

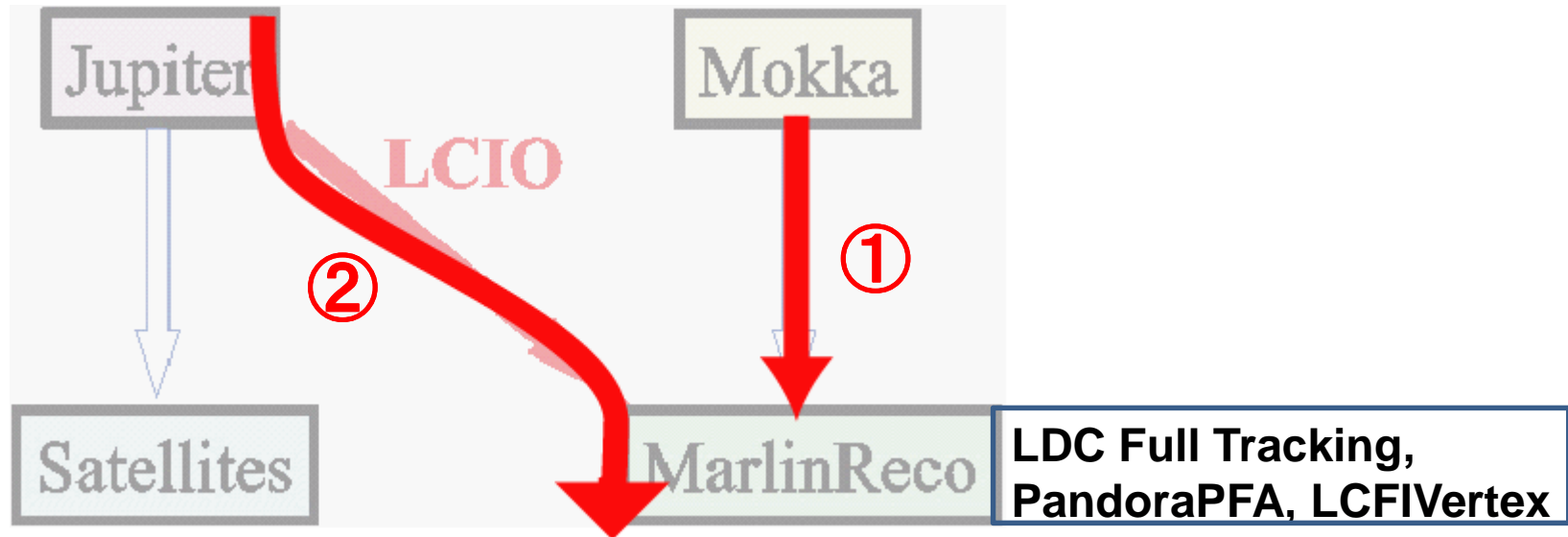
# Preparation for Jet Analysis of Jupiter data using MarlinReco+PandoraPFA

Jan-14-16 ILD workshop @ Zeuthen,  
Satoru Uozumi

# Outline

- Jupiter + Marlin will be a main analysis tool for detector optimisation studies.  
(not only for LDC/LDC', but also GLD/GLD')
- For jet-mode (e.g. ZH -> jets), need to establish the analysis path of Jupiter data using Jupiter-LCIO interface and analysis modules in Marlin  
(FullLDCTracking, PandoraPFA, LCFIVertex ... ).

