FERMILAB-CRADA-FRA-2011-0006

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Highly Efficient Sources of Negative Hydrogen Ions

Cooperative Research and Development Agreement Final Report

CRADA Number: FRA-2011-0006

Fermilab Technical Contact: Dan Bollinger

Summary Report
6 January 2020

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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-2011-0006

CRADA Title: Highly Efficient Sources of Negative Hydrogen Ions

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

Abstract of CRADA work:

Fermilab will provide technical expertise to help Muons, Inc. develop novel modifications of H- source designs which will satisfy the performance requirements of Project X at Fermilab. The new source will be an advanced version of a Penning DT SPS (Dudnikov-Type Penning Surface Plasma Source) with a high efficiency, deliver up to 15 mA average current with improved electrode cooling. Supported in part by DOE STTR grant DE-SC0006267.

Summary of Research Results:

Factors limiting the operating lifetime of Compact Surface Plasma Sources (CSPS) were analyzed and possible treatments for lifetime enhancement considered. Noiseless discharges with lower gas and cesium densities were produced in experiments with modified discharge cells. With these discharge cells it is possible to increase the emission aperture and extract the same beam with a lower discharge current and with correspondingly increased source lifetime.

Related Reports, Publications, and Presentations:

Dudnikov, Vadim, and Bollinger, Daniel. Highly Efficient Sources of Negative Hydrogen Ions. United States: N. p., 2013.Web.

IPAC'10, Kyoto, Japan, Dudnikov, Vadim and Johnson, Rolland P. High Brightness H- Surface Plasma Sources (THPEC072).

Dudnikov, V, Bollinger, D, and Lawrie, S. Lifetime of Highly Efficient H- Ion Sources. 2013. Web. (FERMILAB-CONF-12-248-AD)

Subject Inventions listing:

None

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