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Cathode Priming vs. RF Priming for Relativistic Magnetrons[1]

W.M. WHITE, B.W. HOFF, R.M. GILGENBACH, Y.Y. LAU, M.C. JONES, V.B. NECULAES, N. JORDAN, P. PENGVANICH, R. EDGAR, Intense Energy Beam Interaction Lab, Nuclear Engineering & Radiological Sciences Dept., University of Michigan, Ann Arbor, MI 48109, T.A. SPENCER, Air Force Research Lab, Kirtland AFB, NM, D. PRICE, Titan Corp., San Leandro, CA — Magnetron start-oscillation time, pulsewidth and pi-mode locking are experimentally compared for RF priming versus cathode priming on the Michigan-Titan relativistic magnetron (-300 kV, 2-10 kA, 300-500 ns). Cathode priming [1, 2] is an innovative technique first demonstrated experimentally at UM. In this technique, the cathode is fabricated with N/2 emitting strips or N/2-separate cathodes (for an N-cavity magnetron), which generate the desired number of spokes for pi-mode. Cathode priming yields 13% faster startup with more reproducible pi-mode oscillation. Radio Frequency (RF) priming is investigated as the baseline priming technique for magnetrons. The external priming source is a 100kW, 3μs pulsewidth magnetron on loan from AFRL. RF priming reduced startup delay by 15% and increased pulsewidth by 9%. [1] M.C. Jones, V.B. Neculaes, R.M. Gilgenbach, W.M. White, M.R. Lopez, Y.Y. Lau, T.A. Spencer, and D. Price, Rev. Sci. Inst., 75, 2976 (2004) [2] M.C. Jones, Doctoral Dissertation, University of Michigan, 2005

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William White
University of Michigan

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