II. PRINCIPAL FINDINGS AND RECOMMENDATIONS OF THE STEERING COMMITTEE

The central finding of the Steering Committee is that the NSF should create a new program in computational physics, and that recommendation leads the list below. The remaining recommendations treat issues that were identified during the workshop that should be addressed by such a program. Some of those issues are practical, and the associated recommendations treat the barriers to progress that are specific to the modern practice of computational physics. Other recommendations deal with the intellectual challenges that are shared by several subdisciplines. The findings and recommendations are expressed briefly here, and that brevity reflects the consensus in the committee and among workshop participants on these points.

- **I.** Computation is an important tool for research in many of areas of science in general, and physics in particular. The growing use of this tool provides significant opportunities for the NSF, which can best be taken advantage of through the creation of a program in computational science, preferably within MPS or in the Physics Division by itself. Such a program could serve as an exemplar of a broader, NSF-wide initiative.

- **II.** Fields in which opportunities exist range from those that are mature users of computation, such as cosmology, fluid dynamics, plasma physics, and lattice gauge theory, to those in which the use of computation is rapidly evolving, such as accelerator design, biophysics, experimental high energy physics, and numerical relativity.

- **III.** Support for large-scale software projects is critical. It presents different challenges than the support for traditional theoretical studies, and should be one of the distinctive features of the NSF program in computational science, regardless of the scientific discipline.

- **IV.** Collaborations among applied mathematicians, computer scientists, and applications scientists have great potential in a number of areas. The appropriate mix of individuals, and indeed the usefulness of such collaborations, depends upon the particular area of research.

- **V.** A program in computational science could have an important impact on undergraduate and graduate education through the development of innovative methods to employ computation, data analysis, and visualization in instruction.

- **VI.** An NSF program would play a major role in training the next generation of computational scientists for academic and industrial careers.

- **VII.** Support for hardware platforms ranging from desktop machines to terascale supercomputers is needed. A particular challenge is to enable users to migrate to the correct-sized platform for each problem in a straightforward manner.

- **VIII.** A program in computational science could greatly improve the efficiency with which the PACI Program's supercomputers are used by providing grants to large-scale users for the development and optimization of software.

- **IX.** Computers have become essential tools for designing and driving experiments and for data analysis. They thus play at least as important a role in experimental science/physics as in theoretical science/physics.

- **X.** The explosive growth of data, both from large-scale simulations and a new generation of high-resolution detectors, requires a new investment in data analysis and visualization techniques and software.