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Harmonic Frequency-Locking In The Multi-Frequency Recirculating Planar Magnetron[1] DREW PACKARD, GEOFFREY GREENING, NICHOLAS JORDAN, STEVEN EXELBY, PATRICK WONG, Y.Y. LAU, RONALD GILGENBACH, Univ of Michigan - Ann Arbor, BRAD HOFF, Air Force Research Lab — Sources that generate high power electromagnetic radiation at multiple microwave frequencies are relevant for technologies such as counter electronics. At The University of Michigan, the Multi-Frequency Recirculating Planar Magnetron (MFRPM) [1,2] has been experimentally demonstrated to produce simultaneous oscillations at 1 GHz and 2 GHz, generating up to 32 MW and 13 MW, respectively. The MFRPM is driven by MELBA-C at -300 kV, 1-5 kA for 0.3-1.0 μs with a 0.11-0.3T magnetic field. A novel harmonic frequency-locked state was observed between the 1 GHz and 2 GHz oscillators. Simulations are being conducted to design new experiments to investigate the physics of this locking behavior. [1] G.B. Greening, Ph.D Dissertation, "Multi-Frequency Recirculating Planar Magnetrons," University of Michigan, 2017, [2] G.B. Greening, N. M. Jordan, S. C. Exelby, Y. Y. Lau, and R. M. Gilgenbach, "Multi-frequency recirculating planar magnetrons," Applied Physics Letters, 109, 074101 (2016).

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Drew Packard
Univ of Michigan - Ann Arbor

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