

Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

New Regime of Low Ion Collisionality in the Neoclassical Equilibrium of Tokamak Plasmas¹ J.J. RAMOS, Massachusetts Institute of Technology — The neoclassical description of an axisymmetric toroidal plasma equilibrium is formulated for an unconventionally low ordering of the collisionality that suits realistic thermonuclear fusion conditions. This requires a drift-kinetic analysis to the second order of the ion Larmor radius, which yields a new contribution to the leading solution for the non-Maxwellian part of the ion distribution function if the equilibrium geometry is not up-down symmetric. An explicit geometrical factor weighs this second Larmor-radius order, low-collisionality effect that modifies the neoclassical ion parallel flow and the ion contribution to the bootstrap current. For this low-collisionality neoclassical equilibrium solution, the pressure anisotropy part of the Chew-Goldberger-Low stress tensor is comparable to the gyroviscosity and their contributions to the flux-surface-averaged parallel momentum equation balance exactly.

¹Work supported by the U.S. D.O.E.

J.J. Ramos
Massachusetts Institute of Technology

Date submitted: 22 Jul 2015

Electronic form version 1.4