

Status of the Simulation Samples and Production Chain for ILD optimization

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Outline

- 1 Introduction
- 2 Signals outside of the SLAC MC sample
- 3 SM Sample Status

Introduction

- Every Analysis used in the context of the optimization will need a good (fully simulated) sample of the SM
- Hence:
 - Provide the SM sample centrally, if possible simulated (with different detector setups) and reconstructed (up to a default PF?)
 - Provide all information and tools necessary to produce specific signal samples individually with exactly the same setup as the SM sample
- Set up a complete production chain for simulation, digitization, reconstruction including PF on the grid, using databases for the management of the production, grid SE for the storage of the data and web interfaces for the meta data and data search
- With several millions of events, this is an effort not far away from running experiments of the previous generation . . .



Background

- Tim Barklow and Norman Graf in a great effort have produced a 2nd generation of a complete SM sample for 500fb^{-1} at all 4 polarizations
- It has been cleared of the 4f and 6f final states affected by the SM Higgs boson by setting $m_h = 2\text{TeV}$
- Fragmentation has been checked several times, also all other open issues from the last presentations
- Only open issue now: re-production of τ final states with TAUOLA
- TAUOLA Whizard interface has been developed and successfully tested for SM events, delivered to Tim
- Files are being downloaded to DESY for start of the production in the near future

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Check if you want to produce your own signal

- Signals outside of the SM sample have to be produced individually
- The site

<http://confluence.slac.stanford.edu/display/ilc/Standard+Model+Data+Samples>

provides all necessary files to set up Whizard in exactly the same way as done for the SM sample

- The information from

<ftp://ftp-lcd.slac.stanford.edu/ilc/ILC500/StandardModel/whizard-src/user.f90>

ftp://ftp-lcd.slac.stanford.edu/ilc/ILC500/StandardModel/guinea-pig/ilc_0500_may05_run05_seed06/

can be used to set the same beam structure for any other generator

- Information from

ftp://ftp-lcd.slac.stanford.edu/ilc/ILC500/StandardModel/a6f/include/ilc_fragment_call.f90

ftp://ftp-lcd.slac.stanford.edu/ilc/ILC500/StandardModel/a6f/include/calc_a1sq_a2sq.f90 can be adapted to set up the fragmentation also for other generators

- The resulting generated events can be made available together with the SM sample at

<http://www-flc.desy.de/simulation/database/>



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Simulated and Reconstructed Events: Production

- Start with SM calibration events (Z at 91.2 and 500 GeV, $t\bar{t}$ at 350 GeV) and single particle samples
- This allows for tests and calibration of the reconstruction while the 'real' physics events are simulated
- Then start physics events simulation
 - First run several 10 000 events of each sample, to give everybody a starting point and to be able to do more debugging
 - Then run the rest in the rough order of priority given in the table below
 - Priority can still be discussed, of course
- Once a significant number of simulated events is available, and calibration is done, run digitization and reconstruction including Pandora PF

Simulated Events: Production proposal

(Too?) Aggressive proposal for production of physics events:

possible signals or backgrounds:		\approx No. Events
$ee \rightarrow 4f$	50fb-1	5M
$ee \rightarrow 6f$	200fb-1	400k
$ee \rightarrow 2f$	20fb-1	2.5M
$ee \rightarrow hX$	50fb-1	75k
calibration samples:		
light quark 2f at 91.2 GeV	20 000 events	
tt (6f) at 350 GeV	20 000 events	
backgrounds:		
$\gamma\gamma \rightarrow X$	0.1fb-1	1M
$ee \rightarrow \gamma\gamma(n * \gamma)$	10fb-1	0.5M
$\nu\nu(n * \gamma)$	20fb-1	1.5M
$ee \rightarrow ee$	0.1fb-1	0.2M
$e\gamma \rightarrow e\gamma$	0.1fb-1	0.6M
rest	1fb-1	0.6M

Some thoughts on the use of this for optimization

- The luminosity goal on the previous slide is somewhat aggressive for one detector
- It is most probably too aggressive for optimization
- **My personal recommendations:**
 - Produce as much as possible of the background mentioned above for one detector model
 - Start analyses on that set
 - Determine exact needs for specific backgrounds for each important optimization analysis
 - Do one dimensional scan (e.g. fixed coil energy content) with a background set tailored to analyses
 - In the minimum of the 1D scan, do 2D/3D scan

