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**Multiple frequencies per mode in a relativistic magnetron utilizing a diffraction output** HAYNES WOOD, PETER MARDAHL, DAVID FRENCH, BRAD HOFF, KYLE HENDRICKS — Recently, relativistic magnetrons with diffractive RF outputs have been investigated both with PIC simulations and experimentally [1,2]. Diffractive outputs offer an alternate RF extraction method and may increase the efficiency over relativistic magnetrons that use a conventional power extraction scheme. We have independently verified some of these claims with our own PIC simulations. Furthermore, we have found that the diffractive output influences the modes of the relativistic magnetron by creating an axially overmoded structure. Results demonstrating there are multiple frequencies per mode, and that these can be selected by choosing the proper applied magnetic field and voltage, are presented.

[1] M. Daimon, K. Itoh, G. Imada, and W. Jiang, “Experimental demonstration of relativistic magnetron with modified output configuration,” *Applied Physics Letters*, vol. 92, p. 191504, 2008

[2] M. Fuks, E. Schamiloglu, “70% Efficient Relativistic Magnetron with Axial Extraction of Radiation through a Horn Antenna,” *IEEE Transactions on Plasma Science*, vol. 38, p. 1302, 2010

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