From: Skulski, Michael
To: Capasso, Frances
Cc: Medvedev, Dmitri; Raparia, Deepak
Subject: Intent to Submit an LDRD Proposal
Date: Friday, May 27, 2022 4:18:30 PM
Attachments: Skulski_LDRD_Abstract_May22.docx
Skulski_LDRD_Abstract_May22.pdf

Hello Fran,

I am intending to submit an LDRD Type A Proposal. I have attached a Word Document and PDF if either are helpful.

Title: Target Station for Low-Current Nuclear Reaction Studies at the BNL Linac

PI: Michael Skulski (MIRP/CA-D)

Other Investigators: Dmitri Medvedev (MIRP/CA-D), Deepak Raparia (CA-D)

Abstract: We propose to build a target station on the Linac beamline that would enable in-beam experiments for the measurement of prompt gamma rays and secondary particles resulting from nuclear reactions. The beamline will be operating at very low currents from 1 nA to 1 µA and make use of the available range of proton energies (10 to 200 MeV) for applications including nuclear data efforts to inform isotope production. The end of the main Linac beamline provides both the physical space and vacuum capabilities for a target chamber and associated detector arrays for target irradiation studies. With adjustments to the existing infrastructure along this beamline such as the installation of diagnostic elements and a vacuum chamber for target manipulation, this target station will be used for studying nuclear reaction products. Gamma rays and secondary particles emitted at the direct, compound, and preequilibrium stages, which occur in different proton energy ranges, will aid in the understanding of reaction mechanisms. This will complement the foil stack method currently used at BLIP. The setup would enable such experiments as measurements of low-intensity transitions between energy levels in nuclei induced by primary protons that require low background and secondary neutrons produced through reactions with a target. Currently such capabilities exist at the 88-inch cyclotron at Lawrence Berkeley National Laboratory and at Tandem Van de Graaff at BNL, but only for protons up to 50 and 30 MeV, respectively. The DOE Isotope Program will consider funding studies where in-beam experiments are critical for progress. Expanding in-beam measurement capabilities up to 200 MeV at CA-D would position BNL better to obtain more funds within the initiative.

Thank you,

Michael