



# Toward a full detector simulation: physics lists and gluon emission

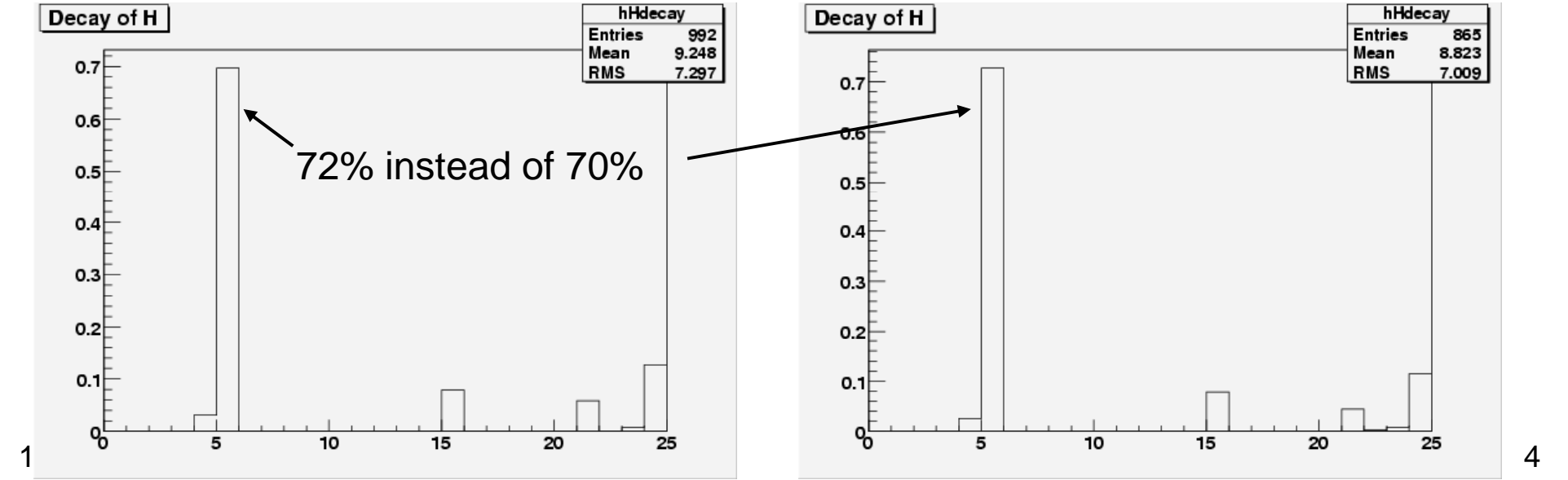
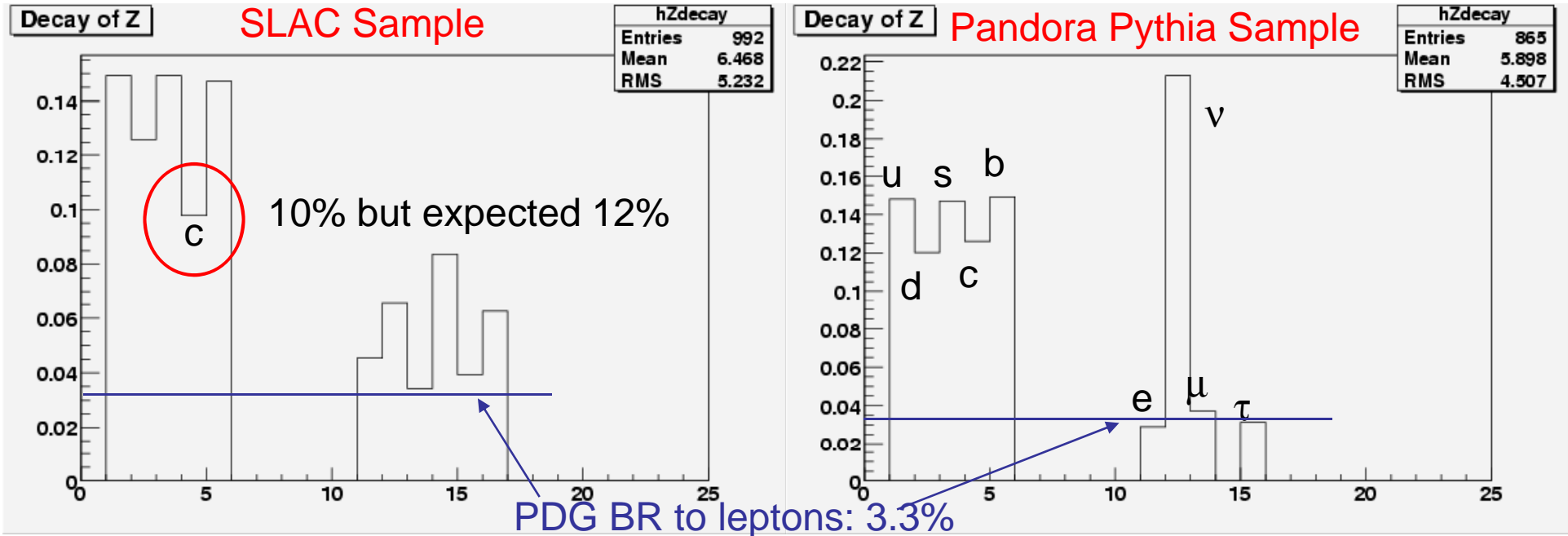
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- Physics List
- Decay BR of Z and Higgs
- Comparison of generators
  - Track multiplicity
  - Gluon emission
- Other requirements