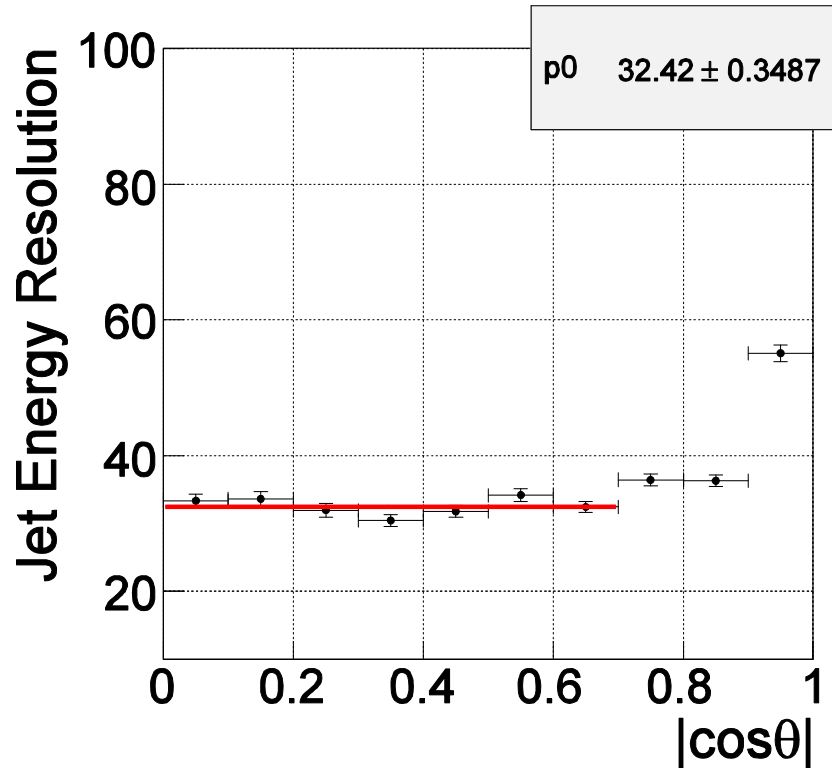
# Steps



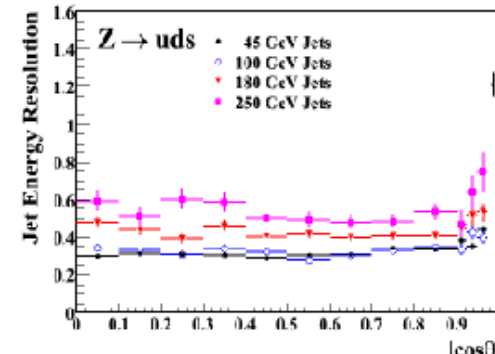
1. Confirm PandoraPFA performance using Z-pole data generated by Mokka (LDC00Sc).
2. Convert Jupiter data using J42LCIO and try to reconstruct events with Marlin framework.
  - Use single muon and Z-pole events for test.
  - Reconstruct track with MarlinReco (TPC+Silicon tracking)
  - Perform jet energy measurement with PandoraPFA
  - b, c-tagging using LCFIVertex
3. Actual analysis of ZH -> jets data.

# Step 1

Look at JER with Mokka data and PandoraPFA (v01-02)



Mark's  
Result  
(v01-01)

