Detector MDI-related R&D

M. Woods, with input from T. Tauchi and P. Bambade

1. Comments on current project list by WWS R&D panel

2. R&D Needs for i) L,E,P and ii) IR/Bkgds

3. R&D Needs: i) simulations and ii) hardware/beam tests

Register of Detector R&D Projects

- WWS Detector R&D Panel -

Project Links:

Luminosity, Energy, and Polarization

Wayne State University
Visible and microwave beamstrahlung at the ILC

CCLRC Daresbury Laboratory
Polarised Positron Source

CERN
Integrated Luminosity Performance Studies

Royal Holloway, University of London
Diagnostics (Luminosity Optimisation and Beam Momentum Measurement)

University of Iowa, Iowa State University, Fairfield University, Karlsruhe-Germany, Trieste-Italy, Turkish Universities
Polarimetry at LC (Compton Polarimeter (at IPBI))

University of Iowa, Fairfield University, Turkish Universities
Luminosity monitor (at IPBI)

Iowa State University, Texas Tech University, SLAC, Purdue University, NITP
Fast, Radiation Hard Gas Cerenkov Beam and Luminosity Monitor

University of Notre Dame, LBNL, Univ. California at Berkeley, SLAC, University College London, Cambridge University
A Demonstration of the Electronic and Mechanical Stability of a BPM-Based Energy Spectrometer for the ILC

Comments:
1. For U.S. projects: - in above list, Wayne St. no longer participating in ILC; some listed projects weren't funded; other projects that were funded aren't listed.
2. Some of above luminosity projects are accelerator (lumi optimization, polarized positron source)
3. Need to identify needed R&D, separate from ongoing projects (see next page). Need to do this for both Detector MDI:LEP and Detector MDI: IR/Bkgds.
4. Needed R&D can be either simulations or involve hardware/beam tests.

M. Woods, SLAC   MDI-related R&D; Snowmass 2005

Detector MDI-LEP: R&D Needs

Topics include Luminosity, Luminosity spectrum, Energy and Polarization Measurements

Need system design and simulations for all of these.

Most "Urgent" needs requiring hardware development and beam tests,
in addition to system design and simulations:

1. electron id requirement of >99.9% efficiency for BEAMCAL down
to polar angles of 5 mrad; BEAMCAL also has to be rad hard
and provide fast luminosity (and possibly other colliding beam
parameter) diagnostics to machine
2. energy spectrometer prototypes for both BPM and synchrotron
stripe spectrometers.

Detector MDI-LEP group should also participate in studies for fast luminosity
measurements (ex. radiative Bhabhas) for machine tuning

Detector IR/Bkgds: R&D Needs

Topics include IR design, Calculating Backgrounds for each Detector subsystem and Estimating Detector background tolerances

Need extensive system design and simulations for these; also input from physics working groups for estimating background tolerances.

Note: expect that Detector Concept groups to become responsible for these MDI issues and to work on them directly with WG4

Most "Urgent" needs requiring hardware development and beam tests,
in addition to system design and simulations:
1. EMI (electromagnetic interference), in particular for VXD.
- need to estimate VXD sensitivity to EMI (power spectrum)
- need for EMI standards for all detector subsystems
and for accelerator systems