Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Design, Simulation and Experiments on the Recirculating Crossed-Field Planar Amplifier[1] STEVEN EXELBY, GEOFFREY GREENING, NICHOLAS JORDAN, DREW PACKARD, YUE YING LAU, RONALD GILGENBACH, Univ of Michigan - Ann Arbor, DAVID SIMON, BRAD HOFF, Air Force Research Laboratory — The Recirculating Planar Crossed-Field Amplifier (RPCFA) is the focus of simulation and experimental work. This amplifier, inspired by the Recirculating Planar Magnetron [1], is driven by the Michigan Electron Long Beam Accelerator (MELBA), configured to deliver a -300 kV, 1-10 kA, 0.3-1.0 s pulse. For these parameters, a slow wave structure (SWS), cathode, and housing were designed using the finite element frequency domain code Ansys HFSS, and verified using the PIC code, MAGIC [2]. Simulations of this device demonstrated amplification of 1.3 MW, 3 GHz signal to approximately 29 MW (13.5 dB) with nearly 53% electronic efficiency. Simulations have also shown the device is zero-drive stable, operates under a range of voltages, with bandwidth of ˜10%, on par with existing CFAs. The RPCFA SWS has been fabricated using 3D printing, while the rest of the device has been developed using traditional machining. Experimental RPCFA cold tube characteristics matched those from simulation. Experiments on MELBA have demonstrated zero-drive stability and amplifier experiments are underway. [1] R.M. Gilgenbach, Y.Y. Lau, D.M. French, B.W. Hoff, J. Luginsland, and M. Franzi, "Crossed field device," U.S. Patent US 8 841 867B2, Sep. 23, 2014. [2] Developed by Alliant Techsystems

[1]This work was supported by the AFOSR Grant FA9550-15-1-0097

Steven Exelby
Univ of Michigan - Ann Arbor

Date submitted: 18 Jul 2017 Electronic form version 1.4