



University
Mohammed I



Physique de la Matière et
des Rayonnements
LPMR



Faculty of Sciences
Oujda

ATLAS Forward Calorimeter's Analysis

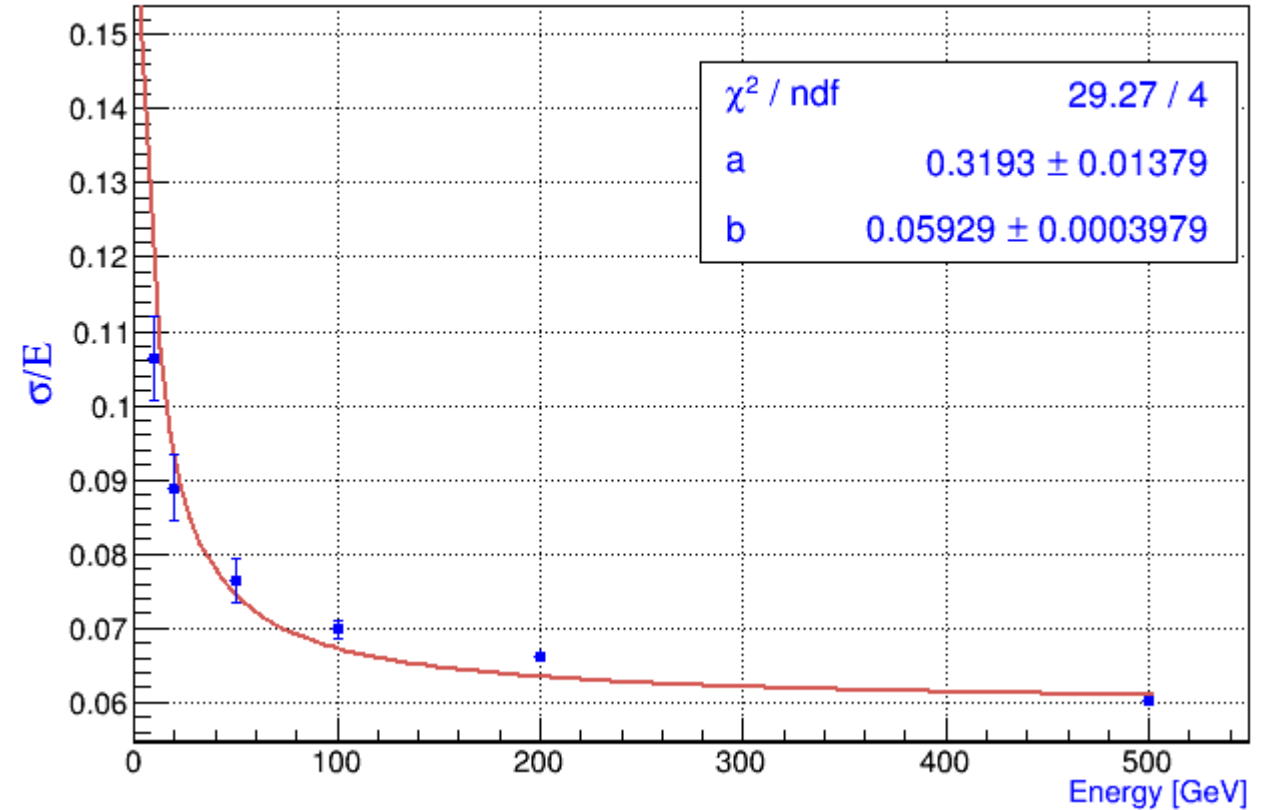
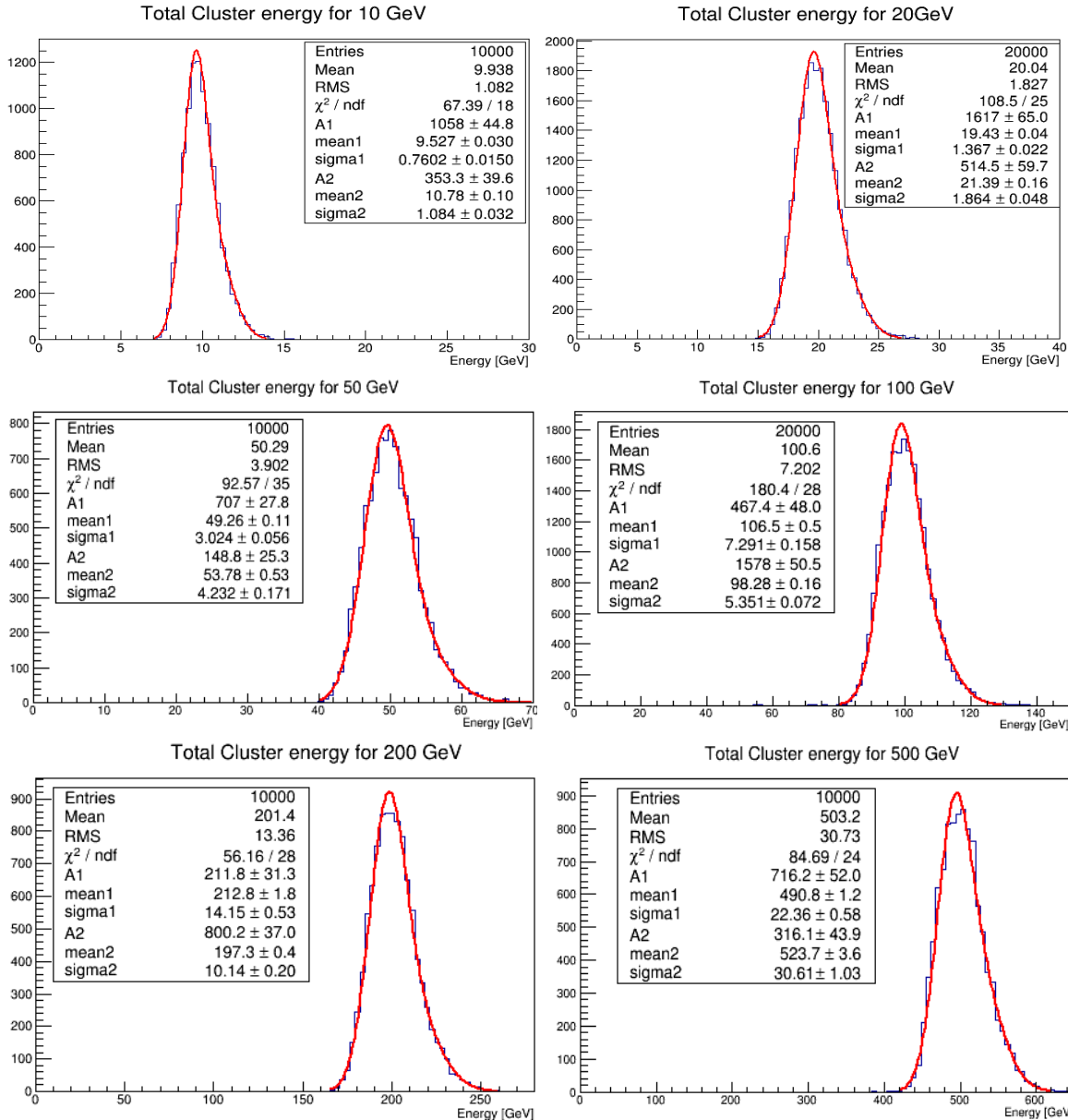
***KTH/FSO Meeting
03/ 06/ 2016***