Simulated Events: Availability

- Entry point for the production:
<http://www-flc.desy.de/simulation/database/>
- An automatic replica system is being set up, storing files not only at DESY but, if possible, also in Japan and in Northe America
- System has been exercised with several test productions
- On the following slides, you can see the interface

Simulated Events: Generator Files



International Linear Collider Generator Files Database

[Search Database](#)

[Browse Database](#)

gamma_Theta90_500GeV-27-250	gamma_Theta90_500GeV-27-250	0	Test_SinglePar	0.0	0.0	0.0
gamma_Theta90_500GeV-28-250	gamma_Theta90_500GeV-28-250	0	Test_SinglePar	0.0	0.0	0.0
gamma_Theta90_500GeV-29-250	gamma_Theta90_500GeV-29-250	0	Test_SinglePar	0.0	0.0	0.0
gamma_Theta90_500GeV-3-250	gamma_Theta90_500GeV-3-250	0	Test_SinglePar	0.0	0.0	0.0
gamma_Theta90_500GeV-30-250	gamma_Theta90_500GeV-30-250	0	Test_SinglePar	0.0	0.0	0.0
gamma_Theta90_500GeV-31-250	gamma_Theta90_500GeV-31-250	0	Test_SinglePar	0.0	0.0	0.0
gamma_Theta90_500GeV-32-250	gamma_Theta90_500GeV-32-250	0	Test_SinglePar	0.0	0.0	0.0
gamma_Theta90_500GeV-33-250	gamma_Theta90_500GeV-33-250	0	Test_SinglePar	0.0	0.0	0.0
gamma_Theta90_500GeV-34-250	gamma_Theta90_500GeV-34-250	0	Test_SinglePar	0.0	0.0	0.0
gamma_Theta90_500GeV-35-250	gamma_Theta90_500GeV-35-250	0	Test_SinglePar	0.0	0.0	0.0
gamma_Theta90_500GeV-36-250	gamma_Theta90_500GeV-36-250	0	Test_SinglePar	0.0	0.0	0.0
gamma_Theta90_500GeV-37-250	gamma_Theta90_500GeV-37-250	0	Test_SinglePar	0.0	0.0	0.0
gamma_Theta90_500GeV-38-250	gamma_Theta90_500GeV-38-250	0	Test_SinglePar	0.0	0.0	0.0

Done

Simulated Events: Search for simulated events



International Linear Collider Simulations Database

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PARAMETER	INPUT	EXAMPLE
Tag:	<input type="text"/>	<p>For the main latest productions select the tags:</p> <ul style="list-style-type: none"> • Test_ZPole_LDC01_06Sc_test_2008_04_02 <p>ZPole uds cambridge files after the HCAL bug correction.</p> <ul style="list-style-type: none"> • Slac_SM_LDC01_06Sc_test_2008_04_02 <p>First tests with the SM files from Slac after the HCAL bug correction.</p> <p>TAGS SUMMARY</p>
Run ID:	<input type="text"/>	m-5-4_cb_1000_noisr_1dc00sc_300t_r1690_12730_qgsp_bert
Process:	<input type="text"/>	cbnInlh...
Center of Mass Energy [GeV]:	<input type="text"/>	1000,500,...
Date of Production:	<input type="text"/>	2006-02-19,2007,12,2006-05,...
Event Generator:	<input type="text"/>	pythia,...
Detector Simulation:	<input type="text"/>	mokka,mokka 5.4,...
Detector Model:	<input type="text"/>	1dc00sc,1dc01_02sc,...
Physics List:	<input type="text"/>	qgsp_bert, lcphys,...
B Field [T]:	<input type="text"/>	3.0,4.0,...
Em Polarisation [$\pm 1.0/0.0$]:	<input type="text"/>	0,1,-1
Ep Polarisation [$\pm 1.0/0.0$]:	<input type="text"/>	0,1,-1

