Report on Fermilab Activities TESLA Collaboration Meeting

Don Edwards

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- Study of TESLA Design
- Restoration of the Photoinjector as FNPL
- Injector Studies
- Flat Beam Experiment
- Superconducting RF
- Polarized RF Gun
- Global Accelerator Network
- Future Possibilities

Study of TESLA Design

With the publication of the TESLA TDR, there is a natural opportunity for US collaborators and other interested parties to study and understand the TESLA proposal.

The purposes of the study are:

- to gain understanding of the overall TESLA design as a combined linear collider and synchrotron radiation source facility,
- to map insofar as possible TESLA cost figures into usual US terms.
- to begin a look at an alternative US siting,
- and, to examine R&D suitable to advance the proposal.

Fermilab/NICADD Photoinjector Laboratory (FNPL)

About one year ago, the Northern Illinois Center for Accelerator and Detector Development (NICADD) was formed. Fermilab and NICADD joined to form FNPL, and the intention to shut down the photoinjector became a thing of the past.

Progress in recovery from loss of personnel is very promising. Now there are two new graduate students (Yin-e Sun, Rodion Tikhoplav), Court Bohn of Fermilab is assisting Helen in laboratory management, and a DESY physicist (Kai Desler) has joined FNPL for two years. Fermilab support has broadened, and facility improvements are underway.

Injector Studies

- Improvement of laser performance (Santucci, Tikhoplav, Wang),
- QE and dark current variation (Hartung, Finley),
- Booster cavity transfer matrix (H. Edwards, Bohn, Sun plus summer students),
- Streak camera measurements of laser beam, bunch compression (Barov).
- Beam position monitor commissiong is underway (Prieto).

Flat Beam Experiment

- The experiment has resumed, though not yet with conditions of mid-2000,
- LBL people have joined the initial DESY, FNAL, Frascati collaboration due to interest in femtosecond X-ray source,
- Currently trying to stretch laser pulse back to and beyond last year's situation.

Superconducting RF

- Fermilab experiment CKM has been approved; RF separated kaon beam proceeds.
- A number of 3.9 GHz deflecting mode cavities (1 to 5 cell) have been tested; though not yet up to DESY standards, this is a significant beginning.
- The first 13-cell structure has been fabricated and needs to be tuned.
- Infrastructure is improving. A high pressure rinsing system is in use at Fermilab, and discussions with ANL have resumed concerning chemistry.
- Preparation of bid package for potential structure suppliers is underway.

Polarized RF Gun

A high-emittance ratio (flat) beam produced from the source is not enough; the electrons should be polarized as well. This is not easy, therefore:

- an ICFA Workshop on Polarized RF Guns for Linear Colliders was conducted at Fermilab on 18-20 April of this year,
- the summary report of the Workshop concurs that this would not be a trivial undertaking,
- anytime I hear that 10^{-12} Torr is needed just to start, I get worried,
- but all that does not mean we give up.
 Formulation of a proposal needs to be undertaken.

Global Accelerator Network

This subject is timely and can be conducted at minimal cost. Though stated in a more demanding long term context in the TDR, we have made remote-involvement tests among FNPL, DESY, and LBL. Various studies such as injector characterization and flat beam behavior can derive immediate benefit from online participation and this activity will be immediately pursued. At the risk of criticism for oversimplification, I suggest that there are three directions in order of ascending cost for the future involvement in the TESLA collaboration related activity at Fermilab worth consideration:

- 1. SMALL–Continuation of photoinjector characterization; this is underway.
- 2. MEDIUM–Design and construct 3.9 GHz accelerating mode structures.
- 3. LARGE–Build at Fermilab, with help of the collaboration, a 150 MeV scale photoinjector (i.e., Injector III) suitable for a linear collider.