

Abstract Submitted  
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**3D-Spirals Emerging from Plasma Disks and High Frequency QPOs\*** P. REBUSCO, B. COPPI, MIT, M. BURSA, Prague — An interpretation based on a novel kind of plasma modes<sup>1</sup> emerging from axisymmetric disks is proposed for High-Frequency Quasi-Periodic Oscillations (HFQPOs) in low mass X-ray binaries as QPOs can be a probe of strong field gravity. Tri-dimensional, tightly wound spirals are considered that co-rotate with the magnetized plasma disk surrounding a black hole in the vicinity of the marginally stable orbit. These modes can be excited by the combined effects of the differential rotation and the vertical gradients of the plasma density and temperature. The spirals are localized over relatively narrow radial widths 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, explaining the observed twin peak QPOs spectra 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 runaway electric field corresponding to a local rarefaction and heating, or to a local increase of plasma density and cooling due to the considered spirals. \*Sponsored in part by the U.S. DOE and the Pappalardo Fellowship program.

<sup>1</sup>B. Coppi, MIT/LNS Report 08/08, submitted to Astronomy and Astrophysics (2008).

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