

# Higgs Factory simulation @ FNAL

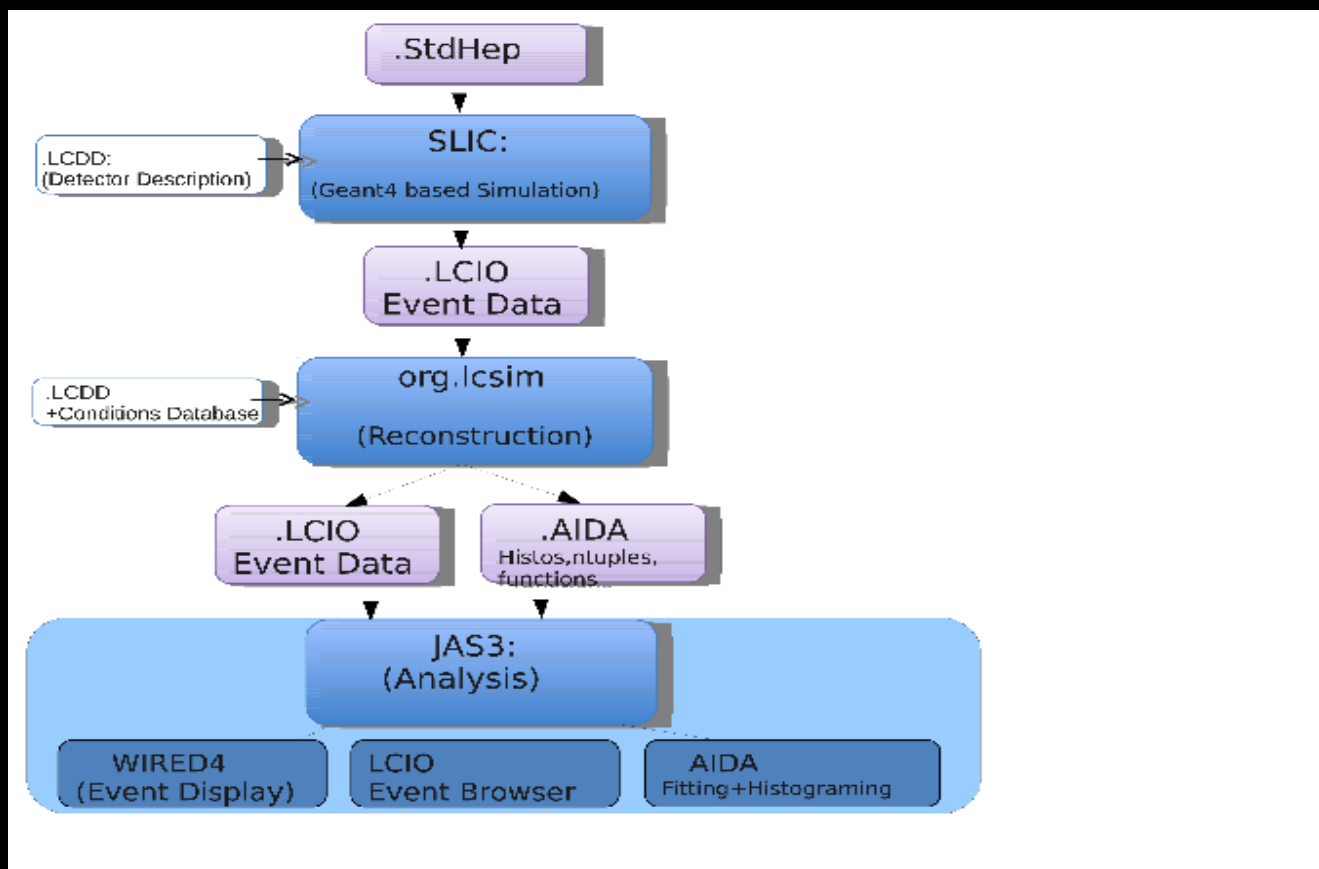
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August 15<sup>th</sup> 2012

# Muon Collider Documentation

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- [Created Confluence page:](#)
- <https://confluence.slac.stanford.edu/display/MCPDS/Home>
- Currently:
  - Overview
  - Event Generation
  - Timing studies
  - Detector Models
  - Available Datasets (needs updating)
- You can sign up here:
- <https://jira.slac.stanford.edu/signup/>

# detsim:/ilc/sid/wenzel/muoncollidersw



To get started:

