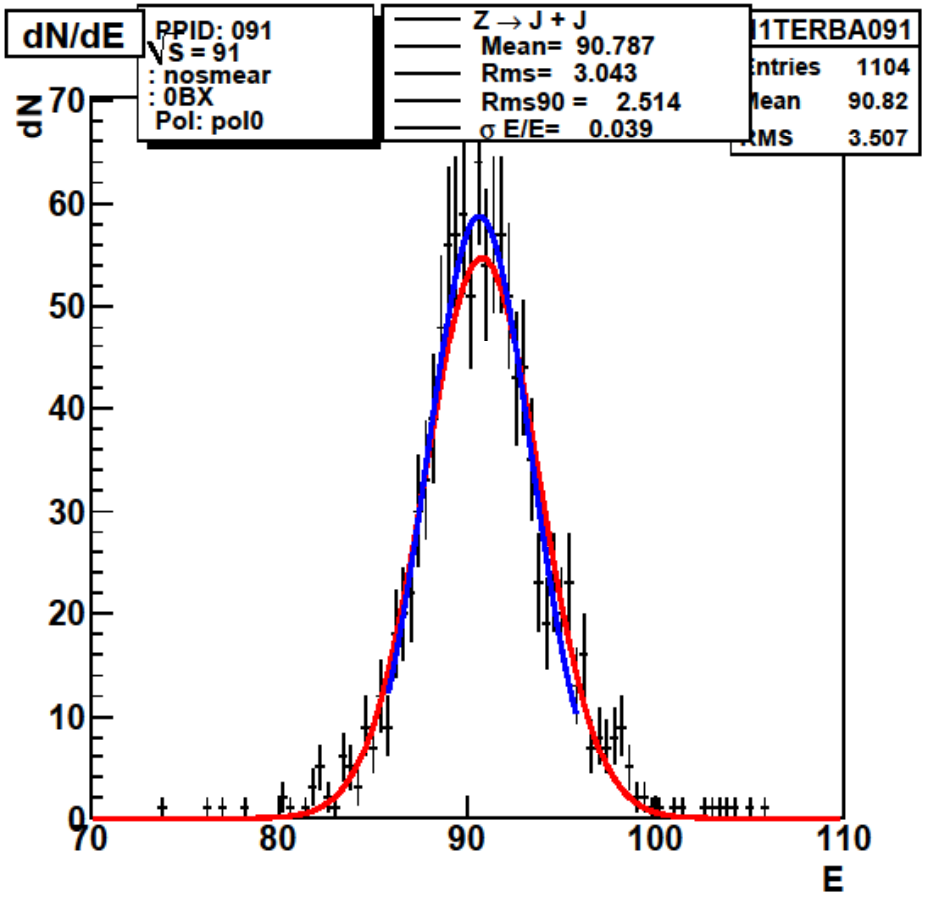
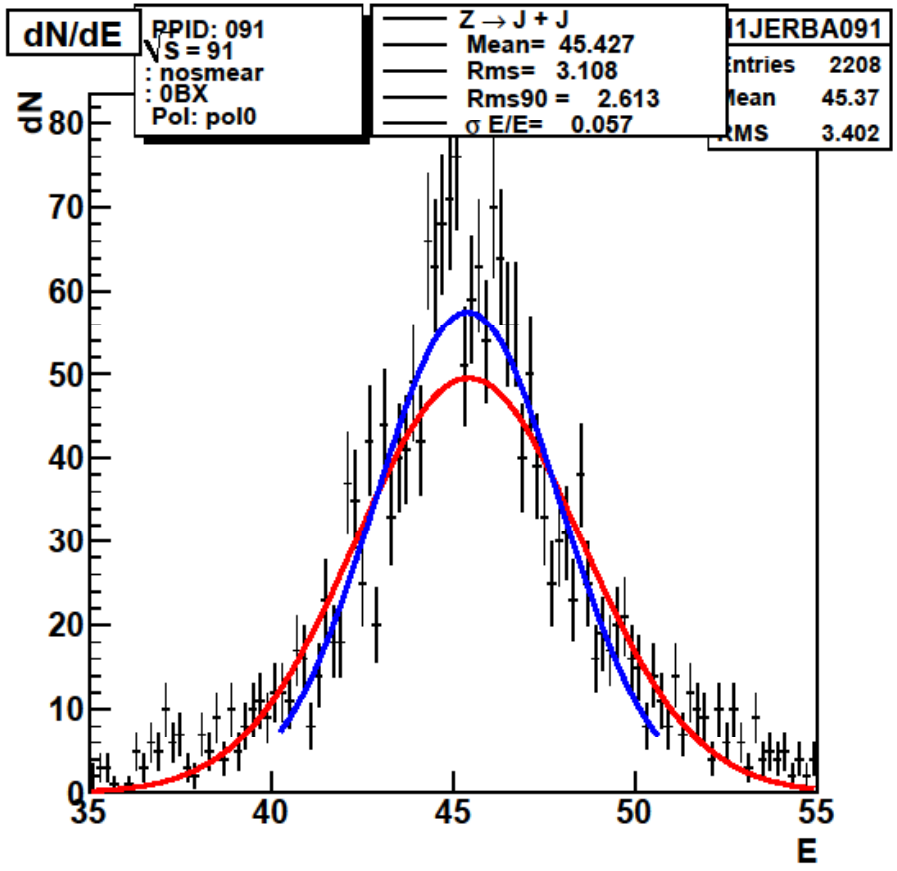
Jet Energy resolution