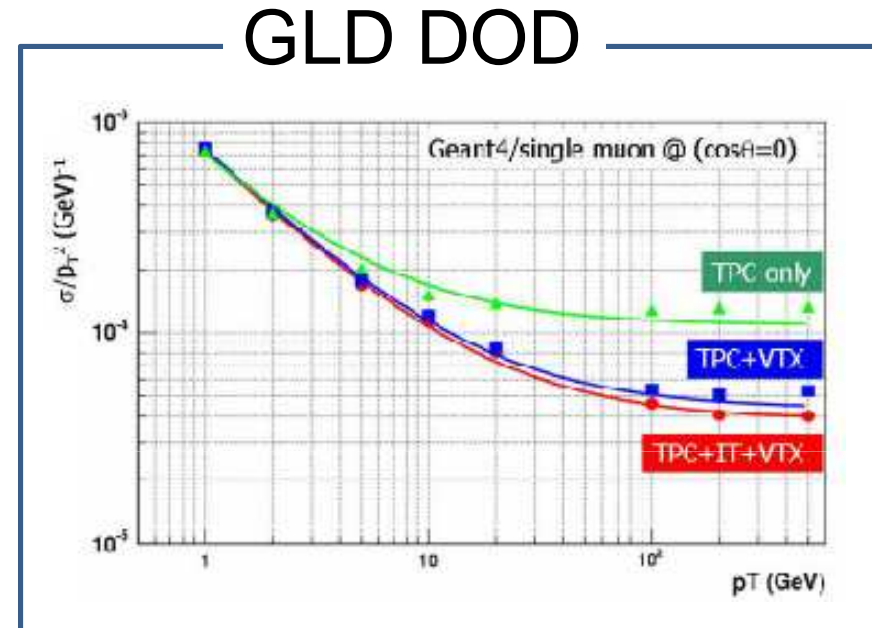
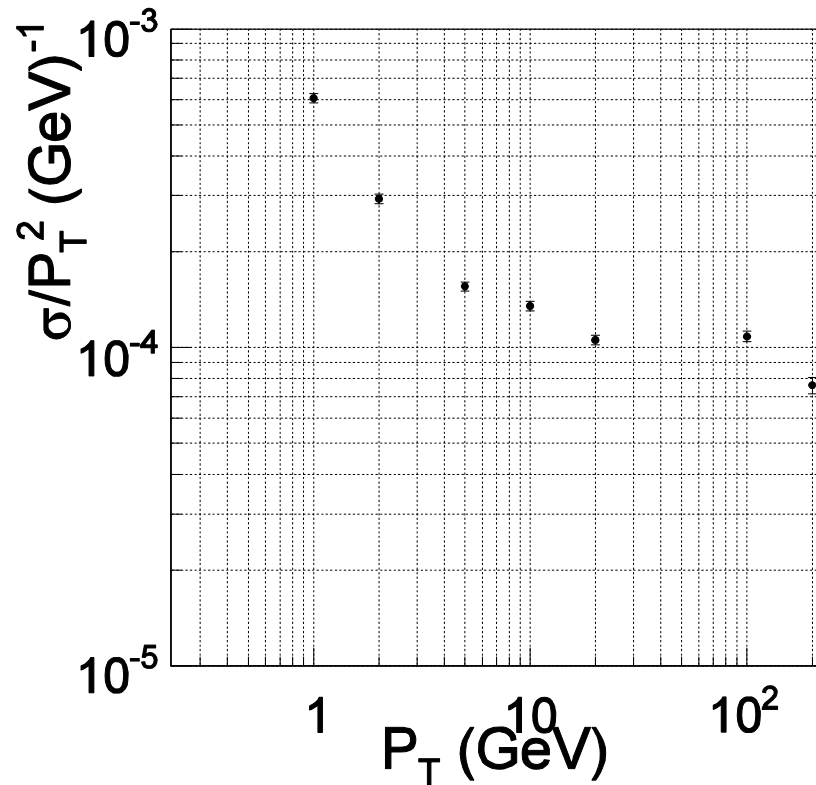


rms90\* PandoraPFA v01-01

$E_{JET}$	$\frac{\epsilon}{E} = \frac{\sigma}{E_{jj}}$ $ \cos\theta  < 0.7$	$\frac{\epsilon}{E_j}$
45 GeV	0.295	4.4 %
100 GeV	0.305	3.0 %
180 GeV	0.418	3.1 %
250 GeV	0.534	3.3 %