<https://confluence.slac.stanford.edu/display/ilc/lcsim+Tutorials>

# Event Generation

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Pythia 6:  $\mu^+ \mu^-$  @ 125 GeV CMS

with the following data cards:

MSEL=0

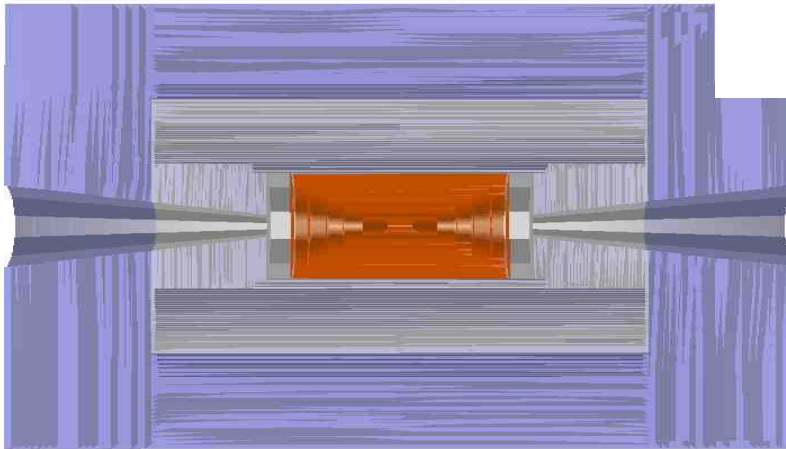
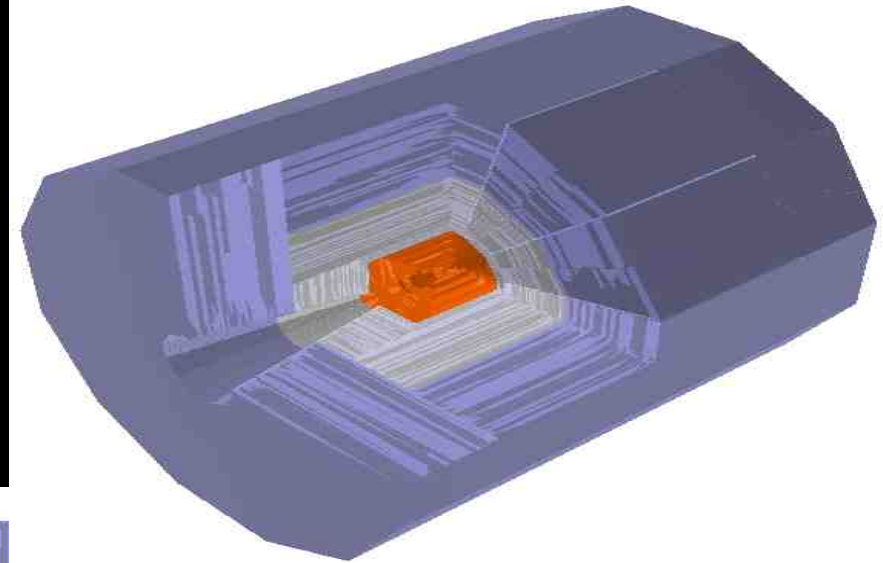
MSUB(3) = 1 ! ff -> H0

