Abstract Submitted
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Enhanced Performance of a Relativistic Magnetron by Magnetic Priming[1] R.M. GILGENBACH, B.W. HOFF, Y.Y. LAU, N.M. JORDAN, E. CRUZ, P. PENGVANICH, W. WHITE, University of Michigan, T.A. SPENCER, Air Force Research Laboratory, D. PRICE, L-3, Titan Division — Magnetic priming [1] was applied to the UM/L-3 Titan relativistic magnetron (6-vane, -300kV, 5-10KA, 0.3-0.5 μs). Three 4-cm-long Mu-Metal were inserted within the cathode, centered beneath the emission region, and spaced 120 degrees apart. These wires produce magnetic perturbations with N/2 azimuthal symmetry (for pi-mode, N vane magnetron). Experimental results using the non-symmetric waveguide load array showed dramatic reduction in pi-mode starting current. Magnetic priming increased the percentage of pi-mode shots from 35% to 58%. Preliminary data also yielded increases in pi-mode peak power and mean pulse width. Symmetric waveguide load array data showed similar trends in magnetron performance improvement. A second series of experiments using three 6-cm wires within the cathode showed an 11% increase in the probability of pi-mode shots over the baseline case. MAGIC simulations combining magnetic priming on the cathode and anode have shown faster startup than the baseline case without magnetic priming, as well as improvements over magnetic priming applied only on the cathode or anode. [1] V.B. Neculaes, R.M. Gilgenbach, and Y.Y. Lau, US Patents 6,872,929 and 6, 921,890 (2005).

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