# Physics Lists

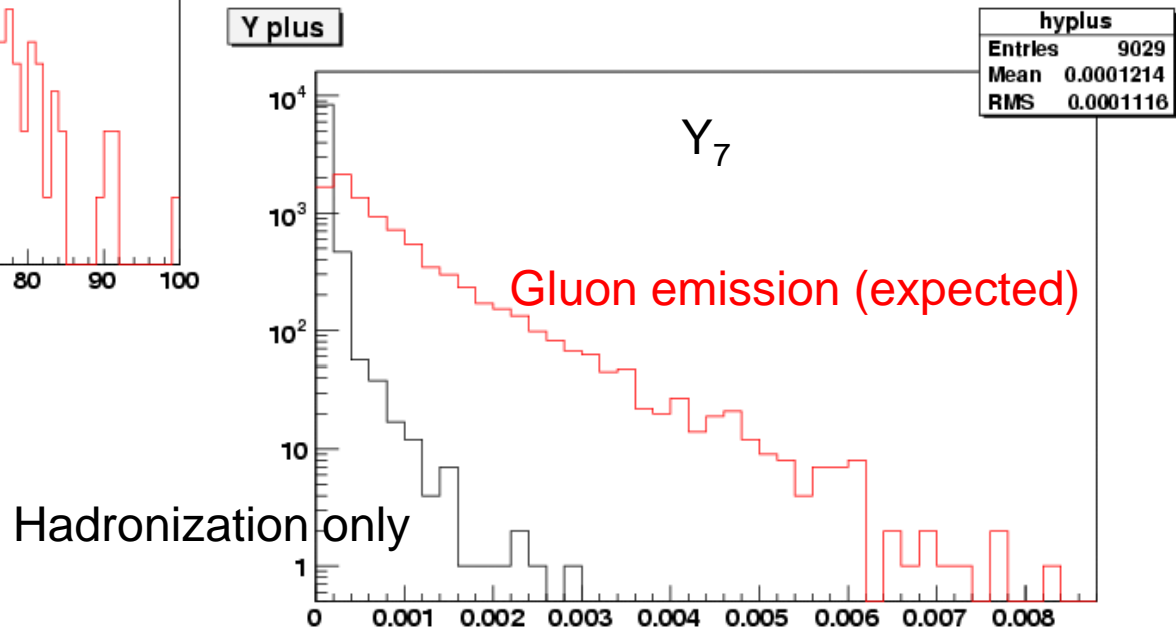
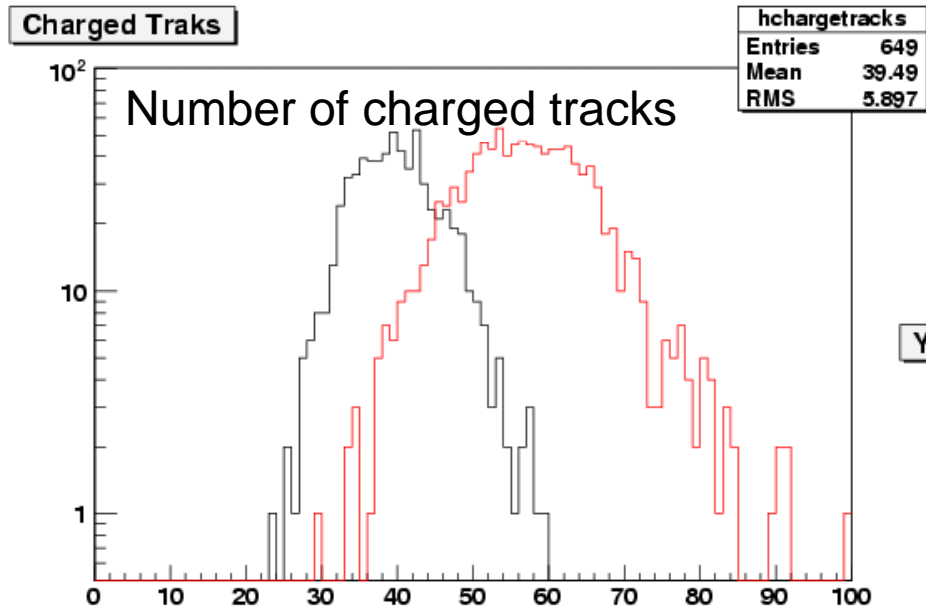
- There are ~50 physics list available, only one can be used and must be chosen soon.
- Performance test using **30 GeV  $\pi^+$** 
  - Some list not included in Mokka:
    - LBE, LHEP\_BERT\_HP, LHEP\_PRECO\_HP, QGSP\_BERT\_HP, QGSP\_BIC\_HP
  - Almost all list need 16-20 minutes
    - **Fastest is LHEP\_EMV**  $\rightarrow$  15'19" (2h 51' for  $Z \rightarrow qq$ )
    - **LCPhys**  $\rightarrow$  17'19" (3h 25' for  $Z \rightarrow qq$ )
  - Some need more time
    - **QGSP\_BERT**  $\rightarrow$  34'18" (4h 31' for  $Z \rightarrow qq$ )
    - QGSP\_BERT\_TRV  $\rightarrow$  33'11"
    - QGSP\_BIC  $\rightarrow$  25' 23"
- A factor 1.5-2 increase in simulation time if we chose to use the slowest list respect to LCPhys (43 days  $\rightarrow$  86 days)

