Summary of SLAC Physics Instrumentation Workshop

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US IP Beam Instrumentation Effort

- Workshop organized by US Beam Instrumentation Working Group coordinators: Mike Woods, Eric Torrence, David Cinabro
- Survey of current and possible techniques for Energy, Luminosity, and Polarization measurements
- Many active participants...
- “NLC-centric”
Some Results

- Emphasis that $dL/dE$ and/or energy spread needs to be well-measured to do precision physics

- “Straw-Man” ECAL Proposal:
  - BPM-based spectrometer upstream of IP
    - possibility of absolute $E$ measurement
  - Wisrd-style spectrometer downstream of IP
    - possibility of absolute $E$ measurement
    - can also measure $dL/dE$
  - Radiative Returns (Si forward tracking) used for luminosity-weighted measurement

Real Time
R&D Plans

• US “Consortia” Forming for Accelerator, Detector R&D aimed at a LC
  – Proposals were due already! (Fall submission)

• This round includes proposals for
  – Mechanical stability demonstration for BPM Spect.
  – Electronic stability in addition, with beam test
  – Detector Simulations for Radiative Returns
  – Forward tracking studies (RR, dL/dE)
  – ?
More open questions

• How well do we need to know Lumi pulse-by-pulse (bunch-by-bunch)?
  – (accelerator-driven)

• How well do we need to know absolute luminosity (<1%, certainly)
  – (physics-driven)
  – are LEP-style lumi monitors suited for environment?

• More studies needed on these issues, since they all factor into \( \frac{dL}{dE} \) questions
Final Comments

Three Things are clear from past experience:

- **Beam tests are crucial**
  - too many surprises over the years
- **Redundant measurements are crucial**
  - unforseen systematics lurk at every turn
- **Complete measurements are crucial**
  - something new is always learned from measuring something new

Precision physics takes meticulous planning

⇒ The systematic you anticipated is never the largest