

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

National Academy of Sciences
National Academy of Engineering
Institute of Medicine
National Research Council

May 1, 2000

Dr. Neal F. Lane
Assistant to the President for Science and Technology
Director, Office of Science and Technology Policy
1600 Pennsylvania Ave, N.W.
Washington, DC 20502

Dear Dr. Lane:

We are writing to stress the critical importance of the construction of the new accelerator-based, high-power, pulsed Spallation Neutron Source, with its many high-flux beam lines.

The importance of this new neutron source to the future of condensed-matter and materials research was highlighted in the report *Condensed-Matter and Materials Physics: Basic Research for Tomorrow's Technology*.¹ This report, a copy of which is enclosed, identifies the critical challenges that need to be addressed in order to realize the extraordinary new capabilities emerging in condensed-matter and materials research in the coming decade. High among these challenges is the need to invest in the facilities and infrastructure that are required to provide a world-class research environment.

The report identifies four key challenges facing condensed-matter and materials physics:

1. Nurturing the intellectual vitality of the field;
2. Maintaining a state-of-the-art facilities infrastructure;
3. Improving the integration of research and education; and
4. Developing new modes of cooperation among universities, colleges, government laboratories, and industry.

The report describes the research effort in terms of a hierarchy beginning at the smallest scale with the work of individual investigators and small groups, which is at the core of the research enterprise. The highest level in this hierarchy "is exemplified by major facilities, including synchrotron light sources, centers for neutron-scattering research, and laboratories for high magnetic field studies."²

The principal recommendation of the report in the area of major materials research facilities is that "**the insufficiency of neutron sources in the United States should be addressed in the short term by upgrading existing neutron-scattering facilities and in the long term by the construction of the Spallation Neutron Source.**"³ The authoring Committee on Condensed-Matter and Materials Physics made two other important recommendations on facilities. One addressed the need for stronger support for operations and upgrades at synchrotron facilities. Another pointed out that synchrotron

Board on Physics and Astronomy

2101 Constitution Avenue, NW, Washington, DC 20418

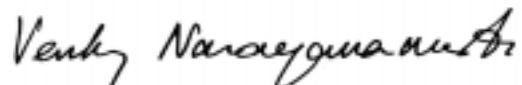
Telephone (202) 334 3520 Fax (202) 334 3575 Email bpa@nas.edu national-academies.org/bpa

and neutron facilities are enjoying broad and increasing use by many disciplines and that the breadth of communities served by these facilities should be considered in providing funding to agencies that support research in these disciplines. The committee made an important distinction between the availability of facilities for synchrotron-light research and neutron-scattering research, pointing out that “. . . we find ourselves with fewer facilities than those judged inadequate by national review committees more than a decade ago. Many of the advances in structural biology, polymers, magnetic materials, and superconductivity depend on access to state-of-the-art neutron-scattering facilities. Without a new neutron source, the nation cannot be competitive in these and other areas of enormous scientific and technological significance. This is an urgent and immediate need, and the committee strongly recommends construction of the Spallation Neutron Source (SNS). Upgrades at existing neutron-scattering facilities are also essential to sustaining neutron-scattering research in the United States during SNS construction as well as to strengthen the field and provide broad access to the user community.”⁴

Sincerely,



Robert C. Dynes, *Chair*
Board on Physics and Astronomy



Venkatesh Narayanamurti, *Chair*
Committee on Condensed-Matter and
Materials Physics

Enclosure: Condensed-Matter and Materials Physics Report

cc: Solid State Sciences Committee
Committee on Condensed-Matter and Materials Physics

¹ *Condensed-Matter and Materials Physics: Basic Research for Tomorrow's Technology*, National Academy Press, Washington, D.C., 1999. This report is part of the series *Physics in a New Era*, which comprises a new survey of the field. One of us (VN) chaired the committee that prepared this report.

² *Op. cit.*, p. 2.

³ *Op. cit.*, pp. 3, 27.

⁴ *Op. cit.*, p. 26.

NOTE: This report has been reviewed by the following individuals chosen for their diverse perspectives and technical expertise in accordance with procedures approved by the NRC's Report Review Committee: William F. Brinkman, Bell Labs, Lucent Technologies; Shirley Chiang, University of California at Davis; Sidney D. Drell, Stanford Linear Accelerator Center; Denis B. McWhan, Brookhaven National Laboratory; and, John J. Rush, National Institute of Standards and Technology.