international linear collider

ILC-Americas
FY10 Work Package
Technical Progress Report

Laboratory: ANL
Work Period: September 1, 2009 to March 31, 2010

Argonne has assumed work in the following WBS elements:

1.1.1 GDE&ART Program Management
1.5.1 Accelerator Physics
1.8.1 Global Controls
1.10.4 Cavity Processing and Vertical Testing
1.10.5 Cavity Gradient R&D

ANL ART Program Management (WBS 1.1.1)

This is a level of effort work package in which Argonne has made available John Carwardine to the GDE &ART Program Management at the 100% level.

Accelerator Physics @ ANL (WBS 1.5.1)

Regarding Positron Production

1. We did the end to end simulation using the Reference Design Report (RDR) undulator with QWT and 0.4X0 Ti target under drive beam with energy from 50GeV up to 250GeV.
2. We studied the polarization dependence on collimators for RDR undulator with 200GeV and 250GeV drive beam.
3. We evaluated the impact of undulator angular errors on yield and polarizations. Based on our study, the angular errors of the undulator on the yield and polarization is ignorable.
4. We studied the yield and polarization dependents on K for 250 GeV drive beam by sweeping through the K factor from 0.3 - 0.9 with different FC and QWT configuration.
5. We studied the energy deposition for Ti and W and made a detailed comparison between them.

6. We simulated a radiation damage experiment which propose to use FLASH beam for a test that to determine the radiation damage threshold for Ti target or Tungsten. This provided a basis for a possible experiment at ESY.
7. We calculated energy deposition for the auxiliary source using 500 MeV drive beam with the undulator target, to yield 1 or few percent of intensity.

Toward the latter part of the 2nd quarter Argonne began in involvement with the electron could effort at Cornell.

- Learned how to run and compile the code synrad3d written by David Sagan at Cornell. The code computes the synchrotron radiation photon absorption as a function of 3D chamber geometry including photon specular reflection.

- Developed a draft R&D plan for future work to study the physics of synchrotron radiation and photoemission, test synrad3d, and perform synrad3d calculations at the locations of specific electron cloud detectors (retarding field analyzer -- RFAs) in CesrTA.

ANL Global Controls (WBS 1.8.1)

- ANL Controls effort has focused on tools for accessing and analyzing FLASH 'DAQ' archive data that was collected during the FLASH 9mA studies in September 2009. ANL is collaborating with DESY controls group on development and upgrades to the FLASH DAQ archiver and data analysis tools.

- Two ANL Controls experts participated in the Workshop on Linac Operations with Long Bunch Trains at DESY, which was focused on the FLASH 9mA studies performed in September 2009. ANL co-led the Working Group on DAQ and Data Analysis.

- ANL has initiated development of a new java-based data browser application for the DAQ data, which is motivated by the need to rapidly review 9mA data and is also expected to be put into routine use for FLASH operations for FEL users as well as for future 9mA studies.

ANL Cavity Processing and Testing (WBS 1.10.4)

- ANL is performing routine EP operations for all 1.3 GHz cavity types (single-cell, 9-cell long and short types).
- A dozen single and nine cell electropolish procedures have been performed so far in calendar 2010.
- Two full-time staff have been trained to support full time operations
- Single cell cavities are routinely testing at 35-40 MV/m at Fermilab

- Nine cell cavities tested thus far are mostly in the range of 30-35 MV/m

ANL Cavity Gradient R&D (WBS 1.10.5)

- A full installation and several engineering cooldowns of the large new 2 Kelvin test cryostat have been completed
- A single-cell cavity provided through the ANL/FNAL collaboration has been cooled down and tested
- A second sound system based on germanium resistance thermometers has been successfully operated with the new cryostat