

Memorandum for: Wu-Tsung Weng
From: Dennis Kovar
Subject: Review of FACET Proposal

For over two decades the DOE Office of High Energy Physics (OHEP) has supported research in the acceleration of electrons by strong wake fields in plasma. Recent achievements of this R&D program have been spectacular, particularly the laser acceleration of electron beams to 1 GeV in 3 cm of plasma by the LOASIS group at LBNL, and the energy doubling of a 42-GeV electron beam at SLAC in a meter of plasma by a SLAC/UCLA/USC collaboration. The accelerating gradients achieved are tens of GeV per meter, several hundred times higher than those in copper accelerating structures. This technology clearly holds great promise for dramatic reduction of the size and cost of future high energy accelerators.

In May 2007 you chaired the committee that reviewed the OHEP Advanced Accelerator R&D Program. That committee's review report contains the following important recommendation.

"The committee recognizes the recent, exceptional developments in long-term particle acceleration R&D. We also recognize that within the current structure of AARD funding, there is no clear mechanism to elevate some new acceleration technologies to the next level of demonstrated performance. The time may be right for increased support to these few promising areas and we suggest that OHEP should consider strategies to capitalize on this long-term investment and to realize multi-TeV acceleration to reduce space and cost of possible future accelerators."

In keeping with this recommendation, we have identified plasma acceleration as a promising technology for increased investment. It is in this context that I am asking you to chair a scientific and technical review of the FACET proposal from SLAC. The proposal requests funding to reconfigure the SLAC linear accelerator for two additional experimental capabilities in the era of Linac Coherent Light Source (LCLS) operation. The first is a new experimental area for advanced accelerator R&D, called the Accelerator Science Facility, or ASF, in the existing linac tunnel at the point where the beam has an energy of 24 GeV; the second is the extension of a beam transfer line to deliver 12-GeV electron beams to End Station A (ESA) for testing detectors and instrumentation. The review will be held at SLAC on February 19-20, 2008. The review committee's recommendations will be an important consideration in our decision on the FACET proposal. The committee should address the following specific points in their report.

1. Assess the technical design of FACET, including the feasibility and adequacy of the desired beam parameters for the intended applications.

2. Comment on the plans for the ASF and ESA user facilities, including the adequacy of the experimental area, extent of the expected user community, and mechanisms to ensure quality of the research program.
3. Evaluate the effectiveness of the anticipated ASF R&D program to confront the critical technical issues for very compact, multi-TeV plasma accelerators.
4. Advise the HEP program on the anticipated scientific impact of FACET, and whether this is commensurate with the scale of resources required to build and operate it.
5. Although this is not a detailed project review, it would also be helpful if you can provide us with a preliminary evaluation of the accuracy of the estimates of total costs for construction and operation of FACET, comment on the credibility of the construction schedule, and assess whether there is an effective management plan.

I would like the committee to submit a short report within one month of the review.
Thank you in advance for your time and effort.

Dennis Kovar

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