PMAS(25,1)= 125

# The mcdrcal00 detector in org.lcsim

**5T solenoidal field,  
radius=3m**

**Calorimeter dimensions:  
Rmin: 1.25 m  
Rmax: 2.96 m  
Length: 2x7.4 m**



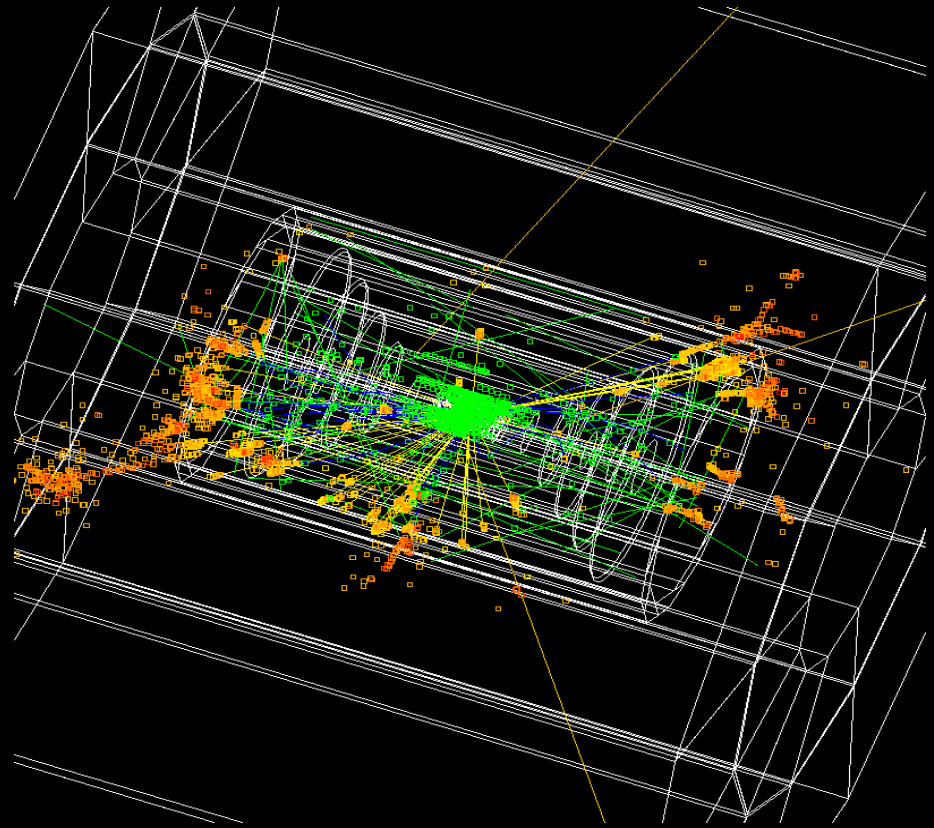
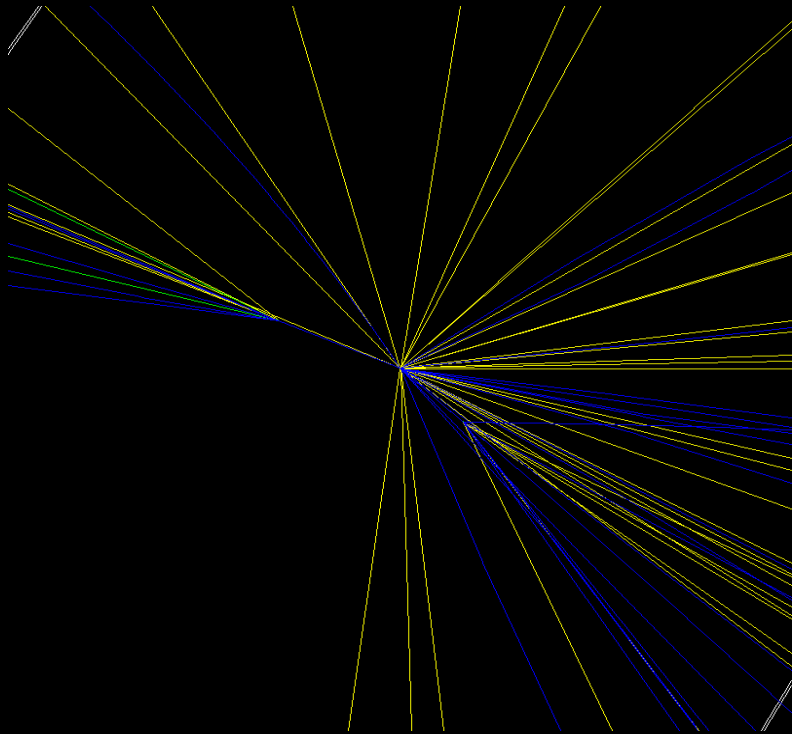
**Tracker: SLAC**

