

Statement by the Snowmass Physics Groups

- Great new discoveries in particle physics and cosmology have vastly improved our understanding of the universe. Recent experimental results and theoretical developments strongly suggest that even greater discoveries are close at hand.
- Among the outstanding issues to be addressed are:
 - the origin of electroweak symmetry breaking
 - the potential unification of the fundamental forces, including gravity
 - the elucidation of neutrino masses and mixing
 - the origin of CP-violation and the nature of flavor
 - the physics of quark and gluon production and confinement, and the phases of QCD
 - the nature of dark matter and dark energy, and the cosmology of the early universe.
- No single type of facility can illuminate all of these fundamental issues. Maintaining a diverse program is crucial for deciphering the basic laws of nature.
- Strong support for existing experimental research, including the Tevatron, the B-factories, and the Large Hadron Collider programs, particle astrophysics and cosmology, and the physics of heavy flavors, neutrinos and rare decays, is critical for the continuing success of US particle physics. Theoretical research in support of these experimental programs is essential.
- There are fundamental questions concerning electroweak symmetry breaking and physics beyond the Standard Model that cannot be answered without a physics program at a Linear Collider overlapping that of the Large Hadron Collider. We therefore strongly recommend the expeditious construction of a Linear Collider as the next major international High Energy Physics project.
- Forthcoming discoveries will point the way for future exploration of new frontiers. It is therefore essential that an aggressive R&D program be pursued to develop the needed facilities and associated technologies. These include new energy-frontier hadron and lepton colliders and detectors, neutrino superbeams and factories, large underground detectors, and space- and ground-based astrophysical experiments. Future large-scale projects should involve extensive partnerships of the international community.