

Snowmass 2001:

A Summer Study on the Future of Particle Physics

- ▷ A community event organized by the Division of Particles and Fields and Division of Physics of Beams of the American Physical Society
- ▷ Saturday, June 30 – Saturday, July 21, 2001 in Snowmass, Colorado
- ▷ Ron Davidson <rdavidson@pppl.gov> (DPB) and Chris Quigg <quigg@fnal.gov> (DPF) are leading the organization.
- ▷ Every particle physicist is welcome. We expect $\mathcal{O}(500)$ participants.
- ▷ The agenda for Snowmass 2001 will be set by the community, not by the laboratories or the funding agencies. We expect to work constructively with the labs and agencies, and we will call on them for support.

What Is Snowmass 2001?

We conceive of the DPF/DPB summer study as a **very inclusive gathering**, not narrowly focused on one machine or a set of machines, but devoted to the field of particle physics, broadly understood. Our first order of business is to **(re)constitute the community** as we prepare to outline the future program.

We seek to promote **mixing** among theorists, accelerator physicists, and experimenters, **and engagement** among different communities of interest.

We count on **young physicists** to help invent our future.

Why in Snowmass?

- ▷ Accessible location, meeting rooms for plenary sessions and *many* working groups
- ▷ History of successful DPF/DPB summer studies there
- ▷ Synergy with the Aspen Center for Physics
- ▷ Snowmass Assn. very cooperative: e.g., subsidized housing for $\mathcal{O}(50)$ students

We have consulted broadly to formulate Snowmass 2001

- ▷ DPF and DPB executive committees
- ▷ Users organizations from Brookhaven, Cornell, Fermilab, and SLAC
- ▷ North-American physicists working at CERN and DESY
- ▷ Representatives of non-accelerator experiments
- ▷ Representatives of the linear collider, neutrino factory / muon collider, and very large hadron collider communities
- ▷ Other physicists representing diverse backgrounds, interests, and experiences:
nuclear physics community: neutrinos, QCD, ...
- ▷ Particle physicists in the APS Presidential Line (G. Trilling, J. Friedman)
- ▷ Directors of Cornell, Fermilab, and SLAC; CERN, DESY, and KEK
Division Directors of Argonne, Brookhaven, Lawrence Berkeley National Lab
- ▷ Chair of HEPAP; DOE and NSF officials

We have received much encouragement and many thoughtful suggestions.

The Shape of Snowmass 2001

Snowmass 2001 will be devoted to particle physics as a whole

- ▷ Experiments at the highest energies and experiments of exceptional sensitivity; experiments that explore very high scales through virtual effects
- ▷ accelerator experiments and experiments that use natural sources
- ▷ mature subjects and subjects just opening up
- ▷ theory that develops hand-in-hand with experiment and visionary theory that hasn't yet engaged experimental particle physics directly
- ▷ the interplay between particle physics and technology
- ▷ accelerators to address a broad range of scientific opportunities
- ▷ the interaction of particle physics with related fields

At the same time ...

our whole community needs to engage with the idea of a linear collider

Some Goals of Snowmass 2001

- ▷ Undertake a thematic survey of our vision of particle physics and its future in the most ambitious intellectual terms. Examine different scenarios for the new physics landscape. Within this broad vision, identify the questions we want to address over the next two decades.
- ▷ Looking far beyond the standard model to string theory and to clues that the coming precision cosmology might supply, understand what might lead us to identify new energy scales or frame new experimental programs.
- ▷ Consider the range of instruments that might help us achieve our scientific goals. Gain a community understanding of readiness, capabilities, cost, and technical risk. Compare U.S. efforts with those in the rest of the world. Prepare a comprehensive R&D Plan that can provide the options we will need in the near and far term.
- ▷ Educate and energize our community to create the future we want.
- ▷ Engage with the public, and with other scientists.

Some Snowmass History

- ▷ 1982 DPF Summer Study on Elementary Particle Physics and Future Facilities, 28 June – 16 July 1982
 - ▷ 1984 DPF Summer Study on the Design and Utilization of the Superconducting Super Collider (SSC), 23 June – 13 July 1984
 - ▷ 1986 DPF Summer Study on the Physics of the Superconducting Supercollider, 23 June – 11 July 1986
 - ▷ 1988 DPF Summer Study on High-Energy Physics in the 1990s, 27 June – 15 July 1988
 - ▷ 1990 DPF Summer Study on High-Energy Physics: Research Directions for the Decade, 25 June - 13 July 1990
 - ▷ 1994 DPF Summer Study on High-Energy Physics: Particle and Nuclear Astrophysics and Cosmology in the Next Millennium, 29 June – 14 July 1994
 - ▷ 1996 DPF/DPB Summer Study on New Directions for High-Energy Physics, 25 June – 12 July 1996
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The last summer study devoted to particle physics as a whole was in 1990

The International Dimension

Our first obligation to our science, to our colleagues throughout the world, and to ourselves is to establish a vision of what particle physics is and what we hope it can become.

