Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Process for Energy Transfer to the Electron Population at Large Distances in Gamma Ray Bubbles[1] B. BASU, B. COPPI, MIT — Resonant interaction of unmagnetized ions with lower hybrid modes that are excited by the positive slope in the distribution of magnetized electrons serves as a mechanism for transferring the longitudinal energy of electrons to the perpendicular energy of ions. This mechanism, considered originally for the explanation of the enhanced rf emission at $\omega \cong \omega_{pi}$ (ion plasma frequency) and the associated enhanced ion heating observed in Alcator [1], was also proposed by one of us (B. C.) to successfully explain the formation of "ion conics" in the suprauroral region [2]. The inverse process of electron energization due to resonant interaction with lower hybrid modes that are excited by an energetic ion population (e.g. a streaming ion population) could be relevant to the formation of the outer edge region of gamma ray bubbles [3]. We proposed a similar process in 1976, considering lower hybrid modes injected in a confined plasma column as the driver of an electron current [4].

[1] B. Coppi, F. Pegoraro, R. Pozzoli, and G. Rewoldt, Nucl. Fusion, 16, 309 (1976).
[2] T. Chang and B. Coppi, Geophys. Res. Lett., 8, 1253 (1981).
[3] The Fermi-LAT Collaboration, Science, 328, 725 (2010).
[4] B. Basu and B. Coppi, RLE Report PRR-76/4, MIT, Cambridge, MA, 1976.

[1]Sponsored in by the U.S. DoE.

Bruno Coppi
MIT

Date submitted: 22 Jul 2015 Electronic form version 1.4