Snowmass2001: the future of particle physics

The community of particle physicists gathered in Snowmass, Colorado in July 2001 for a vast town meeting where we reflected on who we are and what future we can map for learning about the fundamental nature of the universe. The NPSS joined the American Physical Society (Division of Particles and Fields and the Division of Physics of Beams) to sponsor this three-week workshop. Twenty-seven working groups focused on separate but connected issues of physics questions, experimental design and the accelerators which provide much, but not all, of the particles (usually in beams) that make this research possible.

More than 1200 participants registered for this event, surprising the organizers who had expected about 500 people to attend. Although many came for the full three weeks, others could only spare a few days from busy schedules. Some came to participate in the intense high level discussion of the "big picture" while others, including university, national laboratory and industry participants were persuaded by workgroup organizers to come for discussions of issues of physics or technology for which their expertise was particularly helpful.

NPSS sponsored a Technology Emphasis at Snowmass2001 which added to the events a series of eight lectures by distinguished presenters and a series of twelve technology courses (with thirty presenters) on technologies for detectors, accelerators and computing. The lectures included a presentation by Dr. David Larbalestier of the University of Wisconsin on superconducting materials, including the new magnesium-diboride materials. Dr. Carl Kesselman of USC described progress in developing GRID computing tools to share the massive computing which is now linked by our high speed networks. Dr. Yuan Taur from IBM discussed progress of and limitations foreseen for CMOS scaling, which has provided the exponential growth of computing speed. Dr. James Fleming of Sandia described devices in many materials which can be fabricated using the technology of silicon foundries. Dr. Eric Fossum of Photobit Technology Corp., Dr. Chris Damerell of Rutherford Laboratory and Dr. Zheng Li of Brookhaven provided information on Silicon Pixel devices in conjunction with a one-day course on Silicon Pixel/CCD Tracking Detectors. Dr. Andrei Seryi of SLAC described the issues for accelerator design posed by ground motion. Other courses covered the fundamental magnet, RF, beam detector and other technologies required for accelerators. Detectors for particle physics experiments were covered including an intense one-day course on microelectronics, a course on gaseous micropattern detectors and a precision calorimetry course. More than 350 Snowmass attendees found time for these presentations. Slides from many of these presentations have been preserved on an NPSS website. Follow the links from the conferences/meetings link on the http://ieee-npss.org page or the NPSS Technology link from the http://Snowmass2001.org page. You are encouraged to take advantage of this excellent technology resource. In addition to materials associated with the NPSS efforts, the Snowmass2001 web site will provide access to a large body of work collected there for and from the workshop.

Snowmass2001 will impact both the field of particle physics and the participants in many ways. The intense review of the physics and technology which was carried out, permitted the summary presentations to provide recommendations for a wide variety of future directions for which solid analysis had been performed. The large turnout reflected, in part, a very strong presence of younger physicists who took leading roles in many of the discussions and certainly built ties to a much broader group of physicists. Despite the very large participation and the wide variety of physics issues which were explored, a broad consensus was reported (see, for example, Science, 27 July 2001) that the next major

international project for high energy physics should be a linear electron-positron collider. This will provide impetus for the groups working in the US, Japan and Germany to resolve the technical issues surrounding their proposals while the physics community seeks support for this multi-billion dollar project.

The Committee for NPSS Technology Emphasis at Snowmass 2001 would like to offer our thanks to the Snowmass2001 organizers and to the NPSS Lecturers, Organizers and Presenters who provided outstanding presentations.

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