# Calorimeter Properties for Barrel and Endcaps

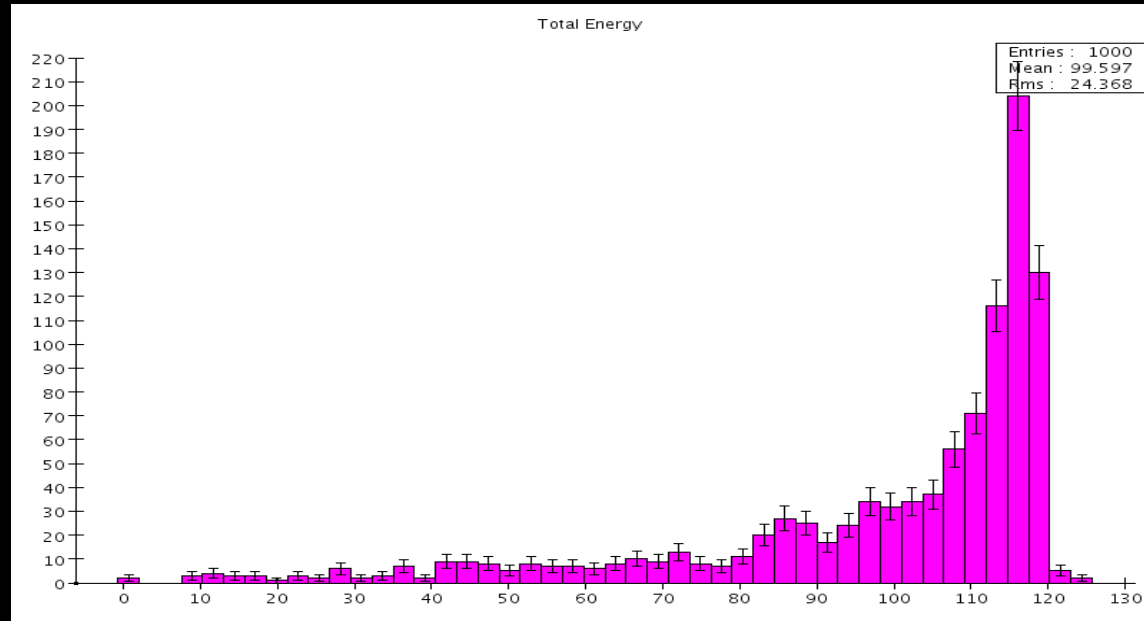
	<b>EM</b>	<b>Hadron</b>	<b>Muon</b>
<b>Material</b>	BGO (PbF2)	BGO (PbF2)	Iron
<b>Density</b> [g/cm <sup>3</sup> ]	7.13 (7.77)	7.13 (7.77)	7.85
<b>Cell size</b> [cm <sup>3</sup> ]	1x1x2	2x2x5	10x10x10
<b>Layers</b>	10	30	22
<b>Detector Depth</b> [cm]	20	150	220
<b>Radiation Length</b> [cm]	1.1 (0.93)	1.1 (0.93)	1.76
<b>Nuclear Interaction Length</b> [cm]	22.7 (22.4)	22.7 (22.4)	16.8
<b>Total Nr of IA length</b> (em+had)	7.5 (7.6)		

# detsim

`/ilc/sid/wenzel/muoncolliderdata/slci/signal/Higgs125_1000.slci`



# TotalEnergyDriver.java

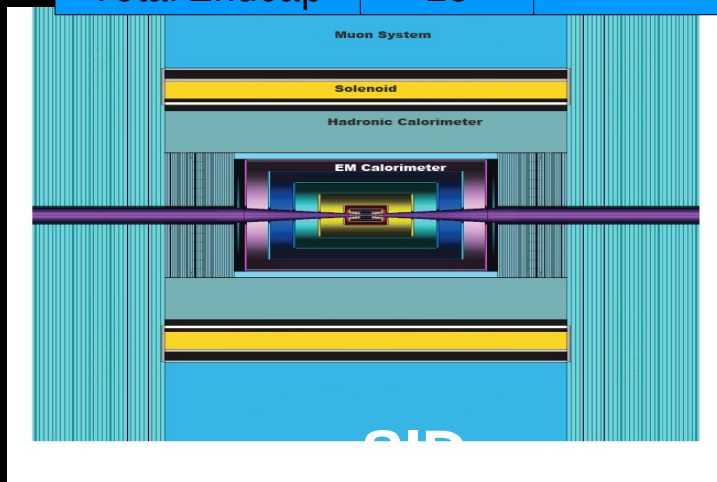


Not calibrated, No dual readout correction .....



