

Evaluation of LDRD Proposal 2016-LDRD-2a: Title Generation and Characterization of Magnetized Bunched Electron Beam from DC Photogun for MEIC Cooler (Riad Suleiman and Matt Poelker)

- 1. Is the project innovative and does it have high scientific and/or technical excellence in one or more of the forefront areas relevant to the DOE missions?*

It is innovative. Ion beam cooling is a requirement for the proposed electron-ion colliders. Use of a magnetized beam will improve the effectiveness of the cooling and aid in achieving high luminosity. This proposal is a well-defined start on the path to ion cooling with a magnetized beam. It proposes a few modifications to the existing Gun Test Stand here at Jefferson Lab. The changes involve a handful of magnets and the required diagnostics to characterize the magnetized beam.

It has high scientific excellence. The results of this research could be peer-review quality.

It may have high technical excellence. The experiment appears quite elegant and straightforward. The experimental details and challenges may elevate the technical excellence to a yes.

The project aligns well with forefront areas relevant to DOE missions – in particular with the DOE stewardship of accelerator science and Nuclear Physics missions.

- 2. Does the project align well with or enhance JLab's Strategic Goals?*

Yes. Demonstrating the production and manipulation of magnetized electron beam for ion cooling will be a positive contribution to the MEIC effort.

- 3. Is there a clear, high impact deliverable by the end of the funding period?*

Yes. The proposal has a "Expected Results" section that contains some soft deliverables related to learning about aspects of the system. However, in Section 2.1 a definitive goal of generating and characterizing a magnetic beam is clearly stated. Not sure why this statement is not in Section 1.2.

- 4. Can the project's aims be completed within the timeline and budget limits?*

The updated proposal increased the project duration from two to three years and included a longer term for the post-doc. With these changes, the project has a high probability of successful completion within the proposed schedule and budget.

- 5. Is there any aspect of the project that isn't clear from the written material provided or any aspect that has high technical risk?*

No

6. *Is there a reasonable probability that timely “follow-on” funding will result from the project in the proposal? (e.g. incremental DOE/NP funding, a patent and tech transfer, a new work for others project, etc.?)*

If an electron-ion collider R&D funding ramps up as presently under discussion, positive results here may lead to a follow-on DOE funding effort on ion beam cooling. The success of this proposal would be an important prerequisite for the cooling effort and would place JLAB in a favorable position to be awarded this aspect of the ion-collider R&D.

Comments: This is a really ambitious project. However, the authors have fully evaluated the risks and have done everything possible to maximize the likelihood of success. This proposal builds on the skills of the Injector Group, which has a track record of success. There were questions during the presentation about the deliverables at the end of the first year. The concern was that all there would be to show would be a pile of parts. In a follow-on communication, the authors provided a list of milestones against which the progress of the project can be tracked, with a clear deliverable at the end of the first year. With this control mechanism in place, the committee believed that the project has a high probability of success.

Recommendation: The Committee judged this to be an *Outstanding* Proposal that should be funded.