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Planetary and stellar auroral magnetospheric radio emission
DAVID SPEIRS, University of Strathclyde, ROBERT A. CAIRNS, University of St Andrews, ROBERT BINGHAM, BARRY J. KELLETT, Rutherford Appleton Laboratory, SANDRA L. MCCONVILLE, KAREN M. GILLESPIE, University of Strathclyde, IRENA VORGUL, University of St Andrews, ALAN D.R. PHELPS, ADRIAN W. CROSS, KEVIN RONALD, University of Strathclyde — A variety of astrophysical radio emissions have been identified to date in association with non-uniform magnetic fields and accelerated particle streams [1]. Such sources are spectrally well defined and for the planetary cases [1,2] show a high degree of extraordinary (X-mode) polarisation within the source region. It is now widely accepted that these emissions are generated by an electron cyclotron-maser instability driven by a horseshoe shaped electron velocity distribution. Although the generation mechanism is well established, a satisfactory explanation does not yet exist for the observed field aligned beaming of the radiation out-with the source region [2]. In the current context, the results of PiC simulations will be presented investigating the spatial growth of the horseshoe-maser instability in an unbounded interaction geometry, with a view to studying the wave vector of emission, spectral properties and RF conversion efficiency. In particular, the potential for backward-wave coupling is investigated as a viable precursor to a model of upward refraction and field-aligned beaming of the radiation [3].

[1] A.P. Zarka, Advances in Space Research, 12, pp. 99 (1992).
[2] R.E. Ergun et al., Astrophys. J., 538, pp. 456 (2000)
[3] J.D. Menietti et al., J. Geophys. Res., 116, A12219 (2011).

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