



December 27, 2011

Dr. Pawel Nadel-Turonski
Jefferson Laboratory

Dear Pawel,

I am writing in response to your proposal for EIC Generic R&D funds, entitled "DIRC-based PID for the EIC central detector". I have appended below the Advisory Committee's comments and recommendation on this proposal. I agree with the Committee's recommendation that your proposal be awarded the requested amount of \$140,000 for FY 2012.

As in the past year, the funding will be transmitted via R&D subcontracts with BNL. Please send me, as soon as possible, a list of institutions to which funds are to be directed, the amounts for each, and a business contact for each institution with whom we can initiate the necessary documentation.

Thanks very much for your interest in the EIC detector R&D program, and for your participation in the Advisory Committee meeting. It is expected that the Committee will meet again in about six months to evaluate new (or updated) proposals and to review progress of on-going projects. We look forward to continued receipt of quarterly progress reports for this project.

With best regards,

A handwritten signature in black ink that reads "Tom".

Tom Ludlam

cc: S. Vigdor, R. McKeown, R. Ernst

Committee report on this proposal:

Proposal # 7 DIRC-based PID for the EIC Central Detector

T. Cao, T. Horn, C. Hyde, Y. Ilieva, P. Nadel-Turonski, K. Peters, C. Schwarz, J. Schwiening, H. Seraydaryan, W. Xi, C. Zorn.
Catholic University of America, Old Dominion, South Carolina, TJNAL, GSI

This proposal is currently in its first year of funding. The proponents have adopted this Committee's recommendations from our earlier review. In particular they have extended the scope of the sensor testing program and are proposing to take advantage of a new, high-B-field dedicated test facility at JLab.

The central detector at the EIC must provide particle identification (e/π , π/K , K/p) over a wide momentum range. A Detector of Internally Reflected Cherenkov light (DIRC) is a radially-compact attractive option. An EIC DIRC will need to deal with the higher momenta particles than the DIRCs for BelleII /SuperB and PANDA.

The proposal is broad and well-written encompassing the following activities: (a) development of a compact readout "camera" that can operate in the high magnetic field of the central solenoid, (a) a study of the possibility to extend the momentum coverage for π/K identification by improving the θ_c resolution, (c) a study of the integration of a DIRC into the EIC full-acceptance detector with and without a supplementary gas Cherenkov detector, and the option of using extended DIRC bars that would allow the expansion volume and readout to be located outside the magnetic field.

Extending the momentum range over which it is possible to identify particle species is useful beyond an EIC and for this reason alone the proposal is worthy of support. The proposal discusses semi-inclusive DIS and Transverse Momentum Distributions but does not provide requirements for DIRC performance. The proponents should *quantify* the degree to which extending the momentum range of particle identification impacts specific physics measurements at the EIC.

For all three years of this proposal there is an appropriate emphasis placed on design and simulation both to determine the performance requirements and to develop a DIRC that can meet them. In year one simulation of pion backgrounds in the EIC central detector will determine the need for supplementary e/π discrimination capabilities (beyond the DIRC and Electromagnetic Calorimeter) in the central detector. Studies will be carried out of the performance of different expansion volume sizes, shapes, focusing designs, and radiator shapes, in terms of single photon resolution and light yield. This will inform the design of a prototype compact expansion volume with multi-pixel readout, the set up of a DAQ system and the test of an expansion volume imaging and sensors. Deliverables will include electron/pion identification requirements, a simulation and reconstruction framework for the DIRC prototype, DIRC resolution studies and initial prototype design. The plan of work and budget are both clearly presented and well-justified for all three years. However the committee would like to see a detailed strategy to achieve a θ_c resolution improvement by a factor that exceeds two.

The committee recommends funding this proposal in full.