Use ILD stdhep files:
Objects of mass 91, 200, 500, 1000, … Gev were generated at 91, 200, 500, 1000, … Gev, decay at rest into uds jets, gluon emission was enabled.
events are simulated with Mokka and reconstructed with Marlin.
The jet energy is obtained using Durham jet finder, forcing the event into two jets.
Two histograms are produced
H1JER which is filled for each jet value je1 and je2
H1TER which is filled with je1+je2
Two different resolutions are computed
from H1JER: jerd=Rms90j/Mean (Jet energy resolution)
from H1TER: jert=Rms90t/(sqrt(2)*0.5*Mean) (Detector resolution)

arXiv:0907.3577v1 Mark Thomson

Jet Energy resolution 91 GeV



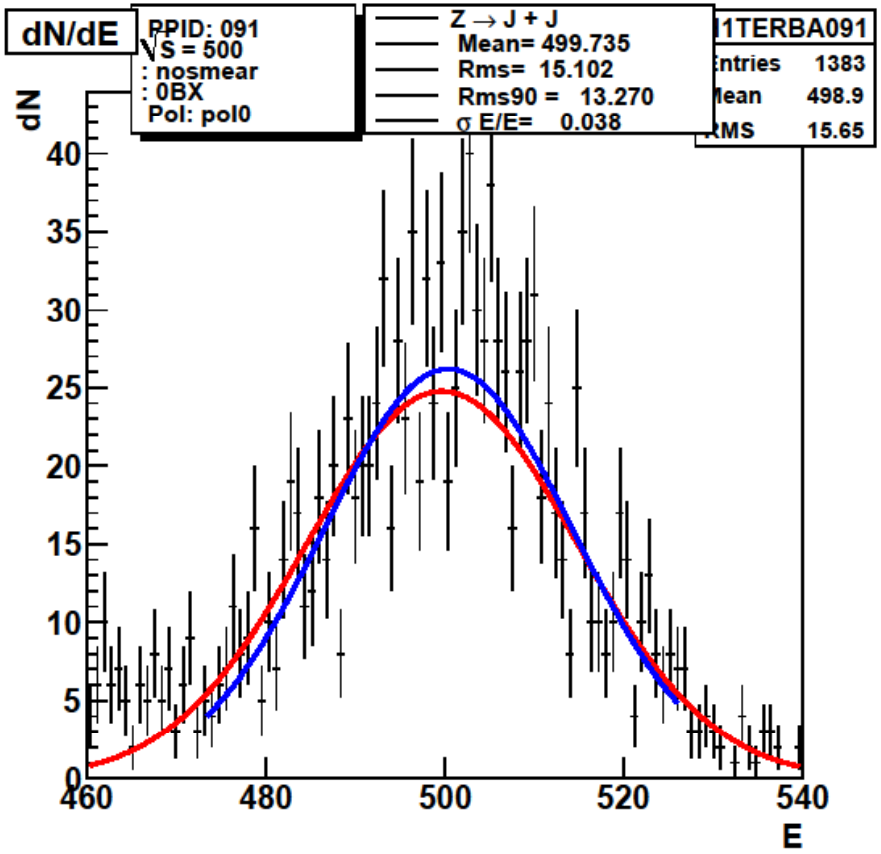


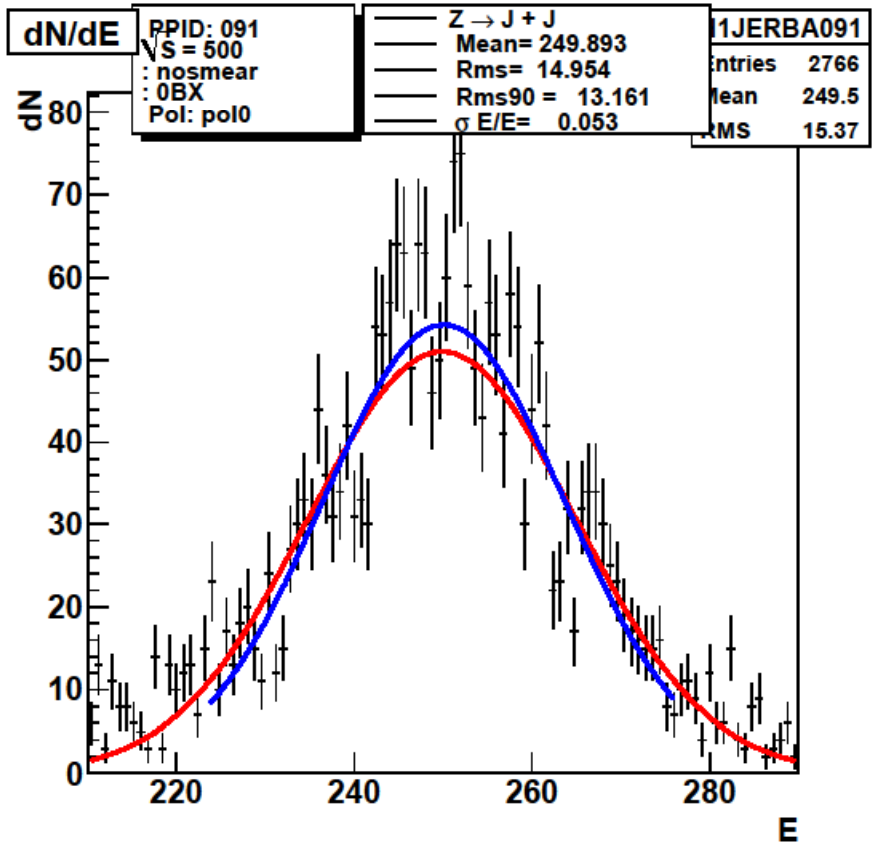
|cos ϴ | < 0.7; Calibration looks fine

Detector energy resolution σE/E=0.039 (PFA paper, 0.0374)

