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Self-Regulating Reconnection in Marginally Collisionless Coronae of Accreting Black Holes[1] JEREMY GOODMAN, Princeton University, DMITRI UZDENSKY, Princeton University/CMSO — Hard X-ray (up to ∼100 keV) emission is commonly observed in accreting Galactic (stellar-mass) and extragalactic (super-massive) black hole sources. This emission is often attributed to the Comptonization of soft accretion-disk photons by a hot overlying corona with a Thomson optical depth is of order 1. We show that this observational result suggests that the coronal plasma is roughly marginally collisionless with respect to magnetic reconnection. As has been recently suggested for the Sun's corona,[2] such marginal states may naturally result from a combination of disk-corona mass- and energy-exchange processes and the condition for the onset of fast collisionless reconnection. We also analyze the electron and ion cooling processes in a reconnection-heated corona, investigate the roles of pair creation and ion thermal conduction, and explore observational implications of our physical picture.

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[2]D. Uzdensky, ApJ, 671, 2139 (2007); see also Cassak et al., ApJ, 644, L145 (2006).

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