Malika TOUIL – Yahya TAYALATI – Bengt Lund-Jensen



Electrons : FCal Energy Resolution

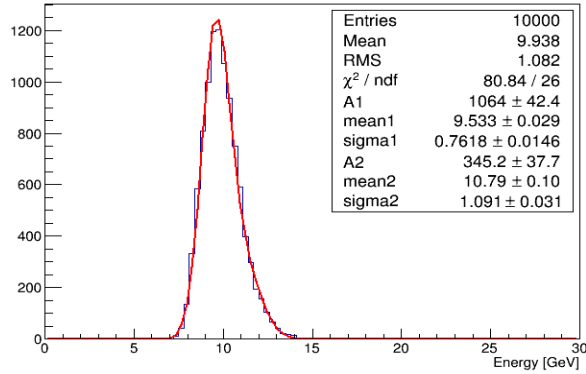
FCal Energy Resolution



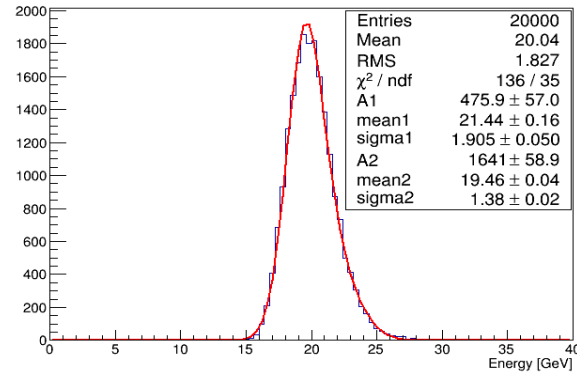


Electrons : FCal Energy Resolution

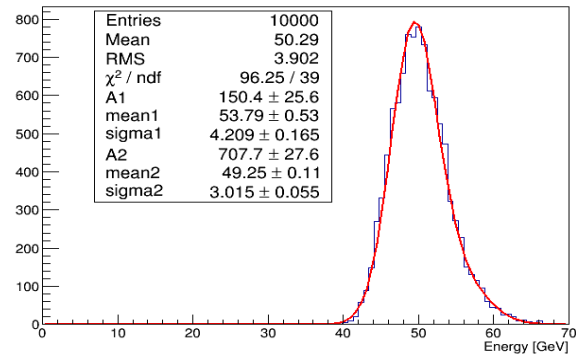
Total Cluster energy for 10 GeV



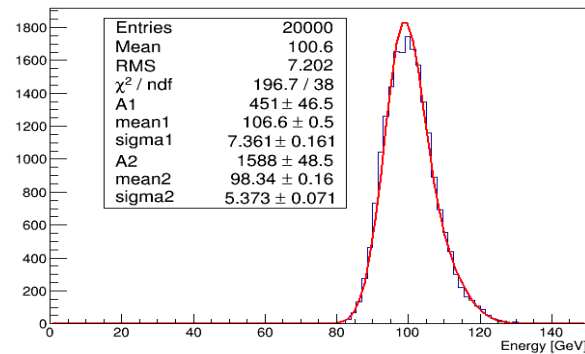
Total Cluster energy for 20 GeV



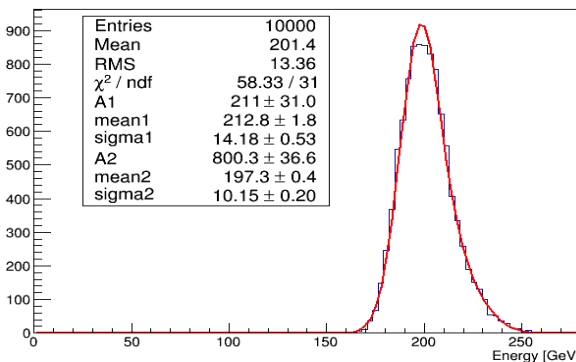
Total Cluster energy for 50 GeV



