

From Zero to SiD - Running Sim Reco

Introduction

The current sim/reco consists of five steps

1. Get Events
2. SLIC for running events through GEANT4
3. lcsim to run the digitization and the tracking
4. SlicPandora to do the ParticleFlowAnalysis
5. LCFIPlus to do the Vertexing
6. lcsim to make DST's

For various reasons, reco is split in three steps. We'd love to have it in one, so if you're keen mitigating this situation, please let us know

Prerequisite

```
cd /scratch/sid_complete
cd v01-17-02-sid
source init_ilcsoft.sh
```

so you have all pathes and libraries properly set

Step 1 Getting Events

there are two ways of getting events into SLIC, using the particle gun or by using a stdhep file as an input

Particle Gun

create a macro file called mymacro.macro

```
/lcio/PDGFlag true
/lcio/filename myparticlegun.slcio
/run/initialize
/generator/select gun
/gun/particle e-
/gun/position 0 0 0
/gun/direction 0. 1. 0
/gun/energy 10 GeV
/run/beamOn 100
```

StDHEP

get an example stdhep file from the SLAC FTP server

[Z-> mumu sample](#)

and store it in a data folder */scratch/sid_complete/data*

now get ready to run SLIC

Step 2 Running SLIC

For all the following purposes, we're using the sidloi3 detector model, others can be used as well (or you can design your own)

for the particle gun do the following

the execute this with

```
cd data
$SLIC/build/bin/slic -g ../lcsim/LCDetectors/detectors/sidloi3/sidloi3.lcdd -m mymacro.macro
```

this will generate a file called *myparticlegun.slcio* with 100 10 GeV electrons fired at 90 degrees in the sidloi3 detector version

For the stdhep, use the following

```
cd data
$SLIC/build/bin/slic -g ../lcsim/LCDetectors/detectors/sidloi3/sidloi3.lcdd -i pythiaZPolemumu.stdhep -O -p .
-r 100
```

- -g denotes the location of the detector description
- -i the input file
- -O autonaming of the output file
- -p the path, here "."
- -r run for 100 events

it should produce an outputfile called

pythiaZPolemumu_slc-3.1.0_geant4-v9r6p1_QGSP_BERT_sidloi3.slcio

Step 3 Running the reco



For the following we'll use the LCIO file made from the stdhep input, for the particle gun file, just replace the file names

use the following Command line (**all in one line!**)

```
java -jar ../lcsim/lcsim/target/lcsim-2.11-SNAPSHOT-bin.jar ../myscripts/sid_dbd_prePandora_noOverlay.xml -
DinputFile=pythiaZPolemumu_slc-3.1.0_geant4-v9r6p1_QGSP_BERT_sidloi3.slcio -DtrackingStrategies=../myscripts
/sidloi3_trackingStrategies_default.xml -DoutputFile=pythiaZPolemumu_slc-3.1.0_geant4-
v9r6p1_QGSP_BERT_sidloi3_reco.slcio
```

- -jar ../lcsim/lcsim/target/lcsim-2.11-SNAPSHOT-bin.jar contains the reco code
- ../myscripts/sid_dbd_prePandora_noOverlay.xml is the steeringfile
- -DinputFile/-DoutputFile define the files to be used
- -DtrackingStrategies is a file with tracking strategies to be used

Step 4 Running the PFA

```
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:../slicPandora/lib/
../slicPandora/bin/PandoraFrontend -g ../myscripts/sidloi3_pandora.xml -c ../myscripts/sid_dbd_pandoraSettings.
xml -i pythiaZPolemumu_slc-3.1.0_geant4-v9r6p1_QGSP_BERT_sidloi3_reco.slcio -o pythiaZPolemumu_slc-3.1.0
_geant4-v9r6p1_QGSP_BERT_sidloi3_pandora.slcio
```

* -g Geometry file

- -c settings
- -i input -o outputfile

Step 5 Running the Vertexing

```
cp ../myscripts/sid_dbd_vertexing.xml .
```

modify the filenames accordingly in an editor

```

<global>
  <parameter name="LCIOInputFiles"> pythiaZPolemumu_slic-3.1.0_geant4-v9r6p1_QGSP_BERT_sidloi3_pandora.
slcio</parameter>
  <parameter name="GearXMLFile"> </parameter>
  <parameter name="MaxRecordNumber" value="-1" />
  <parameter name="SkipNEvents" value="0" />
  <parameter name="SupressCheck" value="false" />
  <parameter name="Verbosity" options="DEBUG0-4,MESSAGE0-4,WARNING0-4,ERROR0-4,SILENT">WARNING<
/parameter>
</global>

<processor name="MyLCIOOutputProcessor" type="LCIOOutputProcessor">
  <parameter name="LCIOOutputFile" type="string">pythiaZPolemumu_slic-3.1.0_geant4-
v9r6p1_QGSP_BERT_sidloi3_lcfi.slcio </parameter>
  <parameter name="LCIOWriteMode" type="string" value="WRITE_NEW"/>
</processor>