Search

Done

Simulated Events: Find simulated events



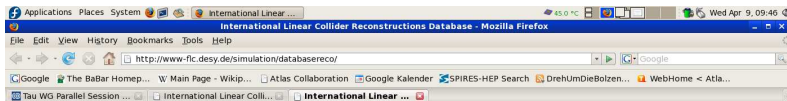
International Linear Collider Simulations Database

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M-6-5p2_stanstau_500_LDC01_05Sc_LCP_ep+0.6_em+0.8_Test_BSM	Test_BSM_LDC01_05Sc	stanstau	500.0
M-6-5p2_uu_w11775_500_LDC01_05Sc_LCP_ep+0.0_em+0.0_Test_500	Test_500_LDC01_05Sc	uu	500.0
M-6-5p2_uu_w11775_500_LDCPrime_01Sc_LCP_ep+0.0_em+0.0_Test_500	Test_500_LDCPrime_01Sc	uu	500.0
M-6-5p2_Z0_Theta90_10-250GeV_LDC01_05Sc_LCP_Test_SinglePar	Test_SinglePar_LDC01_05Sc	Z0_Theta90_10-250GeV	0.0
M-6-5p2_Z0_Theta90_10-250GeV_LDCPrime_01Sc_LCP_Test_SinglePar	Test_SinglePar_LDCPrime_01Sc	Z0_Theta90_10-250GeV	0.0
M-6-5p2_Zh120_500_LDC01_05Sc_LCP_ep+0.0_em+0.0	Test_500_Zh120_LDC01_05Sc	Zh120	500.0
M-6-5p2_Zh120_500_LDCPrime_01Sc_LCP_ep+0.0_em+0.0	Test_500_Zh120_LDCPrime_01Sc	Zh120	500.0
M-6-5p2_Zhiggs120_uds_4jets_350_LDC01_05Sc_LCP_ep+0.0_em+0.0	Test_350_Zh120_LDC01_05Sc	Zhiggs120_uds_4jets	350.0
M-6-5p2_Zhiggs120_uds_4jets_350_LDCPrime_01Sc_LCP_ep+0.0_em+0.0	Test_350_Zh120_LDCPrime_01Sc	Zhiggs120_uds_4jets	350.0
M-6-5p2_Zhiggs120_uds_tautau_350_LDC01_05Sc_LCP_ep+0.0_em+0.0	Test_350_Zh120_LDC01_05Sc	Zhiggs120_uds_tautau	350.0
M-6-5p2_Zhiggs120_uds_tautau_350_LDCPrime_01Sc_LCP_ep+0.0_em+0.0	Test_350_Zh120_LDCPrime_01Sc	Zhiggs120_uds_tautau	350.0
M-6-5p2_Zmumuh120_500_LDC01_05Sc_LCP_ep+0.0_em+0.0	Test_500_Zh120_LDC01_05Sc	Zmumuh120	500.0
M-6-5p2_Zmumuh120_500_LDCPrime_01Sc_LCP_ep+0.0_em+0.0	Test_500_Zh120_LDCPrime_01Sc	Zmumuh120	500.0



Simulated Events: Search for reconstructed events



International Linear Collider Reconstructed Database

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Search Database

PARAMETER INPUT	EXAMPLE
Tag:	For the summary of the tags: TAGS SUMMARY
Run ID:	Rec01-03-01_bb_w11803_500_LDC01_05Sc_LCP_ep+0.0_em+0.0_Test_500
Process:	ch,nInIh,...
Center of Mass Energy [GeV]:	1000,500,...
Date of Production:	2006-02-19,2007,12,2006-05,...
Event Generator:	pythia,...
Detector Simulation:	mokka,mokka 5.4,...
Software version:	The Ilcsoft version used for the digitisation / reconstruction. Ex: v01-03-01,...
Detector Model:	ldc00sc,ldc01_02sc,...
Physics List:	qgsp_bert, lcpbys,...
B Field [T]:	3.0,4.0,...
Em Polarisation [$\pm 1.0/0.0$):	0,1,-1
Ep Polarisation [$\pm 1.0/0.0$):	0,1,-1

Search

Done



Simulated Events: Find reconstructed events



International Linear Collider Reconstructions Database

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Files stored in database.