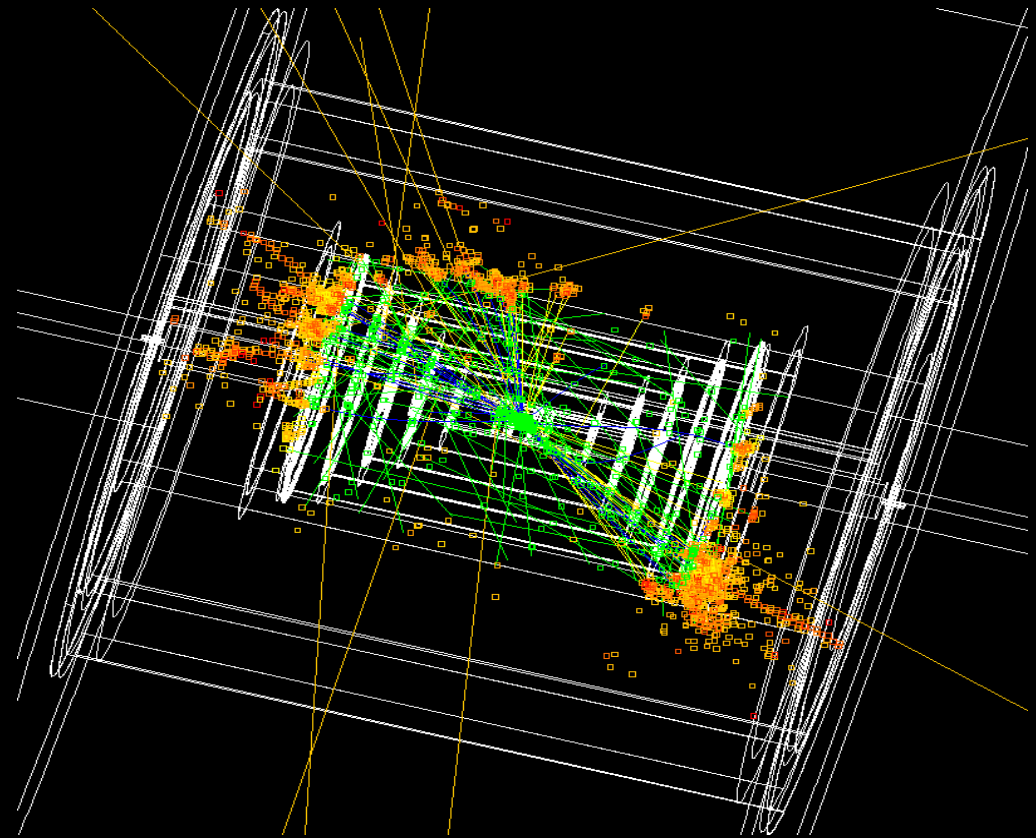
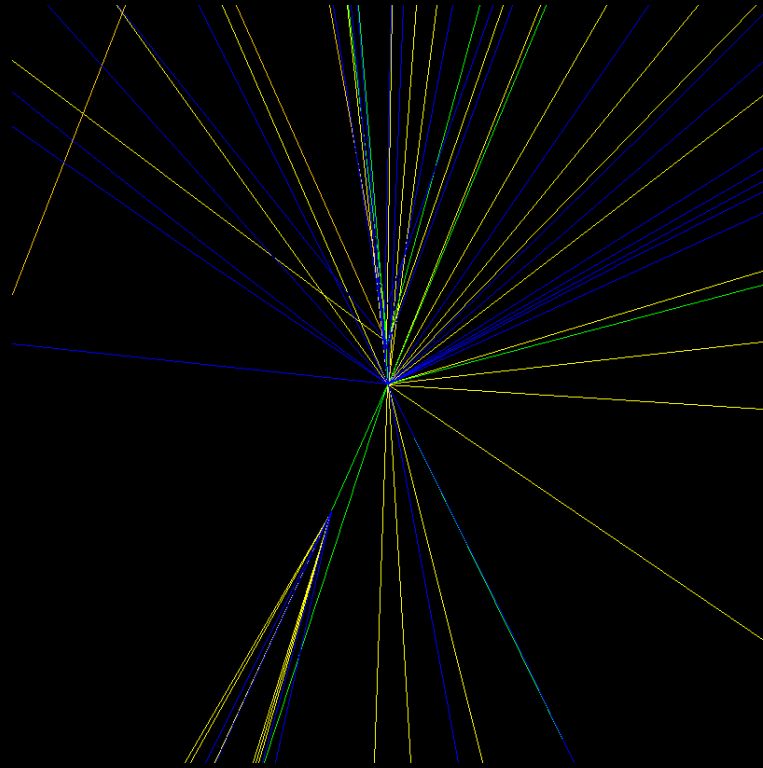
# The CCAL02 detector (Crystal Calorimetry version of SID)

Name	Layers	Thickness/Layer [cm]	Segmentation [cm x cm]	BGO		PbWO <sub>4</sub>	
				X <sub>0</sub>	λ <sub>1</sub>	X0	II
ECAL Barrel	8	3	3 x 3	21.4	1.1	27	1.3
HCAL Barrel	17	6	5 x 5		4.7		5.7
Total Barrel	25				5.8		7
ECAL Endcap	8	3	3 x 3	21.4	1.1		1.3
HCAL Endcap	17	6	5 x 5		4.7		5.7
Total Endcap	25				5.8		7

