

Abstract Submitted  
for the APR10 Meeting of  
The American Physical Society

**Plasma Regions and Regimes Near Black Holes and High Frequency QPOs**<sup>1</sup> P. REBUSCO, B. COPPI, MIT, M. BURSA, C.U. — Tri-dimensional, tightly wound spirals [1] are considered that co-rotate with the magnetized plasma disk structure surrounding a black hole at a radial distance that is related to the radius of the marginally stable orbit. These modes can be excited under the combined effects of the differential rotation and the vertical gradients of the plasma density and temperature. The spirals are localized over radial widths that defines one of the regions surrounding a black hole and have frequencies that are multiples of the plasma rotation frequency. The high toroidal number  $m_\phi$  modes are considered to decay into  $m_\phi = 2$  and  $m_\phi = 3$  modes. The observed twin peak non-thermal spectra of High Frequency QPOs are associated with the excitations of these modes, with the 3:2 ratio. The modulation of the observed radiation associated with general relativistic effects is analyzed, considering different emission processes. These are connected to strong variations of the plasma collisionality parameters corresponding to a local rarefaction and heating, due to the considered spirals.

[1] B. Coppi, *A&A* **504**, 321-329 (2009).

<sup>1</sup>Sponsored in part by the U.S. DOE and the Pappalardo Fellowship program.

B. Coppi  
MIT

Date submitted: 26 Oct 2009

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