



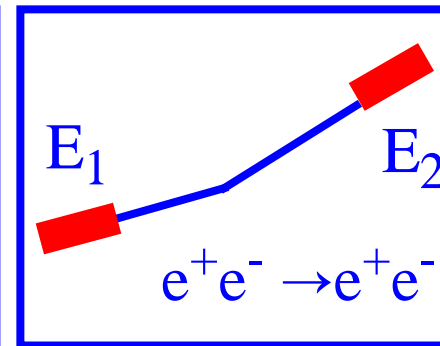
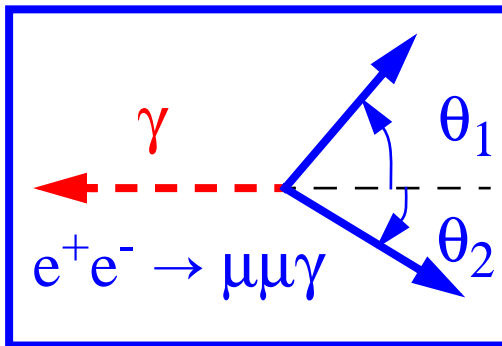
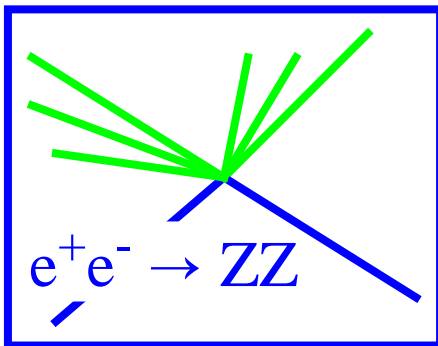
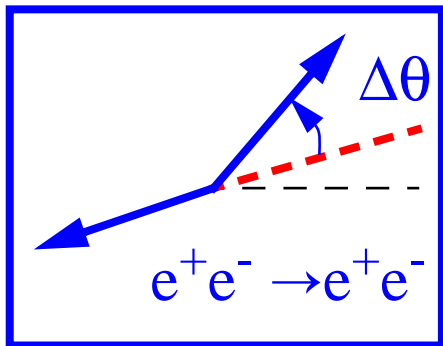
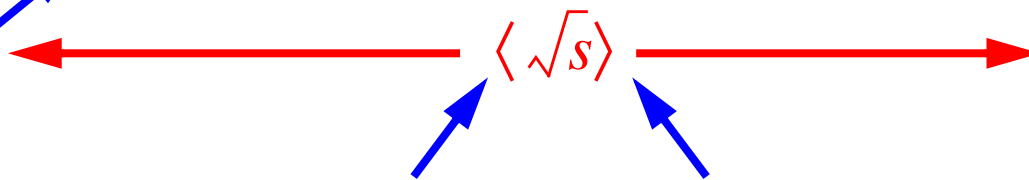
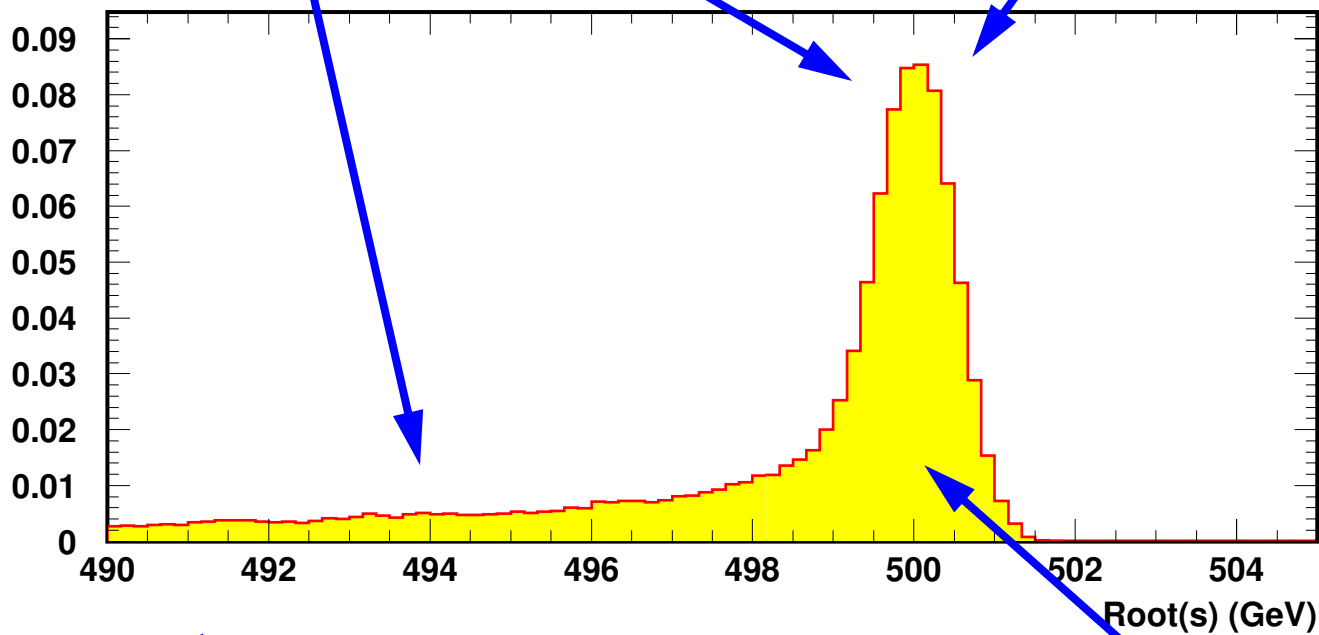
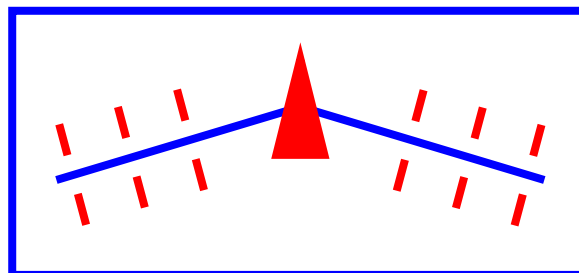
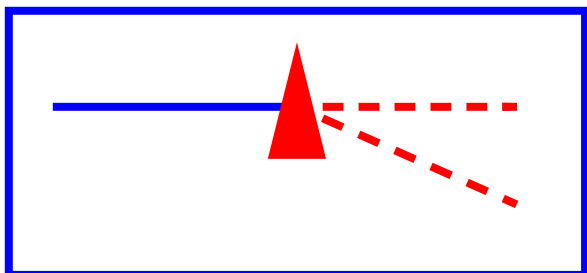
The Lumi Spectrum Challenge