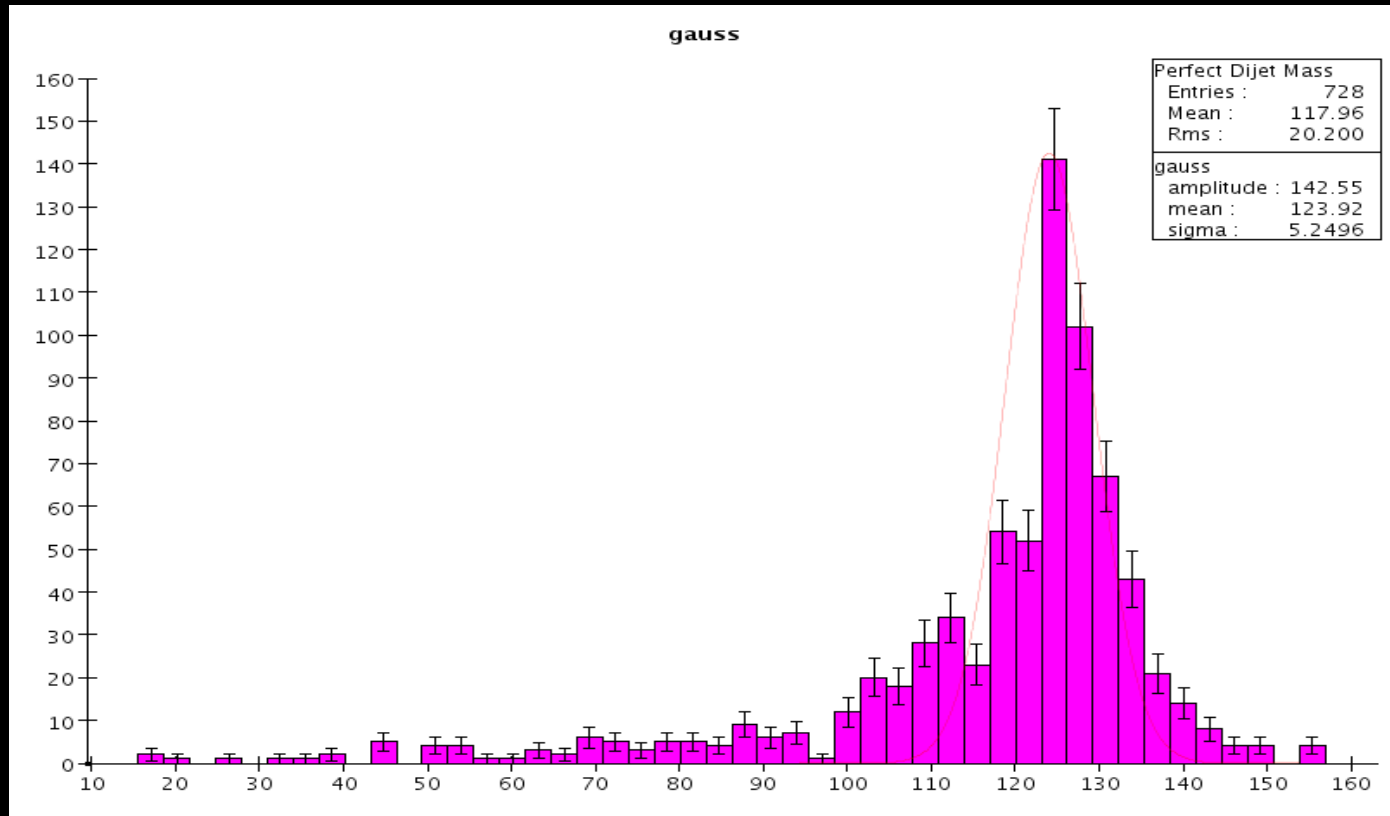


Material	Density [g/cm <sup>3</sup> ]	Rad. len. X0 [cm]	IA len. [cm]
BGO	7.13	1.12	21.88
PbWO <sub>4</sub>	8.3	0.9	18
SCG1-C	3.36	4.25	45.6

detsim



# PFADRSelect.java



# What's next

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- Recover scripts to run slic on FermiGrid
- Generate single  $(e^-, \pi^-)$  data samples to calibrate calorimeter response. Evt. at Z peak.
- Classification of events (b-tagging)
- Examples! Analysis, Documentation.
- Coordinate with Norman to make sure all the necessary files needed are packaged correctly and pushed to the lcsim caches.

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Have fun!