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December 1, 2011

Dr. W. F. Brinkman,
Director, Office of Science,
U.S. Department of Energy,
SC-1/Forrestal Building,
1000 Independence Ave., SW
Washington, DC 20585

Dr. Edward Seidel,
Assistant Director,
Directorate for Mathematical and Physical Sciences,
U.S. National Science Foundation
4201 Wilson Boulevard,
Arlington, Virginia 22230

Dear Dr. Brinkman and Dr. Seidel,

On November 29, 2010, the DOE/NSF Nuclear Science Advisory Committee (NSAC) was charged by you to review and evaluate the current and proposed U.S. research program, scientific capabilities, and opportunities for fundamental nuclear physics with neutrons, and to make recommendations of priorities consistent with projected resources. The scope of the charge included the full suite of fundamental neutron physics research opportunities in the U.S. and internationally, and their evaluation in the broader, world-wide context of fundamental symmetry measurements that test the Standard Model. This review follows a previous NSAC assessment of fundamental physics with neutrons in 2003, as well as the 2007 NSAC Long Range Plan, both of which made specific recommendations for investments in this area.

While your charge letter was addressed to Dr. Susan Seestrom, who is Chair of NSAC, Dr. Seestrom has an active research program in neutron physics and recused herself from participation in the review. I was appointed by Dr. Tim Hallman, of the DOE Nuclear Physics Office, and Dr. Brad Keister, of the NSF Nuclear Physics Program, to serve as Acting NSAC Chair for this review.

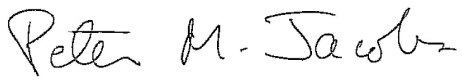
Professor Krishna Kumar, of the University of Massachussetts at Amherst, agreed to chair the Sub-committee carrying out the review. The ten members of the Subcommittee consisted of leading experts in all major areas of physics addressed by the neutron science under consideration, both theory and experiment, and included one European member for international context. The Subcommittee met thirteen times via phone conference, held two open meetings with presentations from the community, and met once more in person to establish the recommendations. Representatives from the DOE and NSF Nuclear Physics offices were present at all Subcommittee meetings. An interim report from the Subcommittee was presented to NSAC on June 30, 2011, with a draft of the final report of the Subcommittee sent to NSAC on October 25, 2011. NSAC suggested limited modifications to the report in subsequent discussions.

The Subcommittee finds that the U.S. effort in fundamental neutron physics continues to be world-class, and that there are compelling future opportunities in the U.S. in this area. The Subcommittee established a rank-ordered list of the five most important scientific priorities, as well as specific recommendations within each sub-area. The Subcommittee finds that these five highest-priority initiatives might be accommodated within a constant level of effort, as outlined in the report and exclusive of MIE construction funding, and finds that the current workforce in neutron physics has sufficient scope and depth to carry them out.

Most notably, the Subcommittee finds that the US initiative to search for a neutron electric dipole moment (nEDM) at the Spallation Neutron Source (SNS) has unique capabilities to achieve a measurement sensitivity that will have profound impact on nuclear and particle physics, as well as cosmology. However, this promising approach still requires significant R&D, and the subcommittee recommends focusing the current nEDM effort on the most critical outstanding issues.

Accompanying this letter please find the final Subcommittee report, which was endorsed unanimously by NSAC at its meeting on December 1, 2011, in Gaithersburg, Maryland.

Sincerely,



Peter M. Jacobs,
Lawrence Berkeley National Laboratory
Acting Chair, NSAC