January 8th, 2005
MDI at the ILC Workshop
SLAC

Eric Torrence
University of Oregon



Energy Measurements





Luminosity Spectrum “Challenge”



Goals

- Demonstrate that we can extract a physics quantity (m_H , m_t) using only experimental observables
- Understand the technical issues in extracting and using the $dL/d\sqrt{s}$ information in a physics analysis
- Expand interest in this subject worldwide
- Better coordinate existing efforts

Caveats

- We should concentrate first on something simple as a learning experience but ensure an outcome
- This can also be used as leverage to improve the global tools for simulation and analysis
- Full-blown “mock data challenge” is not really a good idea at this time

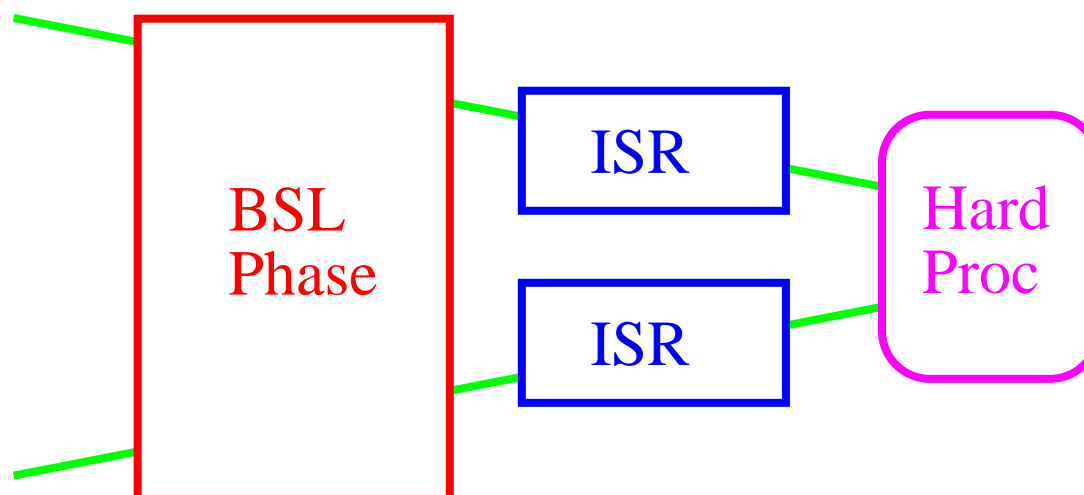


Precision Measurements

- Need precision tools
- Must be integral part of MC generators

<http://home.cern.ch/jadach>

Don't we know how to do this? Isn't this trivial?
I hope so, but I doubt it...



