FERMILAB-CRADA-2007-0001M

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Compact, Tunable RF Cavities

Cooperative Research and Development Agreement Final Report

CRADA Number: FRA-2007-0001M

Fermilab Technical Contact: Milorad Popovic

Summary Report
17 April 2010

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NOTICE

In accordance with Requirements set forth in Article XI.A(3) of the CRADA document, this document is the final CRADA report, including a list of Subject Inventions, to be forwarded to the Office of Science and Technical Information as part of the commitment to the public to demonstrate results of federally funded research.

CRADA number: FRA-2007-0001 (Muons)

CRADA Title: Compact Tunable RF Cavities

Parties to the Agreement: MUONS, Inc and Fermi Research Alliance, LLC

Abstract of CRADA work:

Compact RF cavities that tune rapidly over various frequency ranges are being developed using an innovative design with orthogonally biased ferrite or garnet cores for fast frequency tuning and liquid dielectric to adjust the frequency range and to control the core temperature. We describe mathematical and physical models of RF cavities suitable for FFAG and other applications as well as first measurements of candidate ferrite and dielectric materials. The first uses of the new cavity concept will be for improvements to the 8 GeV Fermilab Booster synchrotron. Funded in part by STTR grant DE-FG02-07ER86320.

Summary of Research Results:

First measurements of the model cavity show excellent agreement with the numerical simulations using SuperFish and ANSYS based on the measured parameters of the ferrite cores. The measurements with a candidate dielectric fluid are also in good agreement with expectations.

Related Reports, Publications, and Presentations:

OSTI Identifier: 1090424; DOE/ER86320-1 Final Report; MOPP105

Subject Inventions listing:

Popovic, Milorad and Johnson, Rolland P., RF cavity using liquid dielectric for tuning and cooling, US Patent No. 8,159,158 filed January 26, 2009 by Muons, Inc (Batavia, IL) and issued April 17, 2012.

Report Date: 17 April 2010

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