

Abstract Submitted  
for the DPP09 Meeting of  
The American Physical Society

**Testing of an Advanced Internal Mode Converter for a 1.5 MW, 110 GHz Gyrotron**<sup>1</sup> D.S. TAX, I. MASTOVSKY, MIT PSFC, J. NEILSON, Calabazas Creek Research Inc., M.A. SHAPIRO, J.R. SIRIGIRI, R.J. TEMKIN, A.C. TORREZAN, MIT PSFC — Megawatt gyrotrons are under development for the electron cyclotron heating (ECH) of plasmas, including ITER. To optimize the efficiency of gyrotrons and of the transmission lines, the internal mode converter (IMC) should output a perfect Gaussian beam. The TE<sub>22,6</sub>110 GHz IMC we have implemented consists of a helically-cut launcher and three smooth curved mirrors. The theoretically predicted output beam has waist  $W_z = W_x = 2.9$  cm at the gyrotron window. Cold test measurements using a VNA and a 3-axis scanner were in good agreement with theory with measured beam waists  $W_z = 2.9$  cm and  $W_x = 2.7$  cm. We also installed the IMC in a 110 GHz, 1.5 MW, 3  $\mu$ s pulsed gyrotron and measured the field pattern with over 40 dB signal to noise accuracy using an rf diode on a 2-axis scanner. Measured beam waists  $W_z = 4.8$  cm and  $W_x = 4.2$  cm compared well with theoretical waists  $W_z = W_x = 4.7$  cm at a plane 124 cm from the gyrotron window.

<sup>1</sup>This research was supported by the DOE, Office of Fusion Energy Sciences.

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Date submitted: 18 Jul 2009

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