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"Snowplow" Model of Gamma-ray Bubbles in the Galaxy and Relevant Mode Particle Interactions[1] A. CARDINALI, ENEA (Italy), B. COPPI, CNR and MIT — A plasma outflow coming from the center of Our Galaxy is simulated by an ion "beam" reaching a "plowed" nearly stationary magnetic field at characteristic galactic distances. Then waves can be excited efficiently in the rarefied plasma ($10^{-2} - 10^{-4}$ cm^{-3}) permeating the relevant magnetic field configuration. These are electrostatic lower hybrid modes driven to instability via Cerenkov interaction. By using a fluid model the relevant dispersion relation is derived and the growth rate is evaluated both analytically and numerically. This rate increases with the "beam" density and its maximum is found when the perpendicular (to the magnetic field) phase velocity of the mode is comparable to the velocity of the "beam" and the parallel phase velocity is comparable to electron thermal velocity. Then efficient energy transfer from the perpendicular ion "beam" to the electron population, via Landau damping, can be expected accelerating fast electrons, or heating the overall electron population. The radiation emission due to the energetic electron component could explain the observed X and gamma-ray spectra characterizing the Fermi Bubbles of our Galaxy [1].

[1] H.-Y. K. Yang, M. Ruszkowski, E.G. Zweibel, Galaxies 6, 29 (2018).

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Bruno Coppi
Massachusetts Institute of Technology

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