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General Relativistic Plasma Disk Dynamics, Key Role of Topology and Interpretation of Black Hole Associated Phenomena* B. COPPI, MIT — The geometry of the plasma disk structures surrounding black holes plays a key role in the excitation of collective modes [1] that are relevant to the global dynamics of these structures. A class of unstable tri-dimensional spirals [2] is identified that depend on the vertical profile of the associated plasma density perturbations, are localized around the radius where they co-rotate with the plasma and are driven by the local differential rotation and the vertical gradient of the plasma pressure. For relatively flat temperature profiles, spiral modes that are purely oscillatory in the frame co-rotating with the plasma and are convective (radially) are found. A considerable rate of radial transport of angular momentum can be associated with these modes. Coexisting unstable normal modes both axisymmetric [1] and of the spiral type [2] can produce significant vertical plasma outflows away from the equatorial plane. The effects of these modes provide a basis for interpreting experimental observations associated with black holes, in particular Active Galactic Nuclei Winds and high frequency Quasi Periodic Oscillations, and for justifying rates of angular momentum transport consistent with the inferred rates of mass accretion. *U.S. D.O.E. partially sponsored.
[1] B. Coppi, *Europhys. Letters* **82**, 19001 (2008).
[2] B. Coppi, Paper P1.177, E.P.S. Inter. Conf. (Crete, Greece, 2008).

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