# Decay BR of Z and H



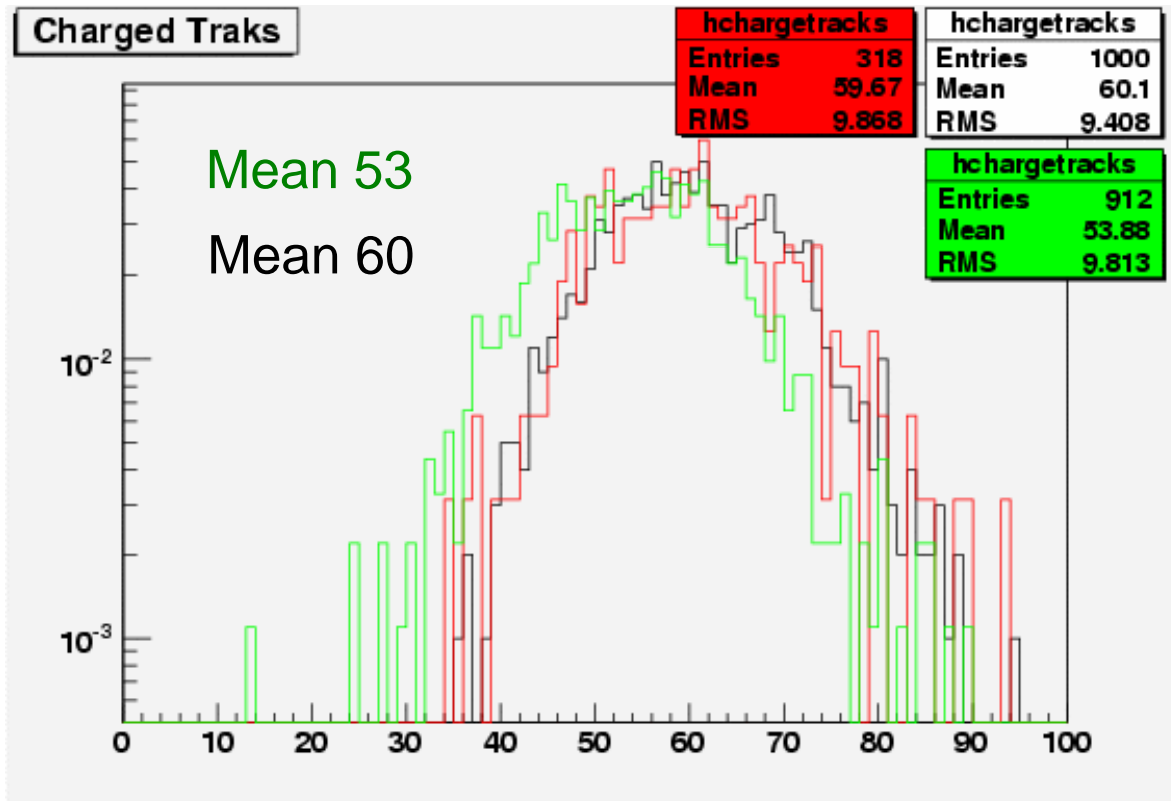
# Whizard vs Pandora Pythia

- Wizard 1.51 and requiring 6 fermions final state
- Pandora Pythia

