FERMILAB-CRADA-FRA-2013-0006

Fermilab

Managed by Fermi Research Alliance, LLC for the U.S. Department of Energy Office of Science

Gated Field-Emission Cathode Radio-Frequency (RF) Gun

Cooperative Research and Development Agreement Final Report

CRADA Number: FRA-2013-0006

Fermilab Technical Contact: Charles Thangaraj

Summary Report
29 November 2016

Fermi National Accelerator Laboratory / Kirk and Pine Street / P.O. Box 500 / Batavia, IL 60510 / 630.840.3000 / www.fnal.gov / fermilab@fnal.gov
Managed by Fermi Research Alliance, LLC for the U.S. Department of Energy Office of Science

Fermi Research Alliance, LLC under Contract No. DE-AC02-07CH11359 with the U.S. Department of Energy, Office of Science, Office of High Energy Physics.

NOTICE

In accordance with Requirements set forth in Article X 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-2013-0006

CRADA Title: Gated Field-Emission Cathode Radio-Frequency (RF) Gun

Parties to the Agreement: RadiaBeam, LLC and Fermi Research Alliance, LLC

Abstract of CRADA work:

The goal of this CRADA was to procure the carbon nanotube cathode from Radiabeam, install it in HBESL and make current measurements as a function of the gun gradient. The gun was operated at 1.3 GHz. After testing, send the cathode back to RadiaBeam for surface analysis.

Prof. Piot (NIU/Fermilab), Dr. Daniel Mihalcea (NIU), Harsha Panuganti (NIU Ph.D student) and Jayakar Thangaraj (Fermilab) led the experimental efforts at HBESL.

Summary of Research Results:

All the above mentioned objectives have been reached.

For science results see the following peer-reviewed articles.

Ampère-Class Pulsed Field Emission from Carbon-Nanotube Cathodes in a Radiofrequency Resonator
D. Mihalcea, L. Faillace, J. Hartzell, H. Panuganti, S. M. Boucher, A. Murokh, P. Piot, J. C. T. Thangaraj, Appl. Phys. Lett. 107, 033502 (2015).

"Simulations of Field-Emission Electron Beams from CNT Cathodes in RF Photoinjectors" Daniel Mihalcea (NIU, DeKalb) , Luigi Faillace (RadiaBeam Tech.) , Harsha Panuganti (NIU, DeKalb) , Jayakar C.T. Thangaraj (Fermilab) , Philippe Piot (Fermilab & NIU, DeKalb), published in the Proceedings of the 6th International Particle Accelerator Conference (IPAC 2015) : Richmond, Virginia, USA, May 3-8, 2015, and available at https://jacowfs.jlab.org/conf/proceedings/IPAC2015/papers/wepje019.pdf

Subject Inventions listing:

None

Report Date: 11/29/2016

Technical Contact at Fermilab: Charles Thangaraj

This document contains NO confidential, protectable or proprietary information.