

Common production, incl. common issues like event overlay

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2 February 2012
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Linear Collider Software Meeting @ CERN

DBD benchmarking requirements

- ILC PEB Benchmarks Task Force
 - ◆ resources (human & computing) limited
 - ◆ cooperation between ILD and SiD in physics analysis
 - same event samples and same high level analysis.
- Processes
 - ◆ 1 TeV:
 - $e^+e^- \rightarrow \nu\bar{\nu}h$ for $Brs(h \rightarrow \mu^+\mu^-, b\bar{b}, c\bar{c}, gg, WW^*)$
 - $e^+e^- \rightarrow W^+W^-$ for $\sigma(WW)$ and beam pol.
 - $e^+e^- \rightarrow t\bar{t}h$ for y_{top}
 - ◆ one of 500 GeV LOI channels
 - ◆ Others to enrich physics case
- Using a baseline detector model with increased realism and improved reconstruction
- with
 - ◆ all relevant SM physics background
 - ◆ machine related backgrounds

Generator samples

■ ILC generator event samples

- ◆ ILC 1 TeV beam parameter has just fixed and common generator samples are about to generate
- ◆ Work sharing (for 1 TeV samples) agreed
 - $\nu\nu H$:
 - 4f (WW, ZZ, singleW, singleZ, ...)
 - 2f ($\mu\mu$, $\tau\tau$, ee with kinematic cuts)
 - 6f
 - tth, 8f (ttZ, ttbb) by Physsim
 - $\gamma\gamma/e\gamma/\gamma e \rightarrow ff$, hadrons, mini-jets
 - pairs
- ◆ Statistic: 1ab^{-1} or 10k as a first step. Could be increased if need more.
- ◆ Based on SVN version of whizard code and inputs
- ◆ Meta files are prepared on a web.
- ◆ Common samples are placed in /grid/ilc/prod/ilc/mc-dbd : To be used for simulation inputs

■ Note: in the case of CLIC

- ◆ The standard binary is provided by Stephan. Generator events are generated as a first step of GRID production.

Simulation

■ Geant4

- ◆ Geant4.5 will be used

- ◆ Physics List:

- CALICE recommends QGSP_BERT_HP.
- set G4NEUTRONHP_NEGLECT_DOPPLER to reduce CPU time
- Another candidates
 - PhysicsShielding
 - FTFP_BERT
 - ➔ Study by CALICE is needed

Machine backgrounds

■ $\gamma\gamma \rightarrow$ hadrons

- ◆ At least, one bunch of backgrounds will be overlaid
 - Bunch separation : 366ns. Expect $O(1)$ bkg events per bunch Xing
- ◆ Issue: IP Z smearing with $\sigma_z=225\mu\text{m}$. Separately for signal event and background event. Can the event reconstruction (LCFIVertex) work properly ?

■ e^+e^- pairs

- ◆ a few x 10k pairs per bunch crossing at 1 TeV
- ◆ SiD : overlay one bunch of pairs with a p_t cut at generator level.
- ◆ ILD : not considered now. SiD method may be applicable.

Common DST

- Main topics of the session tomorrow
- LCIO: common IO and data model is the bases for common DST. But exact information and qualities in objects are not identical between ILD and SiD
- Required common-ness depend on the purpose of common DST. For the common high level physics analysis, equalities on
 - ◆ 4 vectors, vertex info. ...
 - ◆ Particle IDs
 - ◆ ...would be desirable. Need to agree very soon before starting production
- New features of DST for DBD
 - ◆ ILD case:
 - LOI: 2,4,6 jet clustering with LCFIVertexing
 - DBD plan: Vertexing in DST, but jet clustering and vertex tagging (incl. NN training) should be made in user analysis

GRID production

■ Events

- ◆ More than $O(10M)$ SM events for $1ab^{-1}$ 1TeV with no cuts
- ◆ 10 min/events x 10M events x 2000 CPUs → 35 days per detector
- ◆ User specific productions would be required. Ex. ZHH at 500 GeV

■ For efficient production,

- ◆ Generator level cuts are crucial.
 - consistency between ILD and SiD
 - Inputs from analysis groups
 - study stdhep files and samples by pilot production
 - proposed us exact number of events to simulate for each files.

■ GRID tools

- ◆ SiD: ILCDIRAC
- ◆ ILD: Tools at DESY&KEK + ILCDIRAC ?

■ Production

- ◆ ILC VO. Focus on sites with large resources
 - DESY, CERN, IN2P3, KEK (from April), FNAL, ...
- ◆ Resource sharing
 - mechanism ?
 - Schedule ?
 - Small test production has already started
 - Full production. When ? Original ILD plan : 5 months from March