



## YALE UNIVERSITY

A. W. WRIGHT NUCLEAR STRUCTURE LABORATORY

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OFFICE OF THE DIRECTOR

September 29, 2003

Dr. John B. Hunt  
Acting Assistant Director  
Dir. for Mathematical & Physical Sciences  
National Science Foundation  
4201 Wilson Boulevard  
Arlington, VA 22230

Dr. Raymond Orbach  
Director, Office of Science  
USDOE  
1000 Independence Avenue, SW  
Washington, DC 20585

Dear Drs. Hunt and Orbach:

Your letter of March 2003 charged NSAC to review and evaluate the current and proposed scientific capabilities for fundamental nuclear physics with neutrons and make recommendations of priorities consistent with projected resources. You asked NSAC to identify the most compelling scientific opportunities, and the infrastructure and effort required to address them in the context of both U.S. and International efforts. The charge asked NSAC for this assessment in terms of a constant level of effort at the FY 2004 DOE Nuclear Physics Congressional Request level and to recommend priorities with additional funds.

NSAC formed a sub-committee, chaired by Robert Tribble of Texas A&M University, to prepare a response to this charge. This sub-committee has completed its work and presented its report to NSAC at a meeting on September 13, 2003. NSAC unanimously accepted the report and a copy is enclosed with this letter.

The subcommittee report delineates an exciting field of fundamental research, and a host of outstanding scientific opportunities. As highlighted in the recent Long Range Plan for nuclear science, the U.S. program in fundamental nuclear physics with neutrons addresses key questions affecting our understanding of Nature at the most basic levels. Experiments in this area can provide some of the most sensitive tests of fundamental conservation laws to date and seek physics beyond the Standard Model. The physics impact of the measurement of (or of better limits on) the electric dipole moment (EDM) of the neutron is extraordinary, making this the highest priority goal and pointing to the necessity for an active R&D effort in this area. More generally, the SNS will be one of the most powerful spallation neutron sources in the world and the use of one of its beam

lines gives Nuclear Physics a highly leveraged way to capitalize on the investment in that facility.

The U.S. program complements that of our international colleagues and builds on unique expertise in this country. However, under constant level of effort funding the program would have to be significantly curtailed, and new opportunities, such as the EDM experiment, to which the Report and NSAC assigned the highest physics priority, could not be realized. NSAC therefore strongly urges the Office of Science to identify and secure additional sources of funding for developing this important research opportunity in fundamental nuclear physics with neutrons.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Richard F. Casten', written in a cursive style.

Richard F. Casten  
Chair, NSAC

cc: Dehmer  
Keister  
Kovar  
NSAC members