



ILC detector efforts at Fermilab

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Last minute effort, so apologize if I miss things!!

The Bigger Picture at Fermilab



Mike Witherell gave a colloquium yesterday:

"The International Linear Collider and Fermilab"

Have most relevant slides, removed all the "history, how did we get here" slides

Colloquium very well attended, 1 WEST was full and overflow in cafeteria. Video streamed version available

Next week special "Wine & Cheese", Sept 24:

Steve Holmes and Shekhar Mishra will outline more concrete plans for the future

Fermilab in 2020

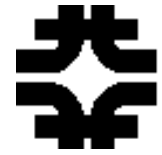


- The overarching vision for Fermilab in 2020 is that it will be the primary site for particle physics accelerators in the U.S.
- The most favorable outcome for particle physics is that a linear collider is built within a short distance from here by an international collaboration of laboratories.

Vision I: FNAL in 2020 hosting the Linear Collider

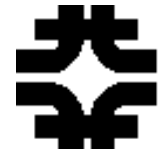


- Linear Collider in operation near Fermilab
 - Fermilab at the center of future discoveries and understanding
 - Major part of Lab activity
- Neutrino Program
 - Based on improvements to the accelerator complex and the experiments over the next ten years
- Large Hadron Collider Program
 - Accelerator and experiment: Fermilab leading center for CMS physics
- Other experiments at FNAL
 - As physics demands
 - Quark Flavor may still be key
 - Other programs
- Astroparticle physics, Accelerator R&D
- Non-particle science



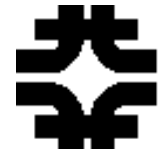
Implications for Fermilab of the Technology Decision

Fermilab and the ILC



- Large HEP laboratories will anchor the design and associated R&D effort on the ILC...
 - DESY, Fermilab, KEK, SLAC will take the lead. (Fermilab has had the smallest effort until now, but will build up, concentrating on SCRF.)
 - CERN is focusing on LHC for now, may do more later.
- but many other institutions will be lending intellectual and technical strength to the effort.
 - In the US., for example, Cornell, LBL, LLNL, BNL, ANL, JLab, and several universities will contribute.
- Fermilab and SLAC will share the leadership of the U.S. effort on the ILC.

Fermilab's role in light of the technology decision



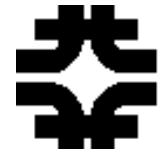
- Fermilab has presented publicly its vision for the future as developed within the Fermilab Long Range Plan:
 - host lab for an internationally constructed and operated Linear Collider;
 - home to a world-leading neutrino program
- Fermilab will now grow the ILC effort.
 - We can double effort quickly, grow from there.
 - We have submitted a bid to host the GDI/CT
- We continue to express our desire to be host laboratory for the ILC.

Fermilab's role in light of the technology decision



- Fermilab expressed publicly
 - that we were committed to significant ILC participation independent of the technology chosen;
 - that an advantage of the cold technology would be the opportunity for an integrated approach to the two possible futures in the Fermilab long-range plan;
 - that in the event of a cold decision Fermilab would be ready and able to assume the leadership role in establishing a U.S. collaboration to push the SCRF development under the aegis of an international LC organization.
- Fermilab will now follow through on that commitment.

Fermilab as a site for the ILC



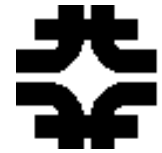
- Fermilab has unique advantages as a site.
 - best option for a site nearby an operating HEP lab
 - large supply of trained and talented people
 - very good geology
 - modest power and construction costs
 - central location(!)
- The particle physics community is coming to the conclusion that the best opportunity for building the ILC is near Fermilab.

Fermilab Plans



- Establishment of US-based capability to design, build, and test SC accelerating structures
 - Superconducting Module Test Facility in MEast will serve linear collider, proton driver, and light source R&D needs
 - The ILC goals and detailed design will emerge from discussions with national and international partners.
- Areas of Fermilab involvement in ILC (entering a period of discussion with international partners)
 - lead role in building an engineering test facility for major linac systems, meeting needs of global ILC effort
 - possible role in several other subsystems
 - detector R&D and test beam work
- Bid to host
 - siting and civil studies
 - public outreach

Fermilab ILC Efforts to Date



- NLC
 - X-band structures fabrication
 - 5 of the 8 structures at successful NLCTA test were built by Fermilab
 - Civil/siting studies
- SCRF
 - Operation of 15 MeV photoinjector (identical to TTF injector)
 - SCRF cavity development for FNPL and CKM
- Extremely talented scientific & engineering group in place with ability to work on warm or cold structures

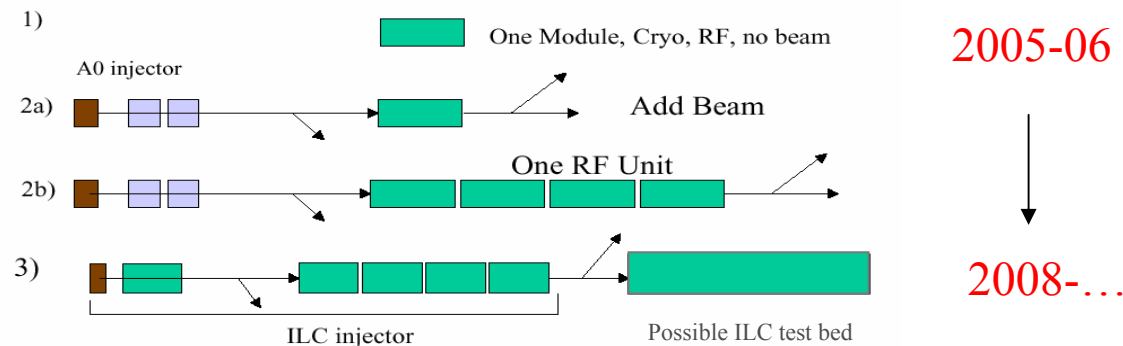


⇒ **Bottom line: By redirecting x-band and focusing SCRF more strongly on ILC Fermilab can effectively double resources in FY05.**