Jet energy resolution σE/E=0.057

Jet Energy resolution 500 GeV



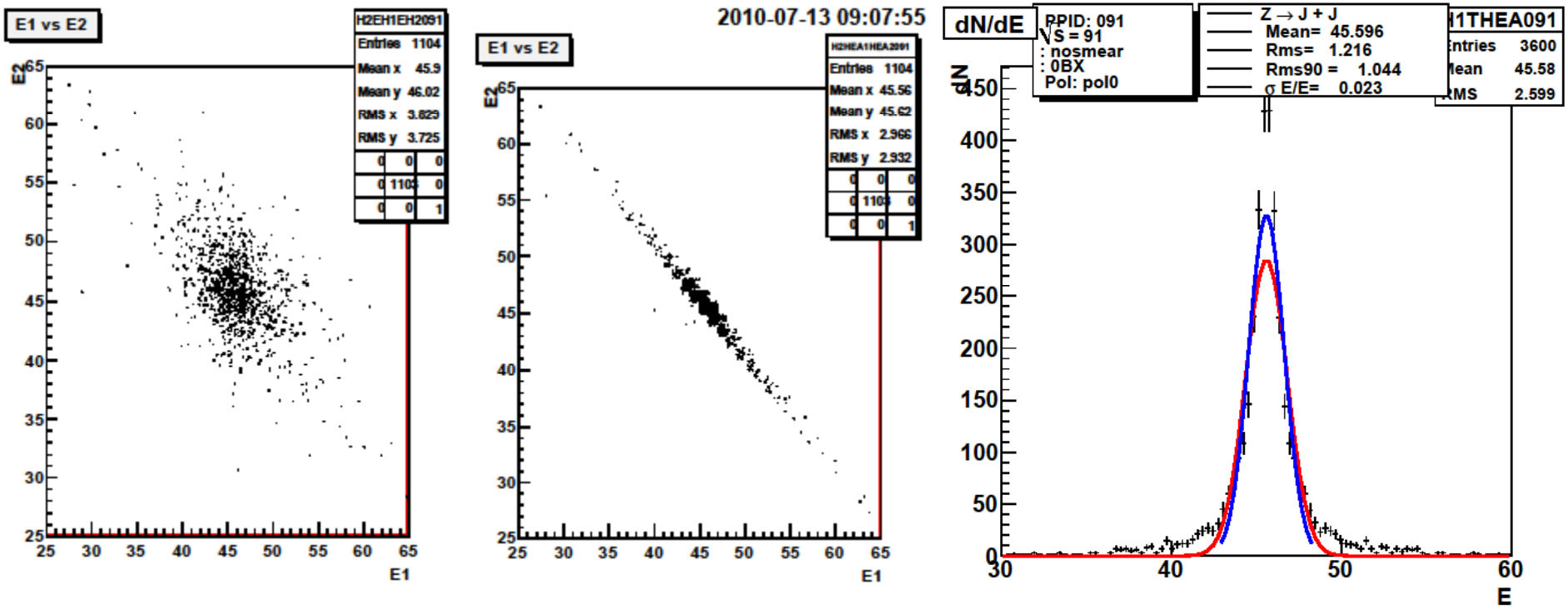


|cos θ | < 0.7; Calibration looks fine

Detector energy resolution σE/E=0.038(PFA paper, 0.028) , why this difference?

Jet energy resolution σE/E=0.053

Jet Energy resolution 91 GeV



Knowing the direction of the quark before gluon radiation; I assign all pfo objects to a quark when the objects are in a cone in space of 90 degree around the quark axis.
In this way I define 2 hemispheres having the quarks as axes.
a physics, here gluon radiation creates an additional resolution term which has nothing to do with the detector resolution, but which degrades the jet energy resolution.

Jet Energy resolution

	meanj	Rms90j	jerd	Meant	Rms90t	jert	Paper
|cos(theta)|<0.7							
√s= 91 GeV	45.43	2.61	0.057	90.79	2.51	0.039	0.037
√s=200 GeV	100.29	4.32	0.043	200.62	4.58	0.034	0.029
√s=500 GeV	249.89	14.16	0.053	499.74	13.27	0.038	0.028
Without theta cut							
√s= 91 GeV			0.063			0.046	
√s= 200 GeV			0.047			0.039	
√s=500 G			0.056			0.043	

1, 2, 3 Tev data under production.

91 GeV data, jert for |cos(theta)|<0.7 ~ ok with ILD paper, discrepancy for larger values of √s; why ?