

Abstract Submitted  
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**Magnetic Field Generation Processes Involving Gravity and Differential Rotation. Solitary Plasma Rings Formation around Black Holes<sup>1</sup>**

BRUNO COPPI, MIT — A clear theoretical framework to describe how magnetic fields are generated and amplified is provided by the magneto-gravitational modes that involve both differential rotation and gravity and for which other factors such as temperature gradients can contribute to their excitation. These modes are shown to be important for the evolution of plasma disks surrounding black holes.<sup>2</sup> Non-linear and axi-symmetric plasmas and associated field configurations are found under stationary conditions that do not involve the presence of a pre-existing “seed” magnetic field unlike other configurations found previously.<sup>3</sup> The relevant magnetic energy density is of the order of the gravitationally confined plasma pressure. The solitary plasma rings that characterize these configurations are localized radially over regions with vanishing differential rotation and can be envisioned as the saturated state of magneto-gravitational modes. The “source” of these configurations is the combination of the gravitational force and of the plasma density gradient orthogonal to it.

<sup>1</sup>Sponsored in part by the U.S. D.O.E.

<sup>2</sup>B. Coppi, *Phys. Plasmas* **18**, 032901 (2011)

<sup>3</sup>Ibid.

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