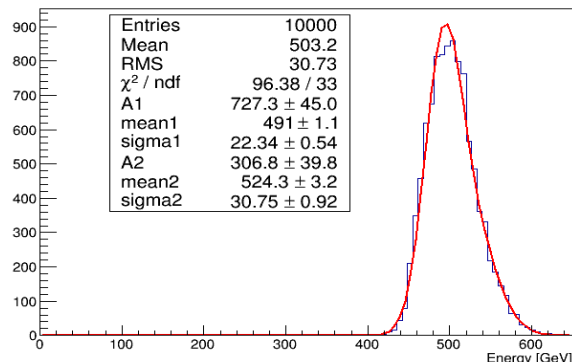
Total Cluster energy for 100 GeV



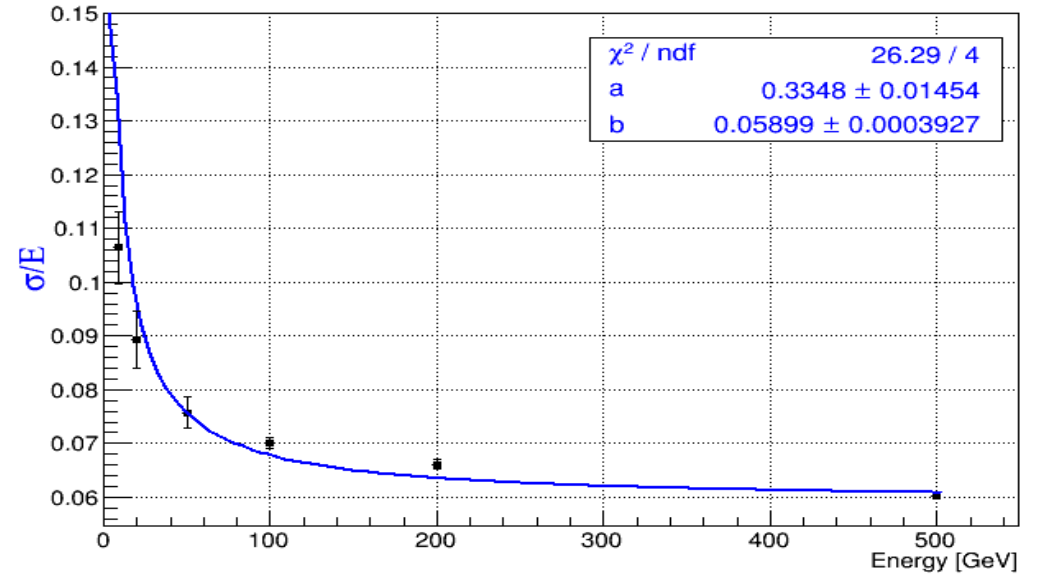
Total Cluster energy for 200 GeV



Total Cluster energy for 500 GeV



FCal - Energy Resolution



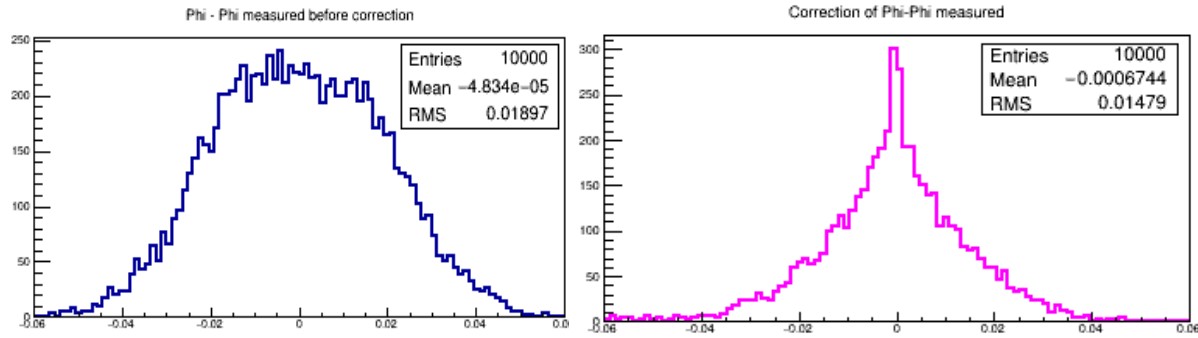
Energy [GeV]	Energy resolution
10	0.1063±0.0067
20	0.0892±0.0053
50	0.0762±0.0029
100	0.07±0.00103
200	0.0659±0.0007
500	0.06029±0.00032



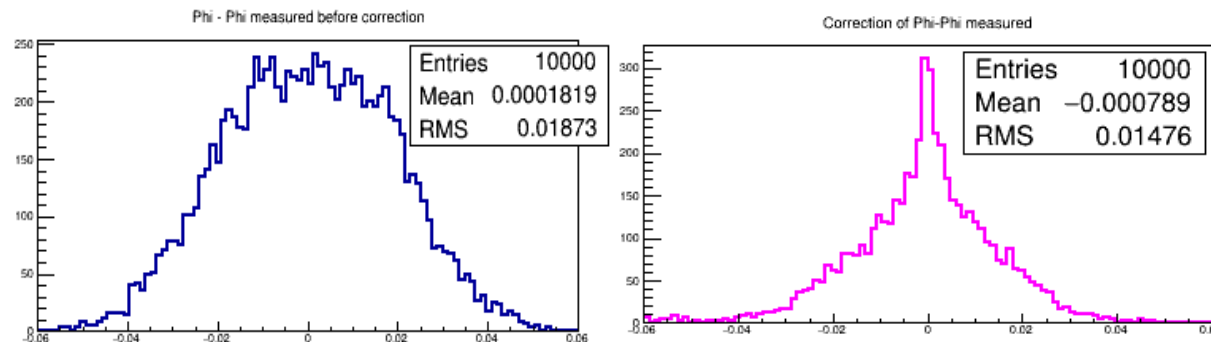
Electrons : FCal Phi Position Resolution

