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Cyclotron radiation emission from electron beams having a horseshoe velocity distribution SANDRA MCCONVILLE, DAVID C. SPEIRS, KEVIN RONALD, ALAN PHELPS, ADRIAN CROSS, ROBERT BINGHAM, CRAIG ROBERTSON, COLIN G. WHYTE, SUPA Department of Physics, University of Strathclyde, IRENA VORGUL, ALAN CAIRNS, School of Mathematics and Statistics, University of St. Andrews, BARRY KELLETT, Space Physics Division, CCLRC, Rutherford Appleton Laboratory — When an electron beam is subject to significant magnetic compression, conservation of the magnetic moment results in the formation of a horseshoe shaped velocity distribution. Such a distribution in the terrestrial auroral zone may be responsible for generating the Auroral Kilometric Radiation (AKR) – an intense RF emission sourced at high altitudes in the Earth’s magnetosphere. We present results from an experimental and numerical investigation of radiation emission from an electron beam subject to significant magnetic compression. Results from both simulations and a laboratory experiment show radiation emission close to the electron cyclotron frequency. Electron transport measurements also indicate the formation of a horseshoe distribution and integration of the experimentally measured antenna patterns provide an estimate of 2% for the RF conversion efficiency. This is comparable with estimates of the AKR generation efficiency.

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