

## Radial RF Injectors for Improved Waste Stream Processing Progress Report 3Q FY18

### Task 0 – Program Management

AFRL has initiated work and engaged with their subcontractors.

The LANL PI, Dr. Lewellen, has been serving as acting deputy group leader for AOT-AE since late CY2017. As of 13 July, his line management has directed him to charge 100% of his time to a management charge code. While this may result in funds remaining at the end of the FY, Dr. Lewellen and AOT-AE remain committed to overseeing the project to a successful completion.

### Task 1 – Beam Physics Design

This task is essentially completed; no new results to report since the last quarterly report.

### Task 2 – Engineering design and analysis

#### *RF power coupler design*

RF power coupler design is ongoing and making good progress.

#### *Cavity prototyping*

A CAD model was generated for the cavity prototype. The model was scaled such that the model beam tube diameters are 0.14", allowing the use of 141 semi-rigid coax [1] as a field probe and RF power coupler surrogate. The resonant frequency is expected to be 2.9 GHz. Figure 1 below shows a cross-section view of the model, with beam tubes on the left-hand side and thru-holes for securing the halves on the right. The different colors indicate different pieces, not different materials. Splitting the model in this way places the joint at a location of nominally zero current flow (ala the Tantawi "half-shell" method of fabrication), and also simplifies fabrication and alignment. Figure 2 shows the first cavity models fabricated, performed using 3d resin printing; we plan to copper-paint the models for an initial frequency measurement, and will compare the results to those from aluminum prototypes to be fabricated later.

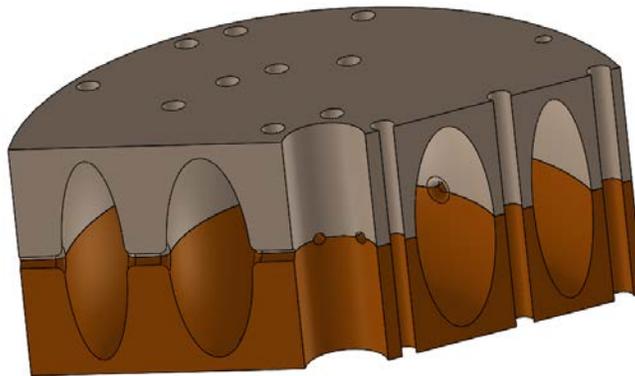


Figure 1: SolidWorks model of the 2-cell scaled cold-test model.



Figure 2: Printed cavity halves.

*Thermal analysis*

AFRL has started the analysis.

*Operating parameters, uptime estimation and costing, etc.*

AFRL has started the analysis.

- [1] <https://www.pasternack.com/images/ProductPDF/PE-SR402AL-STRAIGHT.pdf>