Need $(p_+^\mu + p_-^\mu)$ (4 parameters) to generate hard process

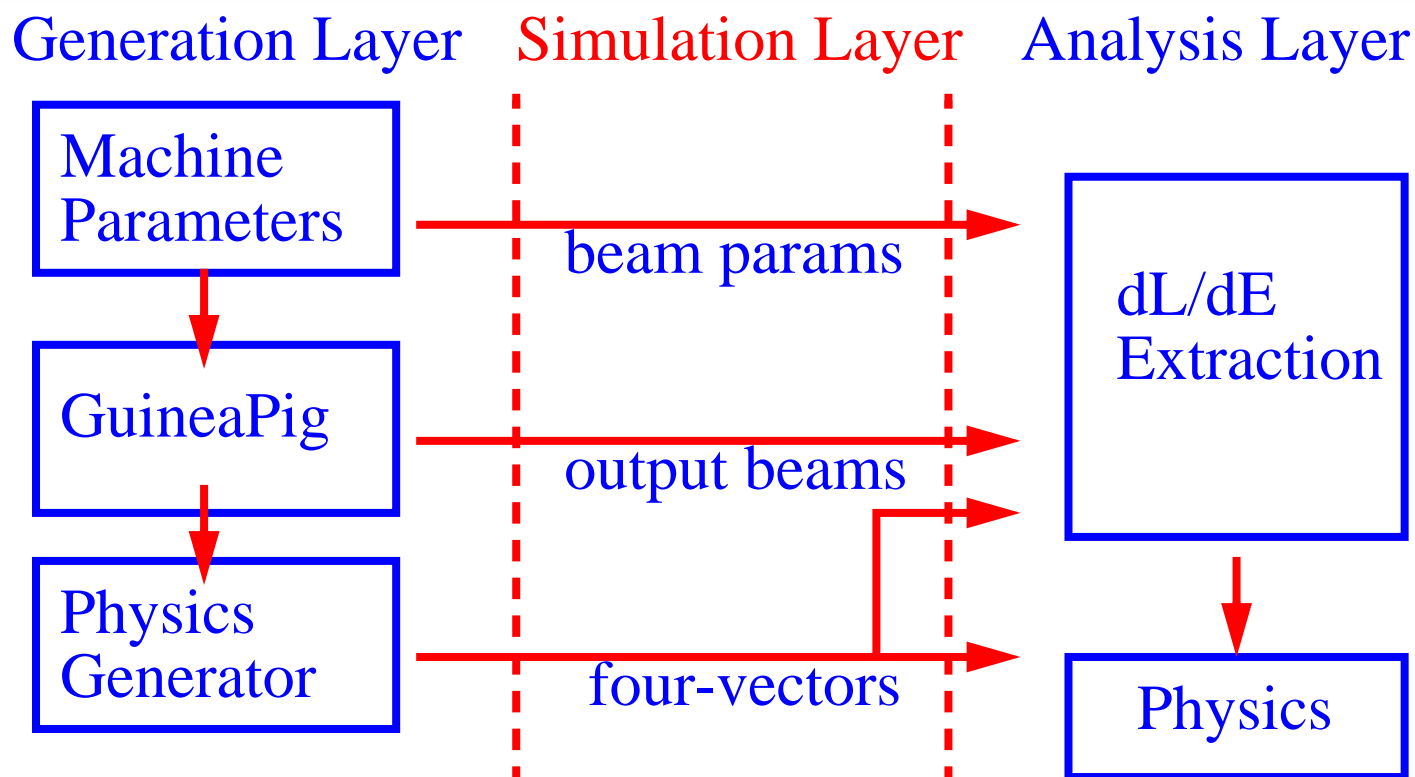
Must at least provide \sqrt{s} , β_z distributions (E^+ , E^-)

extracted from real data (not just \sqrt{s})

BSL production not independent for each beam



Simple Version



- We should have several different data samples representing different operating conditions
- **Machine Parameters** should be varied within a single data set and should include non-optimal mean values (energy imbalance, jitter, beam offsets, ...)
- Glen's **IP Feedback files** can be put to use here