Run ID	Tag	Process	CM Energy [GeV]	Detector Model	Electron polarisation	Positron Polarisation	B Field [T]
Rec01-03-01_K0L_Theta100_10GeV_LDCPrime_01Sc_LCP_Test_SinglePar	Test_SinglePar_LDCPrime_01Sc	K0L_Theta100_10GeV	0.0	LDCPrime_01Sc	0.0	0.0	4.0

Show detailed information about:

Run ID:

Search

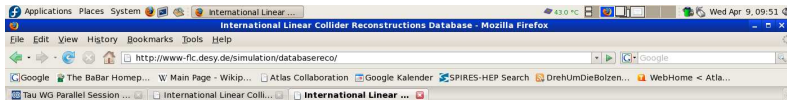
[SEARCH RECONSTRUCTIONS DATABASE](#)

Ivan Marchesini

Last modified: Fri Feb 8 16:33:55 CET 2008



Simulated Events: Full info on reconstructed events



International Linear Collider Reconstructed Database

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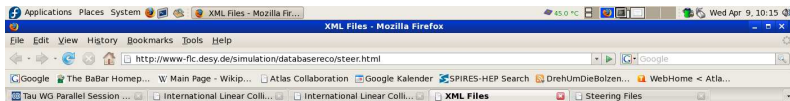
Run ID	Rec01-03-01_K0L_Theta100_10GeV_LDCPrime_01Sc_LCP_Test_SinglePar
Process	K0L_Theta100_10GeV
Tag	Test_SinglePar_LDCPrime_01Sc
Center of Mass Energy	0.0 GeV
Luminosity	0.0 fb ⁻¹
Cross Section	0.0 fb
Contact Person	Ivan Marchesini
Email Address	ivan.marchesini@desy.de
Date of Production	2008-03-13
Event Generator	Pythia
Input Simulation	M-6-Sp2_K0L_Theta100_10GeV_LDCPrime_01Sc_LCP_Test_SinglePar
Simulation	Mokka-06-05-p02
Physics List	LCPPhys
Hesoft Version	Mokka-06-05-p02
Detector Model	LDCPrime_01Sc
B Field	4.0 T
Number of files in this Run	1
Polarisation electron	0
Polarisation positron	0

[Jump to the files summary](#)

Archive location (grid)	lfm:/grid/icc-2008/test/Rec01-03-01_K0L_Theta100_10GeV_LDCPrime_01Sc_LCP_Test_SinglePar_0001.tar.gz
scio file location (grid)	lfm:/grid/icc-2008/test/Rec01-03-01_K0L_Theta100_10GeV_LDCPrime_01Sc_LCP_Test_SinglePar_0001.000.scio lfm:/grid/icc-2008/test/Rec01-03-01_K0L_Theta100_10GeV_LDCPrime_01Sc_LCP_Test_SinglePar_0001.001.scio
Archive location (DESY SE)	srm://srm-dcache.desy.de/pnfs/desy.de/icc-2008/test/Rec01-03-01_K0L_Theta100_10GeV_LDCPrime_01Sc_LCP_Test_SinglePar_0001.tar.gz
scio file location (DESY SE)	srm://srm-dcache.desy.de/pnfs/desy.de/icc-2008/test/Rec01-03-01_K0L_Theta100_10GeV_LDCPrime_01Sc_LCP_Test_SinglePar_0001.000.scio srm://srm-dcache.desy.de/pnfs/desy.de/icc-2008/test/Rec01-03-01_K0L_Theta100_10GeV_LDCPrime_01Sc_LCP_Test_SinglePar_0001.001.scio

Done

Simulated Events: Additional Information



XML Files

[Gear Geometry Files](#) [Steering Files for the Reconstruction](#)

The gear geometry files for the latest detector models and the steering files used for the latest reconstructions can here be found. Anyway, note that **all the proper .xml files can be found in the tar archive associated to each simulated or reconstructed .slio file.**

Inna Marchesini

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Summary

- Production chain on the grid is ready
- Interfaces for worldwide use available
- Generator files mostly copied to Grid SE at DESY
- Open issues:
 - Software completely ready?
 - Detector model?
 - τ final states will still have to wait a bit
 - Requests for change in number of events and priority?