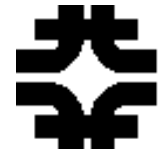
Fermilab Plan



- It is essential to establish U.S. capability in the fabrication of high gradient SRF structures.
 - Fermilab commitment to provide U.S. leadership following cold decision
- Focus has been on a test facility at Fermilab (aka SMTF—Superconducting Module Test Facility).
 - Interested partners: ANL, BNL, Cornell, FNAL, JLab, LANL, LBNL, MIT, MSU, ORNL, SLAC
- Concept of a possible evolution:



Detectors for the Linear Collider



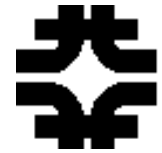
- It is also time to get serious about detectors for the linear collider.
- The Worldwide Study of Physics and Detectors for Future Linear e^+e^- Colliders has been leading this effort, but it is becoming more focused.
- Fermilab involvement (examples)
 - Andreas Kronfeld is a member of the International Organizing Committee.
 - Slavek Tkaczyk and Gene Fisk lead the LC Physics and Detector Study Group in PPD-EPP
 - Harry Weerts and John Jaros are coleading the Silicon-based detector design study.
 - Meson Test Beam Facility (Eric Ramberg)
- Talk to them to see how to get involved.

The Present Fermilab Physics Program



- The existing proton accelerator complex makes possible a very exciting physics program over the next decade.
 - Run II physics program with $4-8 \text{ fb}^{-1}$ for each detector by 2009
 - Neutrino physics program with the NuMI beam (startup in early 2005!) and the Booster neutrino beam
 - BTeV program: next generation in quark flavor physics from 2009-13
 - smaller experiments using slow extracted beam
- Strong program of experiments offsite
 - LHC program: US-CMS and LARP
 - Astroparticle physics program: SDSS, Auger, CDMS, and more

Summary



- Fermilab's vision for its future is to be the home of the primary accelerators for particle physics in the U.S.
- Fermilab's vision for U.S. particle physics is that it should have a central role in the worldwide program to take full advantage of the scientific revolution ahead of us.
- The fullest realization of these hopes would be the construction of the International Linear Collider near Fermilab by a global consortium of particle physics laboratories.
 - We must do what we can to make this possible.
 - We also must get the most science we can from the evolving program with the proton accelerator complex.

Finally



- Fermilab has the opportunity to help lead the particle physics community to a new era of discovery:
 - LHC and ILC exploring physics at the TEV scale
 - Worldwide exploration of neutrino mysteries and quark flavor physics
 - Understanding the nature of dark matter and dark energy
- We must put this exciting possibility forward to our government and society and ask for their support.

Discussion after colloquium



- No real opposition
- Interaction with local businesses and communities. Is there a plan ?
- Funding in 2005 and 2006
- Interaction between proton driver and ILC ? When will there be a decision. Witherell: pursue equally for next 2 years
- Time line. Can Fermilab meet time line if comes here ?
- Access to site if in US?
- Witherell: complication, but need special treaties
- Will there be a central ILC organization in lab (over divisions) ?
- Witherell: no it will be in Technical Division. Not everybody happy

ILC detector efforts at FNAL 1

It obviously needs to grow..... Reason why I am here.....

Historically
there was:

Muon system R&D (*Fisk*)
Some electronics (ASIC R&D)...one ASIC
now (*Tkaczyk*)
Initial interest in tracker layout for SiD (*Cooper, Demarteau*)

My vision is to expand on this and over the next few months make this effort grow, using SiD design study as the area where work can and needs to be done.

Also collaboration with SLAC is extremely important to show that this is really a global effort (start small). Smooth interaction between and coherent direction from SLAC and FNAL are necessary ingredients for this to succeed.

ILC detector efforts at FNAL 2

nothing happens overnight

Establish office space in High Rise and IB2 for detector effort (including visitors)..... in progress on 13th floor (GF, CM, HW +)

Computing: Now have a liaison for ILC computing in Computing Division, which is G.P. Yeh
Provide help and support for NIU simulation effort

Silicon efforts on layout structure/support of tracker will continue and grow (talk tomorrow)

Muon system seems well covered; FNAL pursuing scintillator, not favored by everybody..... but things are happening (G. Fisk & C.Milstene).

Electronics group (W.Wester) getting involved: part of ANL HCAL effort already. This morning meeting at NIU: support for testbeam and longer term work on integrated solution for scintillator HCAL (mechanical & electrical).

ILC detector efforts at FNAL 3

First contact with PPD mechanical engineering group. Interested and willing to work. Overall detector drawings (virtual image + real), detector support etc. Actually anxious to build something.....

Getting involved in testbeam effort: building stand, improve beam line

SiD solenoid: starting collaboration with Saclay. First video meeting in next two weeks and Kirchner coming to FNAL in November. Engineering group at FNAL work on this.

Provide support and get involved/participate in ILC activities around FNAL: *NIU and ANL in HCAL and simulations. Others ?*

Get more people involved in SiD

Are writing short proposal to outline these activities for FNAL management

Miscellaneous for SiD



Phone call with Siegrist: simulation and vertex involvement at LBL
Make sure we do not just simulate SiD.....
Labs have to provide direction and framework for simulation so
univs can use it

ECFA04 went *well* for SiD concept, obviously a lot of overlap
between R&D groups and design studies.