$3.5 < \eta_{\text{truth}} < 4.5$

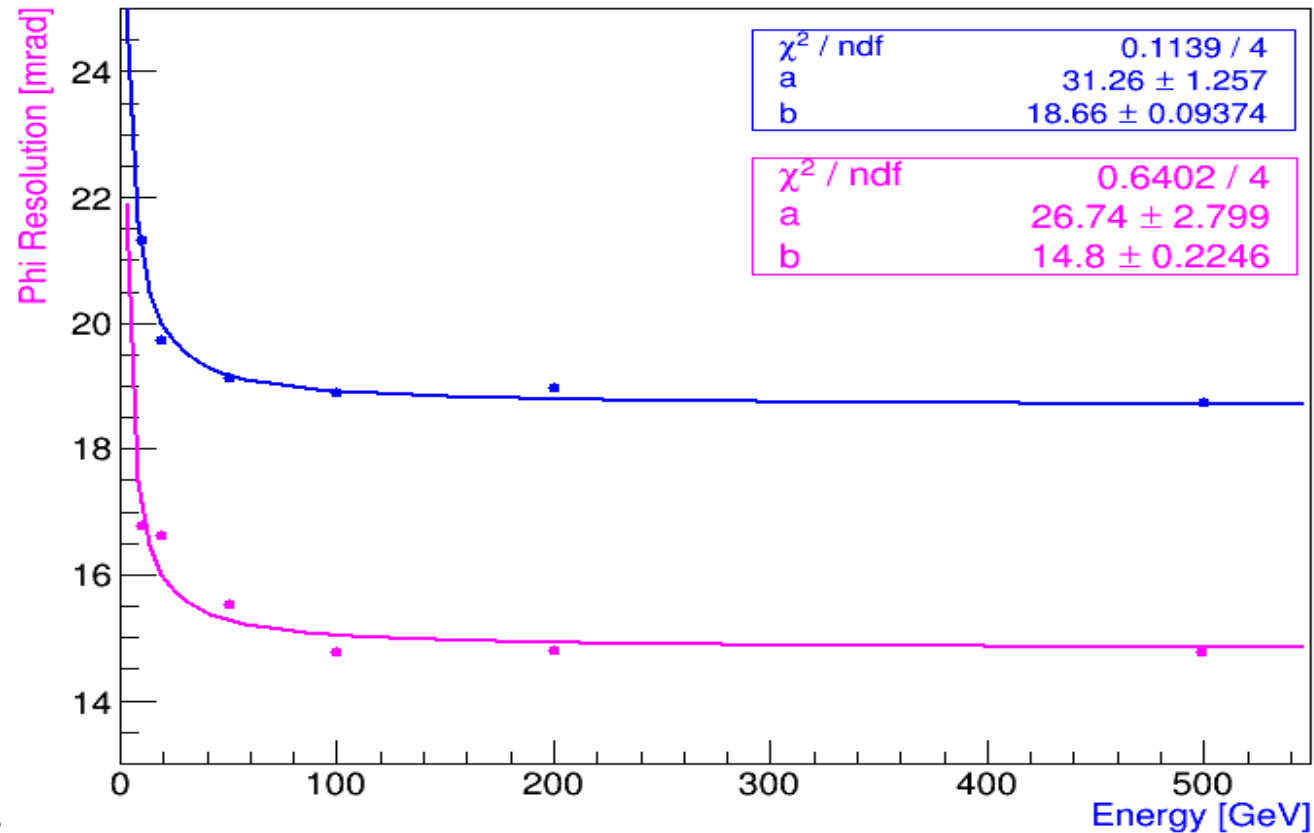
FCal Phi Position Resolution



