

Update on Snowmass 2001

Ronald C. Davidson

Chris Quigg

Co-Chairs, Snowmass 2001

Organizing Committee

High Energy Physics Advisory Panel Meeting

Gaithersburg, Maryland

March 26-27, 2001

Snowmass 2001

- A community events 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.
- **The entire HEP community is welcome.** We expect 500 participants.
- The agenda for Snowmass 2001 is being set by the community.
- We are working constructively with the laboratories and the science agencies.
- Significant international involvement is being encouraged.

Snowmass 2001 Organizing Committee

Particle Physics

Chris Quigg(DPF)

Sally Dawson (BNL)

Paul Grannis (Stony Brook)

David Gross (ITP/UCSB)

Joe Lykken (Fermilab)

Hitoshi Murayama (Berkeley)

Rene Ong (Chicago→UCLA)

Natalie Roe (LBNL)

Heidi Schellman (Northwestern)

Maria Spiropulu (Chicago)

Accelerators & Technology

Ron Davidson (DPD)

Alex Chao (SLAC)

Alex Dragt (Maryland)

Gerry Dugan (Cornell)

Norbert Holtkamp (Fermilab)

Chan Joshi (UCLA)

Thomas Roser (BNL)

Ron Ruth (SLAC)

Jim Strait (Fermilab)

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, costs, and technical risks of various accelerators proposed around the world. Articulate the accelerator R&D needed for near-term and longer-term projects.
- Explore fundamental research in accelerator physics and technology that will be needed to address our longer-term scientific goals.
- Educate and energize our community to create the future we want.
- Engage with the public, and with other scientists.

Snowmass 2001 will explore particle physics as a whole

- Experiments at the highest energies and experiments of exceptional sensitivity; experiments that explore very high scales through virtual effects.
- Accelerators to address a broad range of scientific opportunities; accelerator research—including its historical importance—to provide information for knowledgeable decisions about future projects, and accelerator research and technology development for the long term.
- Theory that develops hand-in-hand with experiment and visionary theory that hasn't yet engaged experimental particle physics directly

Including...

- Accelerator experiments and experiments that use natural sources (land, sea, and sky)
- Mature subjects and subjects just opening up
- The interplay between particle physics and technology
- The interaction of particle physics with related fields...

**The core of Snowmass—as usual—will be the work of individuals and working groups on scientific and technical issues...
...but the times and our situation demand additional special efforts:**

- Important involvement of students and young physicists
 - Subsidized housing for 50 students
 - Young physicists throughout the organization
- Educating ourselves: **teach-ins** on
 - Opportunities for accelerator research
 - Experimental implications of string theory?
 - The role of nonaccelerator experiments in particle physics?
- Educating ourselves: **IEEE/NPSS technology school**
 - Short courses and lectures on advanced technologies sponsored by IEEE Nuclear & Plasma Sciences Society

Snowmass 2001 Accelerator Working Groups

- Muon-based systems (McDonald, Sessler).
- Electron-Positron circular colliders (Oide, J. Seeman, Henderson).
- Linear colliders (Brinkman, Toge, Raubenheimer).
- Hadron colliders (Peggs, Syphers).
- Lepton-hadron colliders (Ben-Zvi, Hoffstaetter).
- High-intensity proton sources (Chou, J. Wei).

Snowmass 2001 Accelerator Physics/Technology Working Groups

- Interaction regions (Markiewicz, Pilat).
- Magnet technology (Gourlay, Kashikan).
- RF technology (Holtkamp, Adolphsen, Padamsee).
- Particle sources (Sheppard, Mokhov, Werkema).
- Beam dynamics (Blaskiewicz, K.-J. Kim, S.Y. Lee).
- Environmental control (Bialowons, Laughton, Seryi).
- High-performance computing (Ko, Ryne).
- Advanced acceleration techniques (Joshi, Sprangle).
- Diagnostics (Pasquinelli, Ross).

Snowmass 2001 Physics Issues

Working Groups

- Electroweak symmetry breaking (Carena, Gerdes, Zerwas).
- Flavor physics (Gavela, Kayser, McGrew, Rankin).
- Scales beyond 1 TeV (Dine, Hewett, Landsberg, Miller).
- Astro/cosmo/particle physics (Akerib, Carroll, Kamionkowski, Ritz).
- QCD and strong interaction (Flaugher, Kinney, Mackenzie, Stermann).

Snowmass 2001 Experimental Approaches Working Groups

- Neutrino factories and muon colliders (Barger, Harris, Kuno, Zeller).
- Electron-positron colliders below the Z mass (Shipsey, Yamamoto, Butler).
- Linear colliders (Battaglia, Jaros, Wells, Hinchliffe).
- Lepton-hadron colliders (Baur, Brock, Marciano).
- Fixed-target experiments (Kumar, Ray, Reimer).
- Astro/cosmo/particle experiments (McKay)...
- Particle physics and technology.

Special effort...

- Education and outreach

We plan an energetic and diverse program of out reach 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
- Physics vans
- Extensive-air-shower detectors at high schools
- (Particle) Physics activities in day camps
- Teacher training (Quarknet + local teachers)

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

Snowmass 2001 Outreach Coordinating Committee

Elizabeth Simmons (Boston University)

Marge Bardeen (Fermilab)

Martin Berz (Michigan State)

Bill Frazer (Aspen Center for Physics)

Evalyn Gates (Chicago & Adler Planetarium)

Joey Huston (Michigan State)

Ronen Mir (Sci Tech)

Mel Month (Brookhaven)

Helen Quinn (SLAC)

Deborah Roudebush (Quarknet teacher, Virginia)

Greg Snow (Nebraska)

Ken Taylor (Quarknet teacher, Texas)

Jeff Wilkes (Washington)

We will produce three documents for the community

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

Comment: Documents proceedings 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.

...three documents for the community

- 2) A survey of **accelerator research and development**
 - a) highlighting the historical importance of accelerator R&D to our field, and to science and society at large;
 - b) giving — in broad terms — the information that will be required for informed decisions about possible future accelerator projects;
 - c) making the case for accelerator R&D not connected with specific projects.

Comments: This document can accomplish several important goals. It will provide perspectives on future possibilities and on the importance of preparing for these futures, and it will make the case for all the important R&D activities.

...three documents for the community

3) 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.*

Snowmass 2001 Needs You!

- Begin investing in your future.
- Come to Snowmass!

We especially welcome younger physicists and advanced students.

- Be an active participant! Sign up for a Working Group.
- Help us create an atmosphere of inclusion and optimism
—a sense of community.
- For more information, consult <http://snowmass2001.org>.