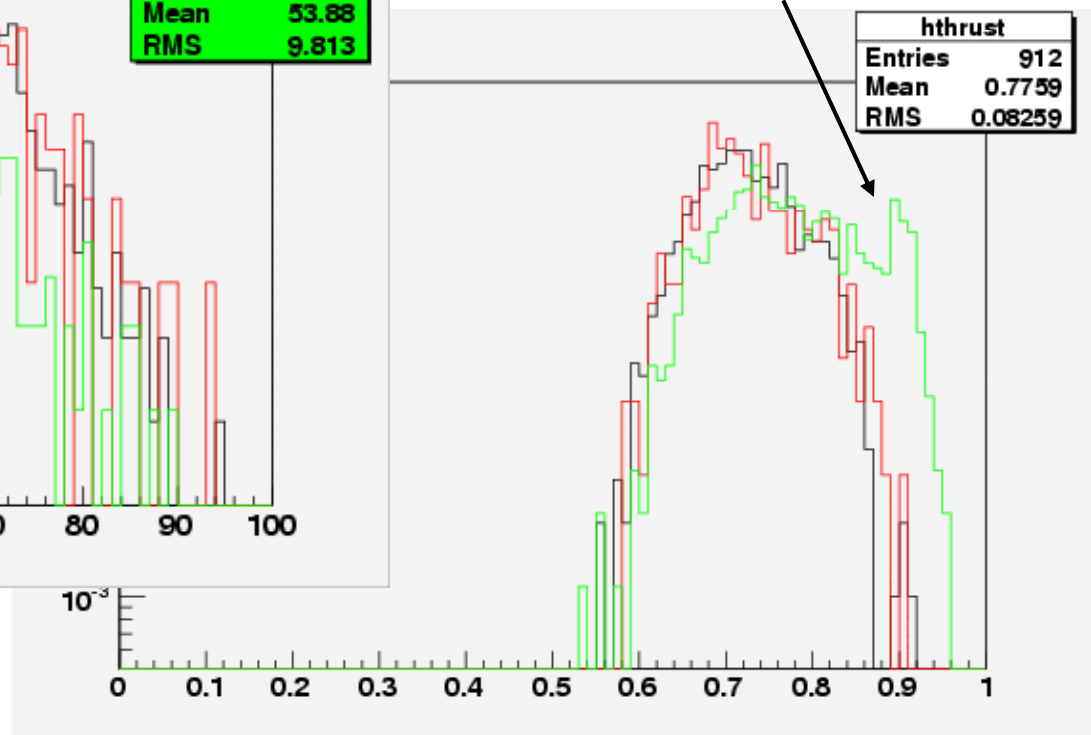


# Slac Sample

- Comparison with two sample from SLAC
  - WHIZARD generation of ZHH (decayed with Pythia)
  - WHIZARD generation of qqbbbb