The close integration of the world-wide particle physics community is a source of its diversity, strength, and optimism. We can accomplish much more as a world community than we can region by region.

We are encouraging extensive international participation in Snowmass.

We will produce three documents for the community

- ▷ A brief and illustrated **thematic survey** of what particle physics is and aspires to be, guided by the scientific imperatives.

Comment: Documents proceeding from broad scientific goals to specific questions and then to instruments and technology development have been used to excellent effect by NASA. We will produce the thematic survey in final form at the summer study, *with professional help*. It should exist in several formats (printed page, web site, seminar materials, etc.), and in versions for different audiences, including the physics community and the wider public.

We will seek financial (and other) support for this activity

... three documents for the community

- ▷ A coherent **accelerator R&D plan** giving—in very broad terms—the needed work, time scales, and levels of effort required to bring us to the point of deciding about different future instruments.

Comment: This document can accomplish several important goals: it will provide a rich timeline of possibilities, with different and overlapping time scales; **it will show the importance of preparing possible futures while acting in the present;** and it offers all the project constituencies the chance to win something, instead of creating an all-or-nothing, either/or environment.

We are all in this together.

... three documents for the community

- ▷ A more detailed, but still < 100-page “white paper” on the field in all its richness and potential.

Comment: In the spirit of the 1994 DPF Committee on Long-Range Planning Report, this document can capture our community’s sense of itself. Organized around scientific and technical goals, rather than laboratory programs, it can serve as important backdrop for future policy decisions.

Work carried out by individuals and working groups for the Summer Study will be reported in the *Proceedings*. We can include working documents or project status reports on a CD-ROM, and on the web. *We will explore innovative ways to publish the work of Snowmass 2001.*

Educating Ourselves

To broaden community involvement in issues that are important for the future of particle physics, we plan a small number of *teach-ins* that we hope will draw everyone at Snowmass

- ▷ How *You* Can Contribute to Accelerator R&D
(perhaps the first Tuesday afternoon)

...

...

We welcome your ideas for other topics

Education & Outreach at Snowmass

We plan an energetic and diverse program of outreach and education while in Snowmass, to reach the population of Aspen, Snowmass, and surrounding communities, and to display to all of us the many approaches to outreach our colleagues have put into practice.

- ▷ Public lectures and events; online event displays; Particle physics on the mall
- ▷ Extensive air shower detectors at high schools
- ▷ (Particle) Physics activities in day camps
- ▷ Teacher training (Quarknet?)
- ▷ **Inreach?** What's hot in other fields; how others see us.

“Science Weekend” in Snowmass, July 7/8, 2001

Education & Outreach ...

Goal: no one who passes through the Roaring Fork Valley during Snowmass 2001 will fail to learn something about particle physics!

Elizabeth Simmons <simmons@smyrd.bu.edu> (Boston U.) has agreed to lead a coordinating committee ...

We welcome your ideas.

We will seek support from DOE & NSF, URA, APS, local sources, etc.

Other Particle Physics Events in Summer 2001

- ▷ 2001 Particle Accelerator Conference, 18 – 22 June 2001, Chicago, Illinois
 - ▷ 4th Edoardo Amaldi Conference on Gravitational Waves (Amaldi 2001) 7 – 12 July 2001, Perth, Australia
 - ▷ International Conference on High Energy Physics of the European Physical Society 12 – 18 July 2001, Budapest, Hungary
 - ▷ 16th International Conference on General Relativity and Gravitation (GR16) 15 – 21 July 2001, Durban, South Africa
 - ▷ 2001 international Conference on Lepton–Photon Interactions 23 – 27 July 2001, Rome
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We could not avoid the overlap with the EPS HEP Conference in Budapest. I have conveyed to the organizers our apologies and our good wishes for the success of the conference.

Next Steps

- ▷ Tell us *your ideas* about working groups, teach-ins, outreach, ...
- ▷ We are forming a small steering committee, plus a coordinating group for outreach and education
- ▷ We will establish a (first set of) working groups by the beginning of the academic year

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These transparencies at

<http://lutece.fnal.gov/Drafts/SnowmassDPFtalk.pdf>

**Snowmass 2001 will be open to all,
but we invite you to**

Join the American Physical Society

**... and the Division of Particles and Fields
and/or the Division of Physics of Beams**

Voices for the HEP community

<http://www.aps.org/memb/joinaps.html>