LC Test Beam Activities

ALCPG09 @ UNM

Oct. 3, 2009

Jae Yu

- Had two sessions: facilities and detectors
- Compilation of talks given by: E. Ramberg, J. Jaros, K. Kotera, C. Mariñas, R. Settles, L. Xia and P. Robunov

US Facilities

- FNAL
  - Meson Test Beam Facility
    - Well utilized with E Hadron beam line (>=1GeV)
    - Extreme low E (~300MeV) tertiary beamline to be available Nov. 2009
    - ILC like beam structure, 1ms ping + 199ms blank
    - Two new pixel telescope systems and a new TOF system
  - Meson Center Test Beam Facility Proposal
    - To provide momentum tagged neutral hadron beam
    - To be reviewed on Oct. 9
- SLAC
  - ESA Test Beams interrupted due to construction of LCLS
  - End Station Test Beam facility proposal submitted to DOE
    - Parasitic test beam extractions using a kicker magnet on LCLS

European Facilities

- CERN:
  - PS: 5 areas with max E up to 3.5 GeV to 24 GeV
  - SPS: 4 areas with max E range up to 400 GeV
- No changes in test beam facility schedule expected in 2010 ➔ At this point all facilities will be available as they have been in the past
- DESY Test beam facility w/ 1 – 6 GeV e
  - Test area 21: EUDET Pixel telescope
  - Test area 24: EUDET TPC Testing with large bore (1m dia) solenoid
  - DESY test beam to run throughout 2009 and 2010

Facilities: Asian and Russian

- KEK FTBL: One beamline w/ 0.4 – 3.4 GeV e
  - To be shut down for 3 years from 12/09 for KEKB upgrade
  - Future operation not yet decided
- JPARC: One beamline w/ 0.5 – 1.1 GeV hadrons
  - Funding secured and PAC endorsement on 6/09
  - Scheduled to complete mid 2010
- IHEP Beijing: 3 areas 0.4 GeV – 1.5GeV
  - Shut down 2008 – 2010 for upgrade
- IHEP Protvino: 8 beam lines with electrons up to 34 GeV and hadrons up to 50 GeV
  - Available 2 mo/year

Summary of TB Facilities

Facilities	Particles	E-ranges	Availability
FNAL MTBF	p, K, □, ⌠, e	E = 1 – 80 GeV E_p< 120 GeV	Present and Continued
CERN (PS/SPS)	p, K, □, ⌠, e	E<400	Present and Continue
DESY	e^+, e^-	0.5 – 6 GeV	Present and continued
IHEP-Protvino	had, e, μ	E_e< 45 GeV E_h=33 – 45 GeV	Available 2mo/yr
SLAC–ETSB	©, e^+, hadrons	E_h< 13.6 GeV	ESA shutdown ETSB Proposed
KEK - FTBL	e	0.3 – 3.4 GeV	Shutdown for 3 yrs on 12/09
JPARC	Hadrons	0.5 – 1.1 GeV	Available from 2010
IHEP - Beijing	e and hadrons	0.4 – 1.5 GeV	Shutdown till 2010

Detector Activities

- Vertex: Many options for vertex detectors
  - 3 CCDs, 2 MAPs, DEPFET, CronoPix, VIP, 3D…
  - Performed beam tests of 1 – few weeks at CERN
  - Requirements
    - High energy beams
    - Beams with ILC time structure
    - High field (~3T) magnets needed
    - High density particle environment
  - An R&D collaboration would be helpful
- Tracking
  - LCTPC Collaboration formed with 38 institutions
  - Large bore 1.2T solenoid installed in DESY T24
  - Collaboration constructing large prototype
  - 2007 – 2009: Tested field cage + 2 end plates (GEM+ pixel and micro-megas+pixel) @ DESY
  - 2010 – 2011: next generation of LP testing in hadron beam

Marcel Vos & Carlos Mariñas

Detector Activities

- Calorimeter
  - CALICE
    - Performed combined Si/W ECAL & Si/Scint+AHCAL+TCMT @ MTBF 2008 and 2009
    - Glass RPC and MicroMega single layer testing @ CERN
    - GEM testing planned in 2009
    - Si/W ECAL+RPC DHCAL+TCMT @ MTBF planned in 2010
    - MAPs ECAL planned in 2010
  - Continued DREAM testing @ CERN
- Muons
  - SiD Muon system performed a test on a few extruded scintillation counter strip prototypes in 2008 at MTBF
  - New test on 284” strips using new electronics (TB4) with higher rate capability and double end readout being prepared

Calorimeter Plans

R&D effort	Sensor/readout /layer test	Small module	Large module
CALICE SiW ECal	2010 – 2012		2010: combined test with DHCal 2012: technical prototype
SiD SiW ECal	?		2010
CALICE ScW ECal	2010 – 2012		
CALICE MAPS ECal	2010 – 2011		2012
CALICE AHCal	2009 – 2010	2010 – 2011	(technical prototype) (current AHCal layers with W)
CALICE RPC DHCal	2010		2010 ($1m^3$ prototype)
CALICE MicroMegas DHCal	Yes		("technical prototype")
CALICE GEM DHCal	2009 – 2010		2010 – 2011 (5 x $1m^2$)
CALICE RPC SDHCal	2010		Later 2010 (part of "technical prototype")
Fiber Dual Readout (DREAM)			2010 –
Totally Active Dual Readout	Yes	(Yes)	(Yes)

Immediate future

Further away

Lei Xia

ILC TB Roadmap Document Score Card

- Outcome of the 1st ILC TB Workshop at Fermilab
  - The document was released to the community, US funding agencies, facility managers and ILC leadership on Aug. 1, 2007
    - FNAL-TM-2392/KEK-Report-2007-3
- Recommendations
  - ✓ Urge to take actions on the loss of SLAC ESA
  - ✓ ILC-like beam time structure
  - ☑ Momentum Tagged neutral hadron beam
  - ☑ Trk-Vtx common beam test infrastructure w/ high field, large bore magnet
  - ☑ High test beam duty factor
  - ☑ Investigation into common DAQ hardware and software

LC Test Beam Workshop 09

- Continuation of the first workshop in 20007@FNAL
- Hosted by LAL, Orsay
- When: Nov. 3 – Nov. 5, 2009
- Goals:
  - To plan for the next 3 years of LC detector R&D beam tests
  - To provide requirements to meet the needs to the facilities managers for adequate preparation
  - Sharpen the view of the community and leverage synergies
  - Document the roadmap
- Registration is open ➔ Please register ASAP on URL http://events.lal.in2p3.fr/conferences/LCTW09/

Conclusions

- Facilities have made continued improvements to meet the ILC detector R&D needs and are still working on making additional improvements
  - Success of SLAC's ESTB proposal will provide additional facilities in low E beams with LC time structure
- A lot of beam test activities in all detector groups
  - Beam test results are being published
  - Groups are moving toward larger scale technical prototype testing
- Shutdown of two Asian facilities would put more stress on existing facilities
- Further details of future needs to be compiled in the upcoming LCTW09