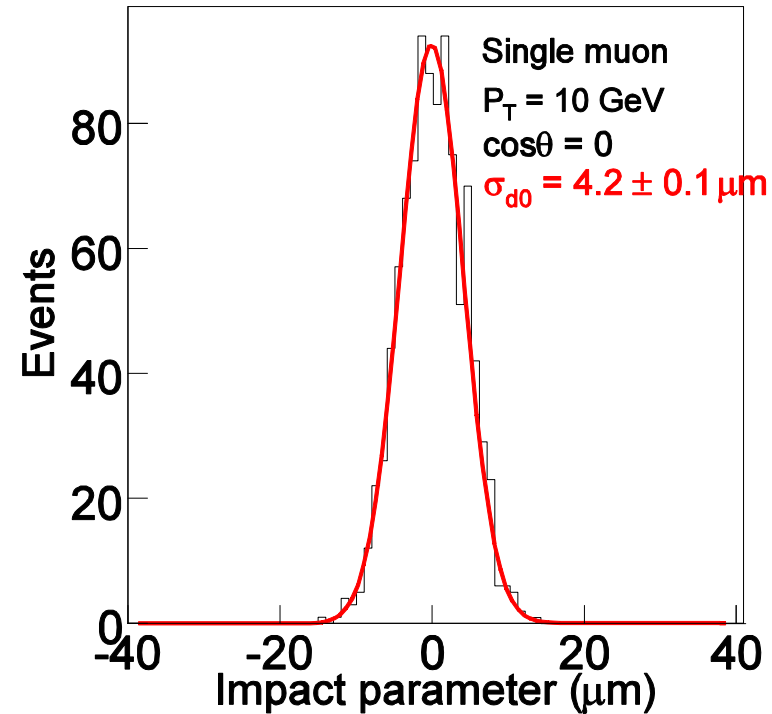
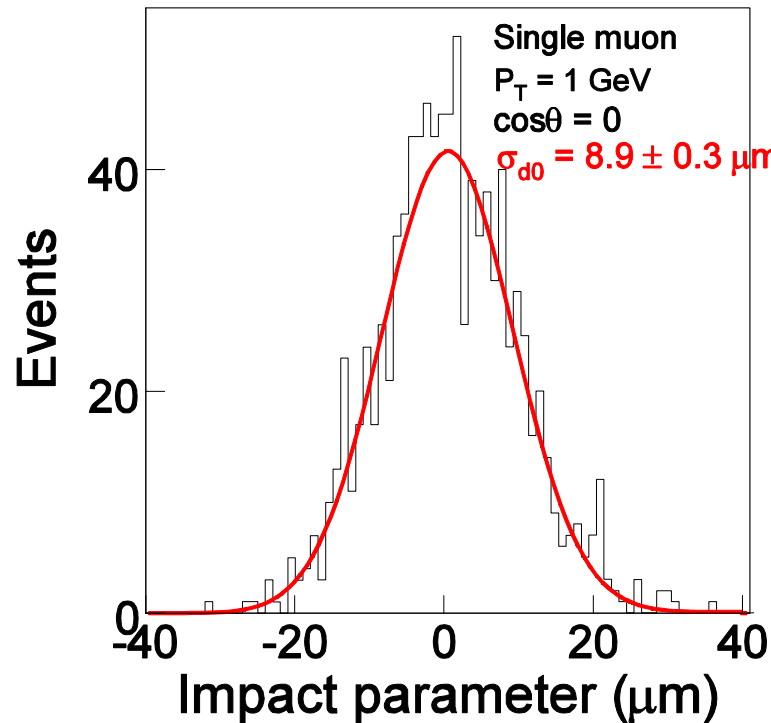
- To learn correct usage of LDC software framework.
- Z-pole data from GRID at DESY  
(M-5-4\_zpole\_dus\_noisr\_LDC00Sc\_4.0T\_r1690.\_I2730.\_QGSP\_BERT).
- Use PandoraPFA v01-02 with Full LDC tracking.
- JER is slightly different with Mark's result, but almost consistent.

## Step 2 – momentum resolution for single muon



- Single muon data ( $\cos\theta=0$ ,  $\phi=90^\circ$ ) generated by Jupiter and converted to Icio.
- Preliminary result looks consistent with past results with Jupiter+Satellites.

