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Build and test a novel low heat leak fundamental power coupler

**Cooperative Research and Development Agreement
Final Report**

CRADA Number: FRA-2015-0078

Fermilab Technical Contact: Sergey Kazakov

Summary Report
1 July 2019

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CRADA number: FRA-2015-0078

CRADA Title: Build and test a novel low heat leak fundamental power coupler

Parties to the Agreement: Euclid TechLabs and Fermi Research Alliance, LLC

Abstract of CRADA work:

Fermi National Accelerator Laboratory and Euclid Techlabs propose to build and test prototypes of a new RF power coupler. The prototype solves reliability problems associated with present power couplers, which may lead to increased up-time of national laboratory accelerators for scientific users, as well as encourage development of industrial, medical, and security accelerator applications. The goal of the proposed project is to build and test a prototype of a proprietary coupler developed by Fermilab. The prototype will permit evaluation of reliability and low cryogenic heat leak in subsequent testing under a follow-on to this pilot program. The prototype design will be fabricated at Euclid Techlabs and tested at Fermilab using existing 1.3 GHz RF infrastructure.

Summary of Research Results:

A reliable coupler design with no copper plating was developed. Coupled electromagnetic-thermomechanical simulations were used in optimization studies that resulted in an extremely low (less than 1 W) power flow to a cold cavity at 250 kW of CW RF power at 650 MHz. A full 3D engineering design was also developed, meaning that the coupler is ready for manufacturing.

Related Reports, Publications, and Presentations:

SRF2015 Presentation by R. Kephart

Subject Inventions listing:

None

Report Date: 1 July 2019

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