200 GeV



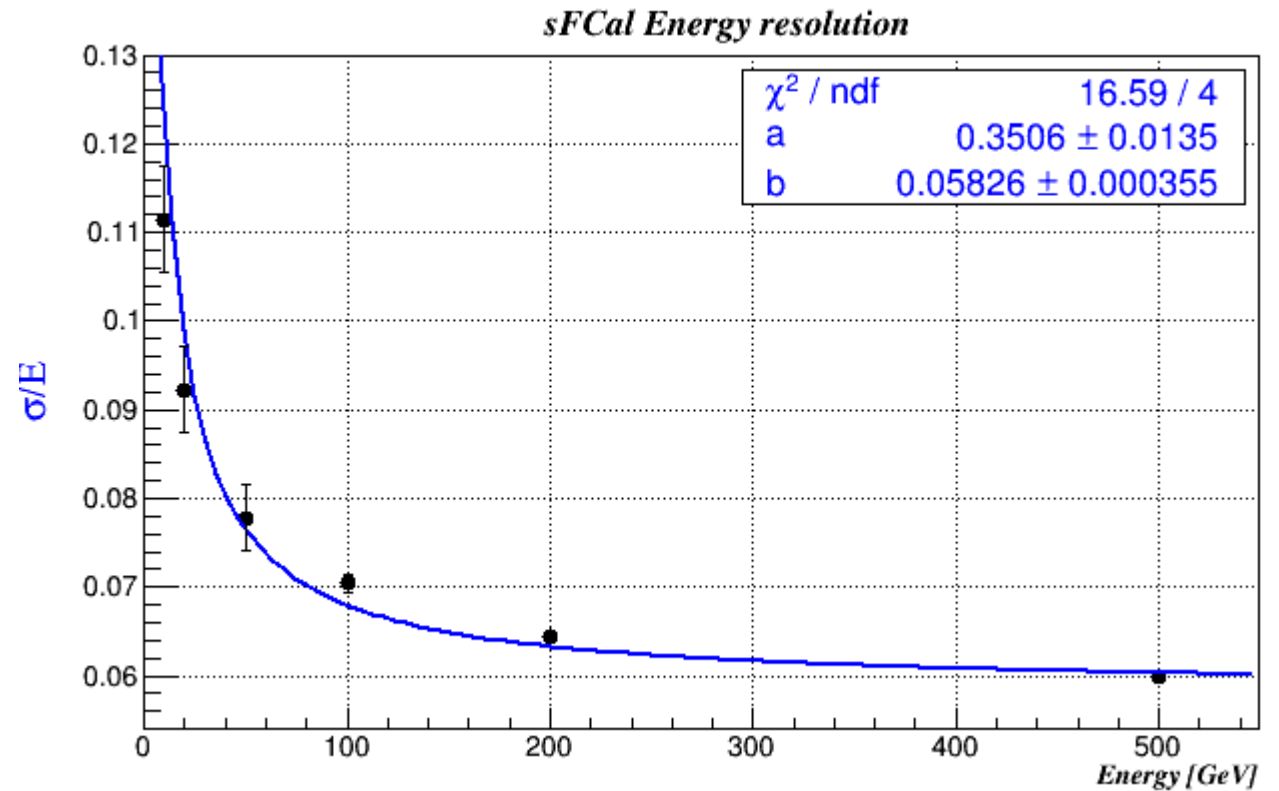
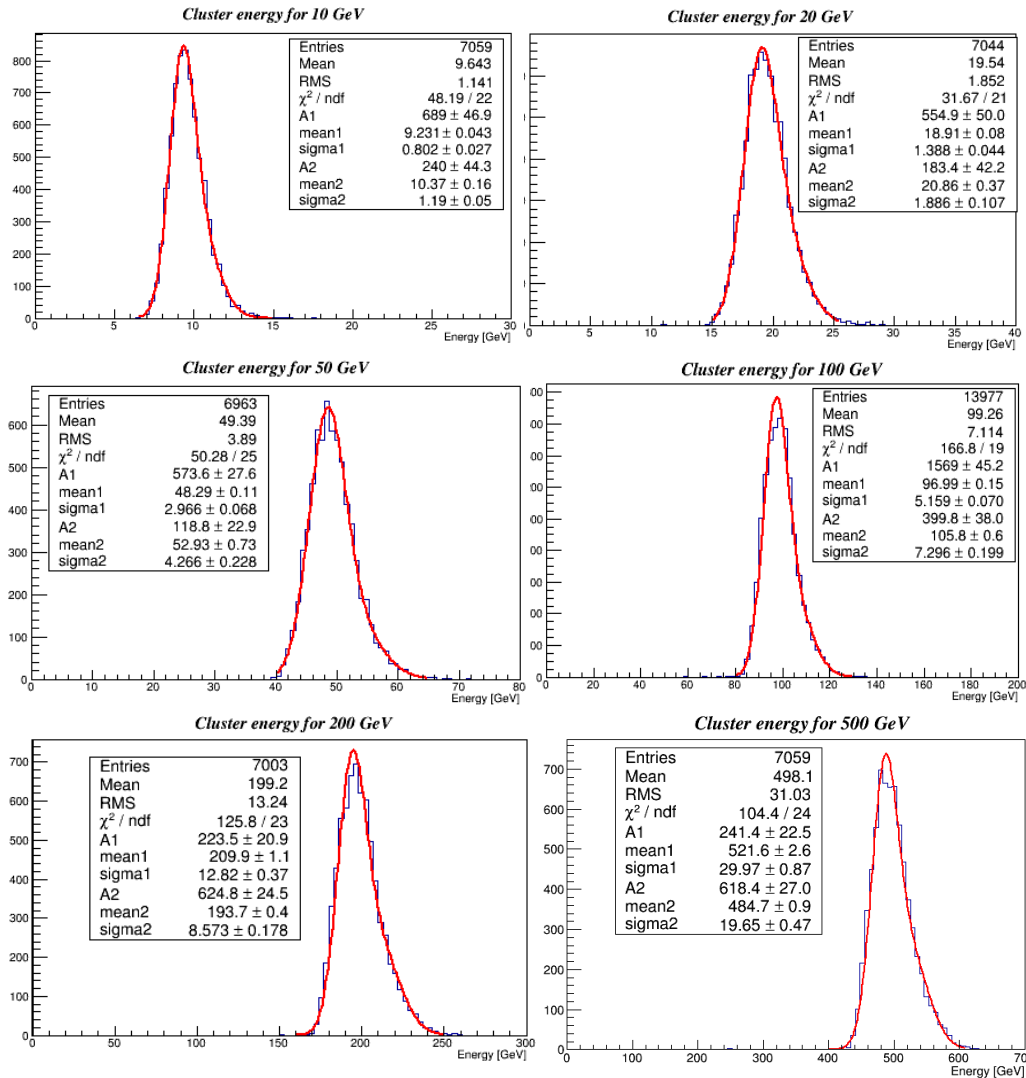
500 GeV



