**Small Project Quarterly Report**

DOE Office of Nuclear Physics (NP)

Facilities and Project Management Division

**Proposal Name:**

Superconducting RF electron gun

**Report Date:**

January 27, 2021

**Report Period of Performance:**

10/1/2020 –12/31/2020

**Co-Principal Investigator:**

Matt Poelker, with Joe Grames and Riad Suleiman

**Work-scope Highlights:**

Jefferson Lab’s contribution to this project is to provide a Compton Transmission Polarimeter, which will be used to measure beam polarization when the SRF photogun employs a GaAs photocathode.

**Q1 FY21 Brief summary of activity issues, concerns, successes:**

*Activity successes*

1. Working with Jefferson Lab Fast Electronics Group to design Data Acquisition System (DAQ) based on expected electron beam characteristics at BNL CeC.
2. Exploring the synchronization required between laser beam, Pockels Cell, Helicity Control Board and DAQ. Considering modifications to the Helicity Control Board that Jefferson Lab will provide.
3. Student Benjamin Fernandes Neres was identified as the GEANT4 modeler of this polarimeter. He will work 3 months in France and then come to JLab for 1 month to wrap up the design aspects project.  JLab will pay room and per diem using funds from this FOA. Benjamin will "own" building a model of target/magnet/detector/shielding in GEANT4 and then he will simulate expected conditions to finalize a design.

*Issues and concerns*

1. Since the beam is macro-pulsed, we need to worry about the relative timing of the laser beam and the Pockels cell switching. Maybe all devices (Pockels cell, helicity board and DAQ) will be triggered by the laser-timing signal? By this we mean, we can’t simply use CEBAF hardware, so we are thinking it through

**Milestones**

Identified the student to perform GEANT4 modeling

**Budget**

Summary of total expenditures:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  ID #  | **Item/Task**  | **Baseline****Total Cost**(AY$) | **Costed &****Committed**(AY$) | **Estimate****To Complete**(AY$) | **Estimated****Total Cost**(AY$) |
| COMTRA  | Compton Trans Polarimeter | $200,100  | $0  | $200,100 | $200,100  |
|  | Totals: | **$200,100** | **$0** | **$200,100** | **$200,100**  |

*Notes:*

* *Costed and Committed numbers are as of December 31st, 2020.*

Summary of expenditures by fiscal year (FY):

|  |  |
| --- | --- |
|  | FY 2020 |
|  |  |
| a) Funds allocated | $200,100  |
| b) Actual costs to date  | $0  |
| c) Uncosted commitments | $0  |
| d) Uncommitted funds  | $200,100  |