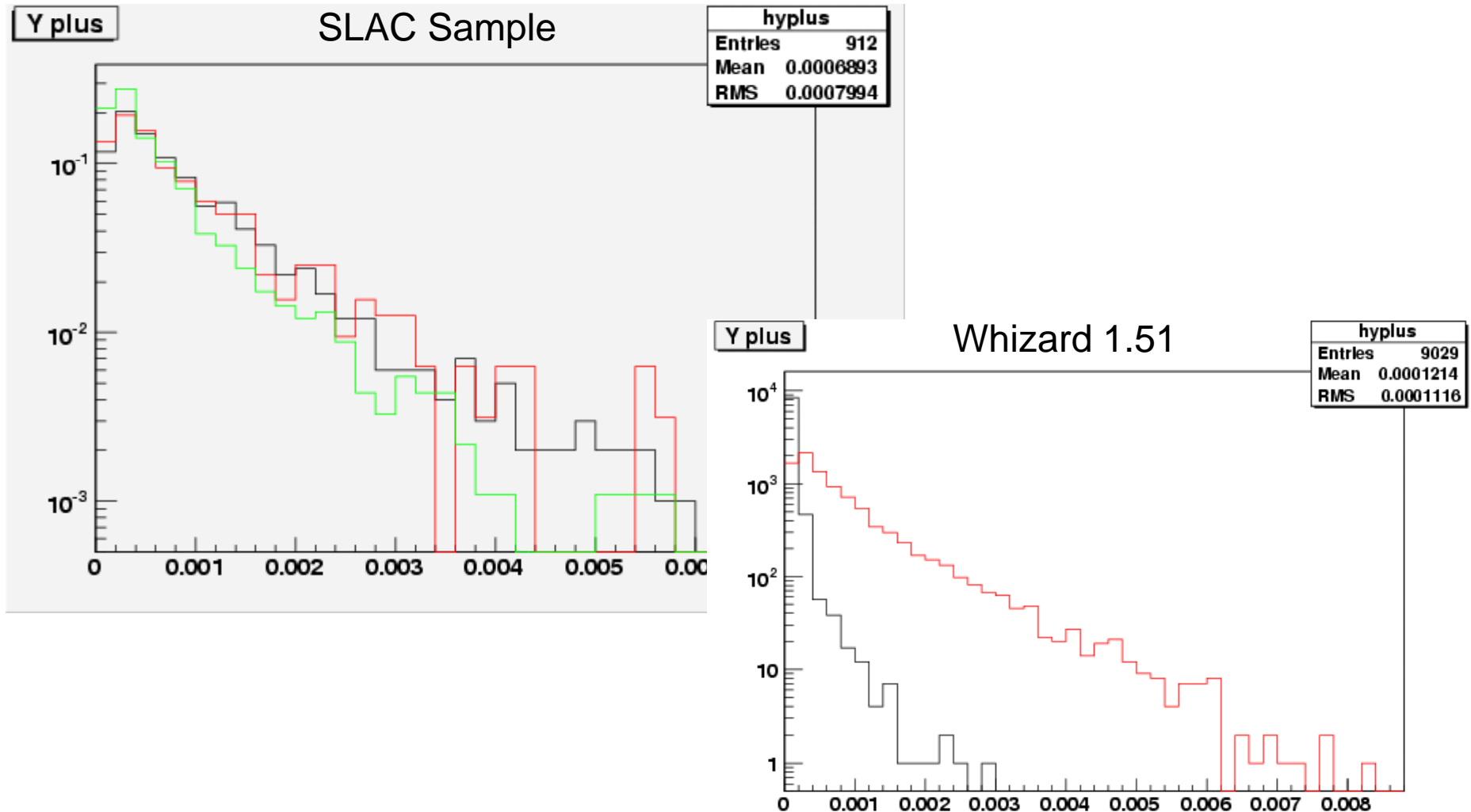


Deficit of track in qqbbbb probably due to 4f final state with gluon emission



# Gluon emission

- Gluon emission is correctly handled



# More points to discuss

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- Particle decay at generation level:
  - For **Pandora Pythia files there are no visible differences** in distribution between the decayed and undecayed samples
- Use a version of Gear compatible with both Mokka and Marlin
  - **Generate an official detector description**, now there are several incompatible definitions on CVS
- Calibration for **digitization processor** should be performed very soon:
  - This samples should have priority on physics samples
  - PFAs need to be calibrated on the same samples and calibrations