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Integrated mechanism that both removes accretion disk angular momentum and drives astrophysical jets[1] PAUL BELLAN, Caltech — Using concepts from laboratory experiments, Hamiltonian mechanics, Hall MHD, and weakly ionized plasmas, I propose a mechanism [1] that simultaneously drives astrophysical jets and removes accretion disk angular momentum. The mechanism depends on the extreme stratification of ionization between the weakly ionized accretion disk and the highly ionized exterior region. In the exterior region, axisymmetric Hamiltonian mechanics constrain charged particles to move on nested poloidal flux surfaces. In contrast, fluid elements in the weakly ionized, highly collisional accretion disk behave like *collisionless meta-particles* with effective q/m reduced from than that of an ion by the nominal disk 10^{-15} – 10^{-8} fractional ionization; this means that the meta-particle effective cyclotron frequency $\omega_{\rm c}$ can be of order of the Kepler frequency $\omega_{\rm K} = (MG/r^3)^{1/2}$. Meta-particles with $\omega_{\rm c} = -2\omega_{\rm K}$ have zero canonical angular momentum, experience no centrifugal force and spiral in towards the central body. Because these inward spiraling meta-particles are positive, their accumulation near the central body produces radially and axially outward electric fields. The axial outward electric field drives an out-of-plane poloidal electric current along poloidal flux surfaces in the external region. As in lab experiments, this current and its associated toroidal magnetic field drive astrophysical jets flowing normal to and away from the disk. [1] Bellan, P.M., Monthly Notices Royal Astronomical Society **458**, 4400 (2016)

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