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Theory of a new cyclotron maser instability with application to space and laboratory plasmas IRENE VORGUL, St Andrews, ROBERT BINGHAM, Rutherford Appleton Laboratory, R.A. CAIRNS, St Andrews, KEVIN ROLAND, DAVID SPEIRS, ALAN PHELPS, University of Strathclyde, BARRY J. KELLETT, Rutherford Appleton Laboratory — Conservation of the magnetic moment results in the formation of a crescent, or horseshoe shaped velocity distribution when a beam of electrons moves into an increasing magnetic field. The resultant horseshoe shaped velocity distribution has been shown to be unstable with respect to a cyclotron-maser type instability. This instability has been postulated as the mechanism responsible for auroral kilometric radiation and also non-thermal radiation from other astrophysical bodies. In this paper the previous theory, that assumed an infinite uniform plasma, is extended to apply to a bounded cylindrical geometry. This more exact theory in bounded cylindrical geometry is also directly relevant to a laboratory experiment currently being carried out.

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