- Before Correction
- After Correction

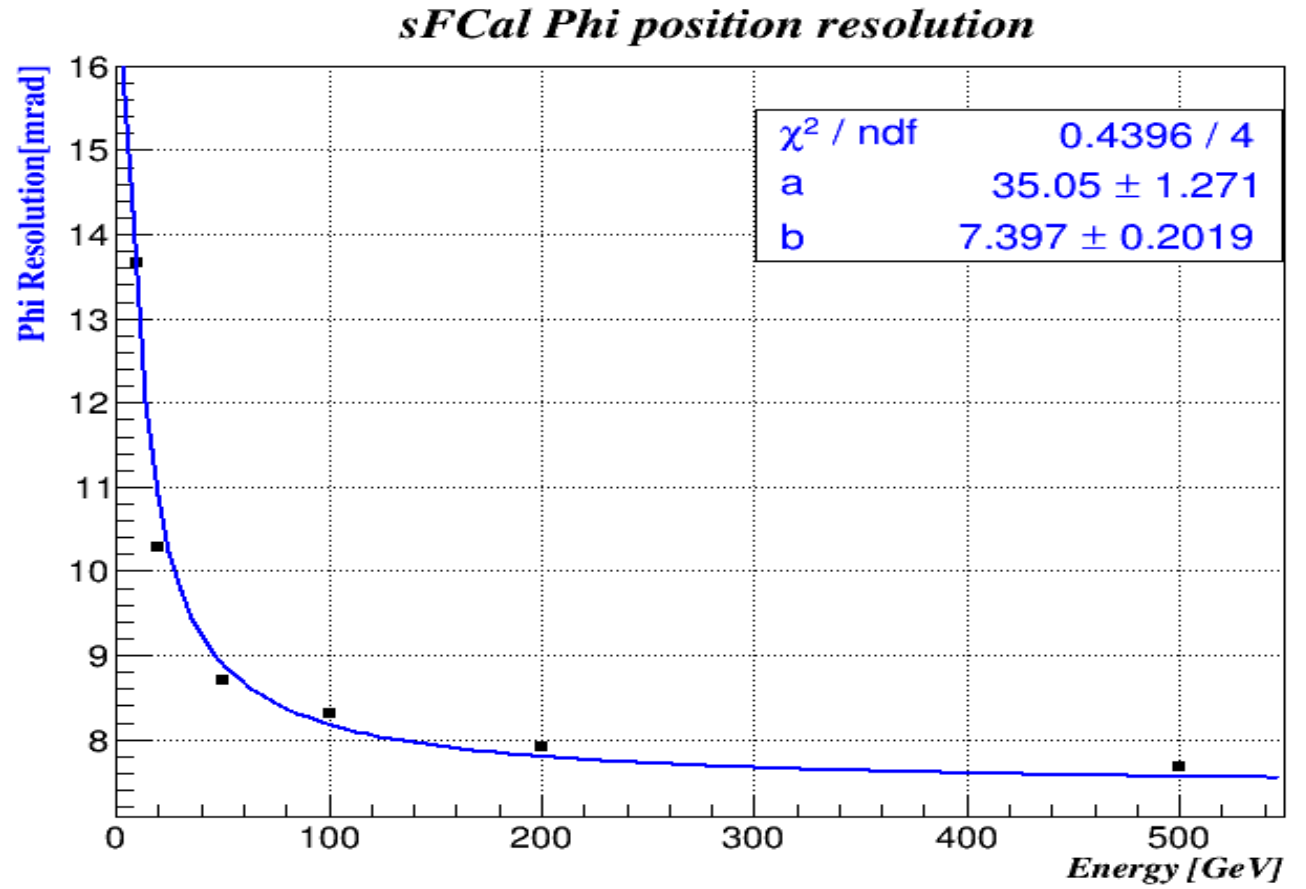
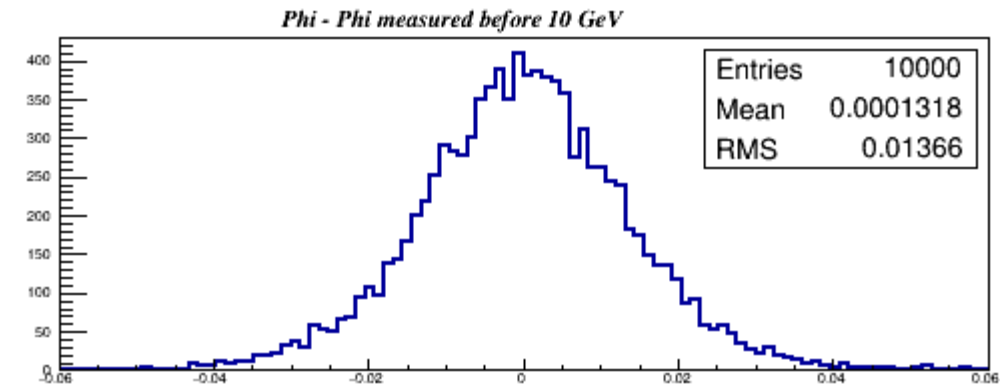
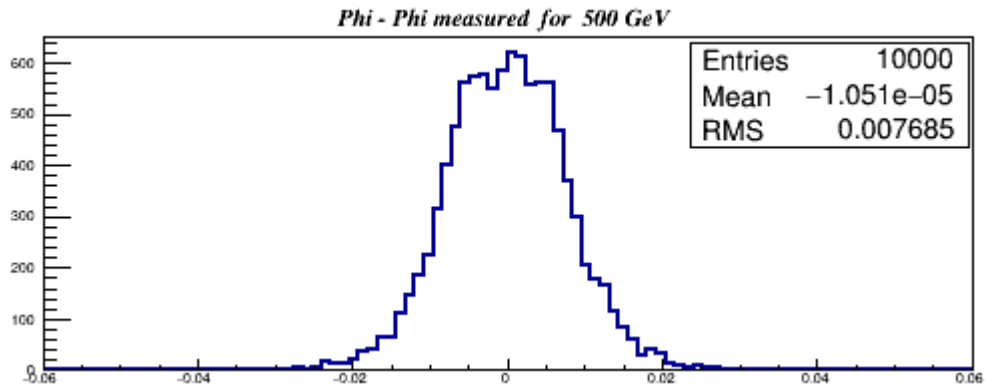


Electrons : sFCal Energy Resolution





Electrons : sFCal Phi Position Resolution





Pions : FCal Energy Resolution

FUNCTION MUST BE MINIMIZED BEFORE CALLING MINOS
MIGRAD MINIMIZATION HAS CONVERGED.

