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**Backward radiation from a horseshoe type cyclotron instability**

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Strathclyde, Glasgow, UK — Recent observations of Auroral Kilometric Radiation  
produced by a beam-driven cyclotron instability suggest that it is generated at a  
small angle to perpendicular in the backward direction with respect to the beam.  
New data also suggest backward propagation of cyclotron radiation from some stars  
with dipole magnetic field. Our experiment at the University of Strathclyde in-  
vestigating cyclotron maser emission similar to AKR also showed that the fastest  
growing wave is propagating backward, with this result confirmed by simulations  
and analytic calculations of the growth rate. We propose here a possible explana-  
tion of this phenomenon. The instability is driven by a population inversion of the  
electron distribution in the perpendicular direction and for different directions of  
propagation slightly away from perpendicular the cyclotron resonance curve passes  
through the region of maximum gradient for different frequencies. Near cyclotron  
resonance the real part of the dispersion relation is strongly frequency dependent.  
We show that this leads to the conclusion that the peak growth would be expected  
for a small backward angle, in line with the results of observation and simulation.

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