

Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Do Accretion Disks Exist in High Energy Astrophysics? B. COPPI, MIT — The familiar concept of an accretion disk is based on its gas dynamic description where, in particular, the vertical equilibrium is maintained by the (weak) vertical component of the gravitational force due to the central object. When a plasma structure differentially rotating around the same kind of object is considered in which the magnetic field diffusion due to finite resistivity is realistically weak, a radially periodic sequence of pairs of opposite current channels is found.^{1,2} Moreover, the vertical confinement of the structure is maintained by the resulting Lorentz force rather than by gravity. Thus, a “Lorentz compression” occurs. In addition, sequences of plasma rings² rather than disks emerge. (Note that H. Alfvén had proposed that planetary rings may be “fossils” of pre-existing envisioned plasma rings. Moreover, a large ring is the most prominent feature emerging from the high resolution X-ray image of the Crab). The “seed” magnetic field in which the structure is immersed is considerably smaller than that produced by the internal toroidal currents. The magnetic pressure is of the order of the plasma pressure. Thus, ring sequence configurations can be suitable for the emergence of a jet from their center. Two coupled non-linear equations have been solved, representing the vertical and the horizontal equilibrium conditions for the structure.*Sponsored in part by the U.S. D.O.E.

¹B. Coppi, *Phys. Plasmas* **12**, 057301, (2005)

²B. Coppi and F. Rousseau, *Ap. J.* **641** (1), 458 (2006)

B. Coppi
MIT