Detail in simulation layer can be increased as time goes on. Probably start with simple parameterized smearing (or even start with **no simulation at all?**)

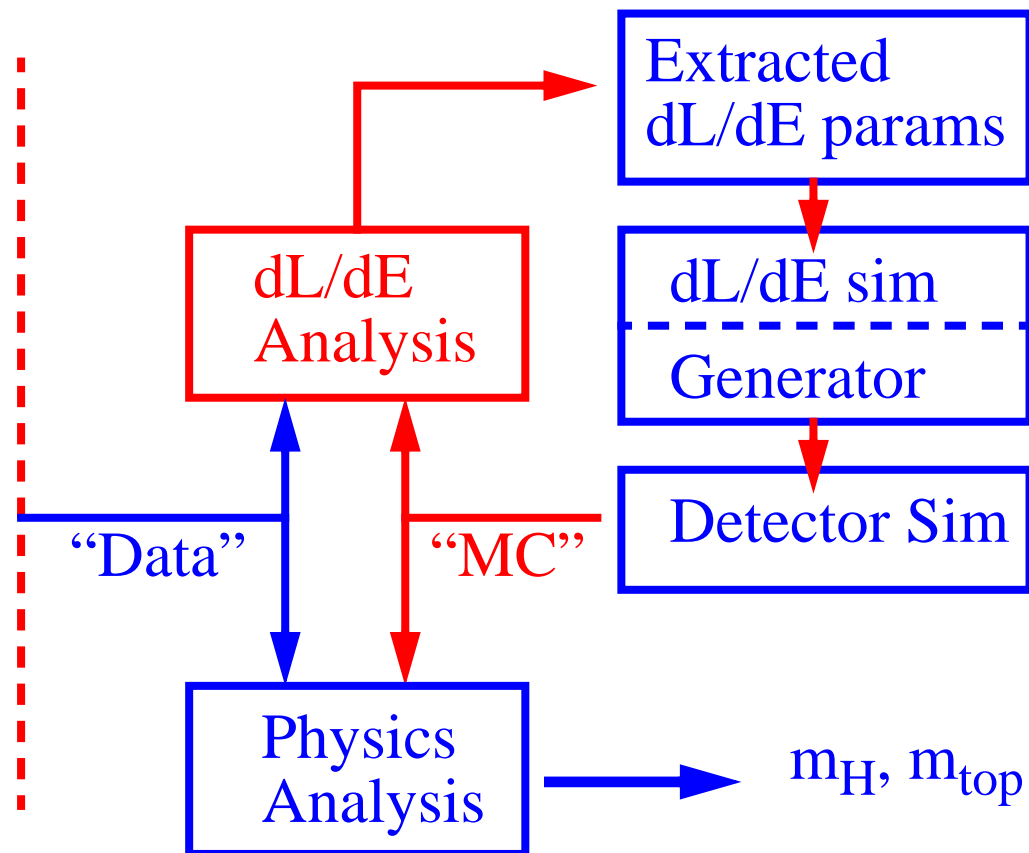


More Sophistication



dL/dE extraction

- Ultimately, we use MC as an analysis tool
- Simulation of dL/dE must be input directly



Need iterative “bootstrap” procedure to get dL/dE parameters for MC simulation

(from Jadach...)



Other Thoughts



- With full generation information, events can be re-weighted to simulate different machine conditions
- Should save four-vectors in format suitable for feeding to full detector simulation some day
- Want to leverage existing sophisticated analyses and analyzers (like Klaus Desh)
- Try to build framework and documentation to make it easy for casual users to pick this up
- Many questions about which approximations are OK and which are not
- Important to identify and reserve critical reference reactions (say $e^+e^- \rightarrow ZZ$) that other detector groups might also want to use for calibration...



Proposal



I personally think we should get started on something like this soon as an international effort with something to report by Snowmass

Immediate To-Do list

- Characterize p_+^μ , p_-^μ variations in Glen's files (GP does not write out all information...)
- Investigate technical problems with **generation layer**
- Look at existing formats (**LCIO**) for defining events or decide to use our own simple format
- Evaluate how sophisticated we want to make the simulation layer (**start with none?**)
- Find people to be responsible for **analysis layer** tasks

I see this as a first step in a long program. Should design things to be modular, easily upgradable, and open to international participation (ie: don't tie to closely to one particular detector or analysis package).