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Diffusion regime of electron-electron collisions in weakly ionized plasmas BORIS BREIZMAN, University of Texas at Austin, GENNADY STUPAKOV, SLAC National Accelerator Laboratory, Menlo Park, California 94025, USA, GRIGORY VEKSTEIN, Jodrell Bank Centre of Astrophysics, The University of Manchester, Manchester M13 9PL, UK — We consider weakly ionized plasma where the frequent elastic scattering of electrons on neutrals changes the character of electron-electron collisions entirely. This comes into play when the frequency of the electron – neutral collisions is so large that the corresponding electron mean-free path is shorter than the closest distance between the colliding electrons. In this extreme case, the electron energy equilibration differs considerably from that in fully ionized plasma. A crucial role is now played by diffusion of electrons caused by their scattering on neutrals, and we demonstrate how a proper account of this diffusion allows one to estimate the characteristic energy equilibration time for electrons. We also present a rigorous derivation of the kinetic equation for electrons via Bogolyubov’s approach based on Liouville equations for multi-particle distribution functions.

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