```

```
$MARLIN/bin/Marlin sid_dbd_vertexing.xml
```

Step 6 Making the DST

This final step creates two lcio files, one DST and with all the collections. It also performs the truth-matching

```

java -jar ../lcsim/lcsim/target/lcsim-2.11-SNAPSHOT-bin.jar ../myscripts/sid_dbd_postPandora.xml -
DinputFile=pythiaZPolemumu_slic-3.1.0_geant4-v9r6p1_QGSP_BERT_sidloi3_lcfi.slcio -DrecFile=pythiaZPolemumu_slic-
3.1.0_geant4-v9r6p1_QGSP_BERT_sidloi3_full.slcio -DdstFile=pythiaZPolemumu_slic-3.1.0_geant4-
v9r6p1_QGSP_BERT_sidloi3_dst.slcio

```

Inspect the generated File

use the anajob tool from the LCIO package

```
anajob data/pythiaZPolemumu_slic-3.1.0_geant4-v9r6p1_QGSP_BERT_sidloi3_full.slcio
```

it should yield

```

EVENT: 9
RUN: 0
DETECTOR: sidloi3
COLLECTIONS: (see below)
//////////

```

COLLECTION NAME	COLLECTION TYPE	NUMBER OF ELEMENTS
BeamCalHits	SimCalorimeterHit	0
BuildUpVertex	Vertex	0
BuildUpVertex_RP	ReconstructedParticle	0
BuildUpVertex_V0	Vertex	0
BuildUpVertex_V0_RP	ReconstructedParticle	0
CalorimeterHitRelations	LCRelation	199
ClusterMCTruthLink	LCRelation	2
EM_BARREL	CalorimeterHit	64
EM_ENDCAP	CalorimeterHit	0
EcalBarrelHits	SimCalorimeterHit	64
EcalEndcapHits	SimCalorimeterHit	0
HAD_BARREL	CalorimeterHit	87
HAD_ENDCAP	CalorimeterHit	0
HcalBarrelHits	SimCalorimeterHit	87
HcalEndcapHits	SimCalorimeterHit	0
HelicalTrackHitRelations	LCRelation	22
HelicalTrackHits	TrackerHit	22
HelicalTrackMCRelations	LCRelation	22
LumiCalHits	SimCalorimeterHit	0
MCParticle	MCParticle	16
MCParticlesSkimmed	MCParticle	16
MUON_BARREL	CalorimeterHit	48
MUON_ENDCAP	CalorimeterHit	0
MuonBarrelHits	SimCalorimeterHit	48
MuonEndcapHits	SimCalorimeterHit	0
PandoraPFOCollection	ReconstructedParticle	2
PrimaryVertex	Vertex	1
PrimaryVertex_RP	ReconstructedParticle	1
RecoMCTruthLink	LCRelation	2
ReconClusters	Cluster	2
SiTrackerBarrelHits	SimTrackerHit	13
SiTrackerEndcapHits	SimTrackerHit	0
SiTrackerForwardHits	SimTrackerHit	0
SiVertexBarrelHits	SimTrackerHit	10
SiVertexEndcapHits	SimTrackerHit	0
StateAtECal	LCGenericObject	2
StateAtEnd	LCGenericObject	2
StateAtStart	LCGenericObject	2
TKR_RawTrackerHits	TrackerRawData	20
TKR_TrackerHits	TrackerHit	13
TrackMCTruthLink	LCRelation	2
Tracks	Track	2
VXD_RawTrackerHits	TrackerRawData	16
VXD_TrackerHits	TrackerHit	10

and list all the individual LCIO collections

or use jas to look at the Events

```

jas-assembly-3.0.3/jas3 data/pythiaZPolemumu_slic-3.1.0_geant4-v9r6p1_QGSP_BERT_sidloi3_full.slcio

```

File->New Wired4 Viewer

