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Laboratory measurement of cyclotron radiation inhibition by background plasma relevant to the polar magnetosphere SANDRA L. MCCONVILLE, MARTIN KING, University of Strathclyde, MARK KOEPKE, West Virginia University, DAVID SPEIRS, KAREN GILLESPIE, ALAN PHELPS, ADRIAN CROSS, KATHLEEN MATHESON, University of Strathclyde, ALAN CAIRNS, IRENA VORGUL, University of St Andrews, ROBERT BINGHAM, BARRY KELLETT, Rutherford Appleton Laboratory, KEVIN RONALD, University of Strathclyde — Auroral Kilometric Radiation (AKR) emitted at polar regions of magnetised planets such as Saturn and Earth arises as particles descend and accelerate through an auroral density cavity (partial plasma depletion region, f_{pe} ~9kHz and n_p ~$10^6 m^{-3}$) into the increasing magnetic field at the poles. Adiabatic conservation of the magnetic moment increases the pitch angle of each electron causing an increase in perpendicular velocity, resulting in a horseshoe shaped distribution function in velocity space. This distribution has been shown to be unstable to a cyclotron resonance maser type interaction and produces radiation with spectral peaks at ~300kHz, GW's of power and with wave propagation in the X-mode. A scaled laboratory experiment allows magnetic compression of an electron beam to represent the action of the Earth's magnetic field on the particles. A Penning trap was incorporated into the experimental apparatus to allow generation of background plasma. Results showed that the background plasma affected the EM wave generation, characterised by reduced intensity, intermittent radio emission compared to the stable emission observed in the absence of plasma.

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