High power microwaves at 9 GHz from an extended length cavity in a coaxial beam geometry

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Experiment and simulation demonstrate high power microwave generation at 9 GHz using a 9-cm-diam, 400-keV, 7-kA annular electron beam. The beam is propagated in a coaxial drift tube between inner and outer conductors, a configuration which increases the available beam current and reduces the surface fields from existing high power sources. The microwave interaction is provided by an extended length loaded cavity, overcoming the limitations of radiative loss and low quality factor usually imposed by the coaxial geometry. A coupler samples 25 MW of the total 200 MW produced by the beam-cavity interaction. Simulations indicate that the 7% efficiency can be significantly improved by optimizing the interaction length.