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RESULTS OF A COMPACT REFLEX TRIODE WITH MULTI CAVITY ADJUSTMENT

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This study focuses on achieving wide tunabiltiy of a compact reflex triode virtual cathode oscillator (vircator). The cathode is of a bimodal carbon fiber (CF) material paired with a pyrolytic graphite anode. These materials display ideal operating characteristics which including but not limited to, long lifetime > 10ˆ6 shots, high operating temperatures > 1000 K, and large current densities ˜200 A/cm2. A 12 stage, 158 J pulse forming network (PFN) based Marx generator serves to drive the Vircator at 350 kV, 4 kA with ˜100 ns pulsewidth. The operating frequency of interest is in the range of 1-6 GHz, where the tunability is achieved by varying the length of the anode-cathode (A-K) gap, the length from the back wall to the A-K gap, or/and the distance from the bottom of the cavity to the A-K gap. The primary focus in this experiment was to increase the achievable frequencies by placing a square waveguide within a sealed vacuum tube. This allows the bottom part of the waveguide to be easily adjusted while still maintaining the waveguide integrity. The resulting microwave frequencies are shown along with the system performance.

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