## Step 2 – $d_0$ resolution for single muon

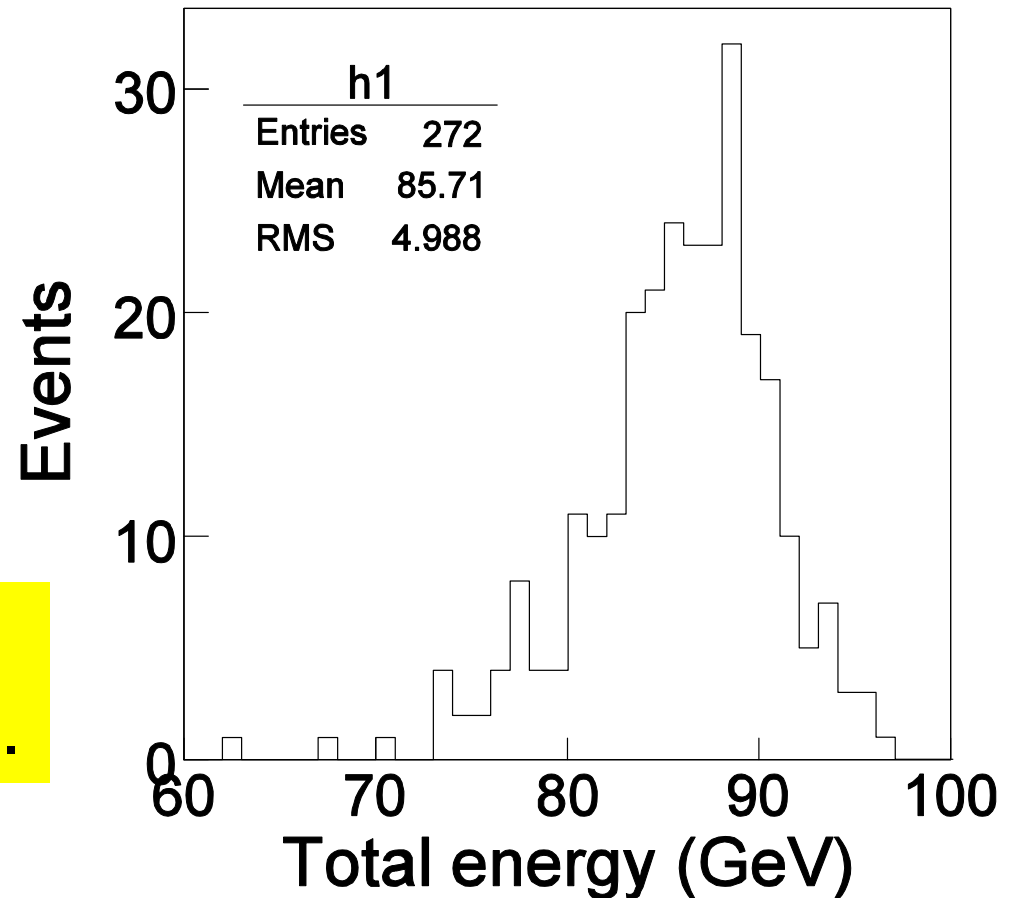


- Again Single muon data with true  $d_0 = 0 \mu\text{m}$ .
- SiliconDigi+SiliconTracking in Marlin is working for the Jupiter data!
- $d_0$  resolution looks consistent with Jupiter+Satellites.

## Step 2 – Jet energy resolution for Z-pole events

- Z-pole data generated by Jupiter and converted to LCIO.
- Reconstruct Z-mass with full LDC tracking and PandoraPFA v01-02.

Sorry, still working.  
But seems to be not bad.



# The work is underway in good shape, but ...

- Often we need to look into source codes to solve compatibility with Jupiter/Marlin, and it is quite time consuming.
- Many GEAR or other parameters are needed to be set in steering file, but sometimes it is not easy to find a correct values.
  - > Need a table of “official” set of parameters for each configuration !
- For other points, Marlin framework is quite comfortable to use for me.



# Summary

- We are establishing analysis path using Jupiter + LCIO interface + Marlin framework.
- Work is ongoing in good shape, but often encounter many problems.  
(compatibility of geometry, GEAR parameters ....)
- Need help from experts !

## Near Future Plans

- Establish analysis path (including latest PandoraPFA , JetFinder and LCFIVertex, and so on.) in a few weeks.
- Proceed to optimization study with ZH -> jets mode.