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Tridimensional Plasma Spirals and High Frequency Quasi Periodic Oscillations Around Black Holes* P. REBUSCO, B. COPPI, MIT, M. BURSA, Czech Ac. — A theoretical interpretation based on a novel kind of disc plasma modes [1] is proposed for High-Frequency Quasi-Periodic Oscillations (HFQPOs) in low mass X- ray binaries [2]. Tridimensional, tightly wound spirals are considered that co-rotate with the plasma disc in the vicinity of a black hole. These modes can be excited, from an axisymmetric disc embedded in a "seed" vertical magnetic field, by the combined effects of the differential rotation and the vertical gradients of the plasma density and temperature. Considering the electron temperature gradient is a clear oversimplification of the gradients that electron distributions can have in the highly non-thermal regimes from which HFQPOs emerge [3]. The tridimensional spiral modes considered are localized radially over relatively narrow widths [1] and have frequencies that are multiples of the local plasma rotation frequency. The higher toroidal number m_ϕ modes are considered to decay into $m_\phi = 2$ and $m_\phi = 3$ modes, explaining the observed twin peak HFQPOs with the 3:2 ratio. Large variations in the collisional mean free path, corresponding to local compression and rarefaction, are associated with the considered spirals. These variations can lead to different emission characteristics. *Sponsored in part by the U.S. DOE. [1] B. Coppi, A&A 321, 504 (2009). [2] P. Rebusco, New Astronomy Review 855, 51 (2008). [3] B. Coppi, Phys. Plasmas 032901, 18 (2011).

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