us to include both direct and exchange scattering processes. We also introduce an effective electron-electron interaction to include correlation corrections to $\tau_k^*$. Results are presented for different densities and sub-Fermi temperatures.

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Matthew Mower
University of Missouri

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