



EPP2010 Report

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EPP Decadal Survey

- U.S. National Academy of Science reviews each field of physics every ten years
- Most recent survey of Elementary Particle Physics was completed in 1998
- But since then, much has changed
 - Discovery of Dark Energy
 - Connections with Astronomy
 - Discovery of Neutrino Mass
 - Connections with Nuclear Physics
 - Precision Electroweak Measurements
 - World consensus on Linear Collider



EPP Decadal Survey

- A new Survey is needed to
 - Lay out the grand questions that drive the field
 - Find the opportunities that are ripe for discovery
 - Identify the tools to achieve the scientific goals
 - Articulate the connections to other sciences and to society at large
 - Foster collaborations with scientists around the globe
 - Recommend a realistic implementation plan



EPP2010 Charge

- The Committee is charged to
 - Identify, articulate, and prioritize the scientific questions and opportunities that define elementary particle physics
 - Recommend a 15-year implementation plan with realistic, ordered priorities to realize these opportunities
- Emphasis on ranking science priorities
 - For the Committee, and for LCWS, the Linear Collider looms large



Committee Members

- N. Augustine (Lockheed Martin)
- J. Bagger (JHU) BPA Liaison
- P. Burrows (London)
- S. Dawson (BNL) *Vice-Chair*
- S. Faber (UC Observatories)
- S. Freedman (UC Berkeley)
- J. Friedman (MIT)
- D. Gross (UC Santa Barbara)
- J. Hezir (EOP Group)
- N. Holtcamp (ORNL)
- T. Kajita (Tokyo)
- N. Lane (Rice)
- N. Lockyer (Penn)
- S. Nagel (Chicago)
- H. Quinn (SLAC)
- R. Patterson (Cornell)
- C. Shank (LBNL)
- H. Shapiro (Princeton) *Chair*
- P. Steinhardt (Princeton)
- H. Neal (Michigan)
- H. Varmus (MSK)
- E. Witten (IAS)



Not your Usual Committee

- Non-physicists
 - Strengthen our connections with society at large
 - Sharpen our physics questions
- Non-particle-physicists
 - Help us engage other scientific communities
- International representation
 - Place U.S. particle physics in an international context
- Overall goal: To present a compelling vision for our field and to create an action plan that will allow us to achieve our goals



Work Plan

- 1st meeting in Washington, Nov 30 - Dec 1, 2004
- 2nd Meeting at SLAC, Jan 30 - Feb 1, 2005
- 3rd Meeting at Fermilab, May 16 - 17, 2005
- 4th Meeting at Cornell, Aug 2 - 3, 2005
- Goal: Report by Dec, 2005

Also: Field trips to CERN, DESY, KEK, as well as letters to ACFA, ECFA and ICFA



Washington Meeting

- Physics Presentations
 - Chris Quigg, Joe Lykken, Persis Drell
- Agency Perspective
 - Michael Turner, Robin Staffin
- Prioritization
 - Pat Looney, Chris McKee, Abe Seiden, Barry Barish
- DPF Town Meeting
 - Community Representatives



SLAC Meeting

- LHC / LC Physics
 - Ian Hinchliffe, Hitoshi Murayama, JoAnne Hewitt
- Flavor Physics
 - Bob Cahn, Boris Kayser
- Astrophysics
 - Steve Kahn
- DPF Town Meeting
 - Community Representatives



Fermilab, Cornell Meetings

- Fermilab
 - Accelerator-based program
 - International perspective
 - Halliday, Totsuka, Wagner
 - Selected topics in nonaccelerator physics
 - DPF Town Meeting
- Cornell
 - Connections to astronomy and astrophysics
 - International perspective
 - Aymar
 - DPF Town Meeting



Reflections

- The Committee is coming together nicely
 - Outsiders are receiving tutorials from insiders
 - Insiders are receiving tutorials from outsiders
- The Committee is asking the right questions
 - The community had better be able to answer them!
 - The outsiders see through cheap and easy answers
- The Committee's leadership is outstanding
 - They are taking their responsibility very seriously



Questions

- The Committee is posing questions to the community
 - First set: Linear Collider
 - Second set: Neutrinos, Astrophysics, Cosmology ...
- It invites written comments to epp2010@nas.edu
 - All communications are public. Click on
 - www.nationalacademies.org/bpa/EPP2010.html
- The Linear Collider community has an important role to play ...



ILC Questions: Physics Case

- How does a Linear Collider address the compelling questions of particle physics? Is a Linear Collider clearly the right machine to address these physics objectives?
- What physics does a 500 GeV Linear Collider address? What are the arguments for going to an energy scale of 1 TeV? How would results from the LHC change these arguments?
- What are the physics arguments for operating a Linear Collider during the same time frame as the LHC?
- How would the combination of the LHC and a Linear Collider answer questions that could not be addressed by either machine alone?
- What physics would a Linear Collider address that would be impossible to probe at the LHC?
- How would the physics discoveries from experiments at a Linear Collider be useful to other branches of science?



ILC Questions: R&D Plan

- What general R&D is required to arrive at a construction decision and about how much would it cost? What is the relative difference in R&D cost between a 500 GeV and a 1 TeV Linear Collider?
- What are the characteristic time frames and constraints for a R&D program that leads to a construction decision?
- What are the greatest technological risks?
- How would decisions about the necessity of different R&D paths be made?
- How could the R&D be useful even if the ILC did not proceed to implementation?
- Is it possible to give a reliable estimate of the overall cost of the project?
- Does the U.S. accelerator science community have the capacity and capability to do the work necessary to make a bid to host a Linear Collider?



ILC Questions: International Planning

- How would a Linear Collider be managed and operated in the context of an international laboratory?
- How can the U.S. funding mechanisms (with yearly budget decisions) connect with a long term international project?
- How would cost overruns be handled?
- What is the model for distributing the costs between the host country and other participants?
- What arguments can be made for hosting an International Linear Collider in the United States?

The Committee needs to develop crisp and clear answers to these questions. It is asking for your help!