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Theory of Collisional Relaxation of Temperature Anisotropy in a Strongly Magnetized One Component Plasma[1] LOUIS JOSE, SCOTT BAALRUD, University of Iowa — Plasma kinetic theory typically assumes that the gyroradius is much greater than the Debye length. As a consequence, particles are unmagnetized within the microscopic collision volume. Since binary interactions depend only on the distance between particles, the interaction volume is spherically symmetric. Conversely, O'Neil et al have developed a kinetic theory for very strongly magnetized plasmas in which the gyroradius is less than the distance of closest approach. Here the particles are strongly magnetized within the collision volume. In this limit, the gyroradius is so small that the collision volume effectively maps to disk surfaces of a cylinder. Here, we consider an intermediate regime where the gyroradius is less than the Debye length but greater than the distance of closest approach. In this regime, the particles gyrate within the collision volume, but the mapping to the disk surface is not possible. We take the collision volume as a cylinder and scattering through both the cylindrical and circular surfaces are included. Screening is included by modelling interactions using the Debye Huckel potential. In this way, the theory transitions from the unmagnetized limit to the strongly magnetized limit. The theory is tested by comparing with molecular dynamics simulations of the temperature anisotropy relaxation of one component plasma. These results are relevant to ongoing experiments in ultracold and non-neutral plasmas.

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