Abstract Submitted for the DPP17 Meeting of The American Physical Society

A unified theory of the magnetized collision term for $plasmas^1$ CHAO DONG, DING LI, WENLU ZHANG, Institute of Physics, Chinese Academy of Sciences — Recently, the general form of the magnetized Fokker-Planck equation and coefficients have been derived for plasmas. To calculate the magnetized Fokker-Planck coefficients accurately, a unified theory is developed here. The basic idea is to divide the collision area into two regions: (i) $0 < b < b_c$; (ii) $b > b_c$. Here b is the impact parameter and b_c is chosen to be much larger than the Landau length and much smaller than the inter-particle distance and particles' thermal gyro-radii. For region (i), the collective effects are unimportant and the magnetic field does not affect the collision process, so the usual binary collision theory without magnetic field is employed to calculate the Fokker-Planck coefficients. For region (ii), the wave theory taking account of the magnetic field effects is employed to calculate the magnetized Fokker-Planck coefficients. Synthesize of the results of the two regions will give the exact magnetized Fokker-Planck coefficients and thus the exact magnetized collision term which includes, in a rather complete manner, the collective effects, the magnetic field effects, and the contribution from close collisions.

¹Supported by Strategic Priority Research Program of Chinese Academy of Sciences and National Natural Science Foundation of China.

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Date submitted: 13 Jul 2017

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