MIGRAD WILL VERIFY CONVERGENCE AND ERROR MATRIX.

FCN=5.24557e+06 FROM MIGRAD STATUS=CONVERGED 70 CALLS 71 TOTAL
EDM=1.03064e-14 STRATEGY= 1 ERROR MATRIX ACCURATE

EXT PARAMETER				STEP	FIRST
NO.	NAME	VALUE	ERROR	SIZE	DERIVATIVE
1	a1	7.19081e-02	6.88741e-06	6.67591e-06	-1.29042e-02
2	a2	9.01044e-02	1.21859e-05	1.06629e-05	-1.96519e-03
3	a3	8.67512e-02	3.23761e-05	3.21212e-05	3.55177e-03

FCN=5.24557e+06 FROM MINOS STATUS=SUCCESSFUL 16 CALLS 87 TOTAL
EDM=1.03064e-14 STRATEGY= 1 ERROR MATRIX ACCURATE

EXT PARAMETER		PARABOLIC		MINOS ERRORS	
NO.	NAME	VALUE	ERROR	NEGATIVE	POSITIVE
1	a1	7.19081e-02	6.88741e-06	-6.88741e-06	6.88741e-06
2	a2	9.01044e-02	1.21859e-05		
3	a3	8.67512e-02	3.23761e-05		

Print results from minuit

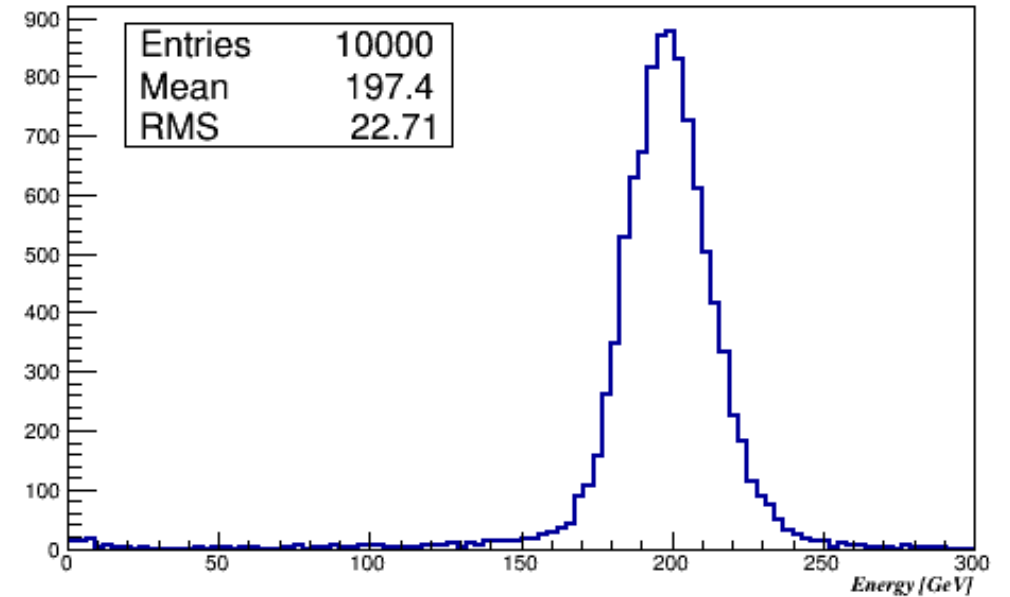
a1=0.0719081

a2=0.0901044

a3=0.0867512

chi2 / ndf = 5.24557e+06/869997 = 6.02941

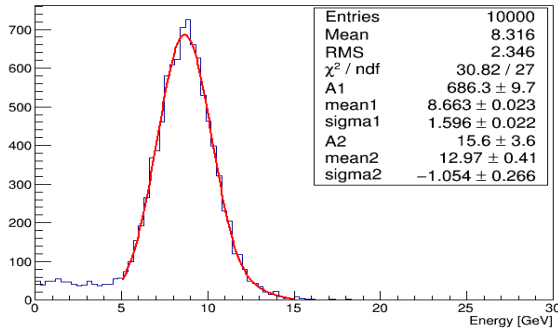
Total cluster Energy for 200 GeV



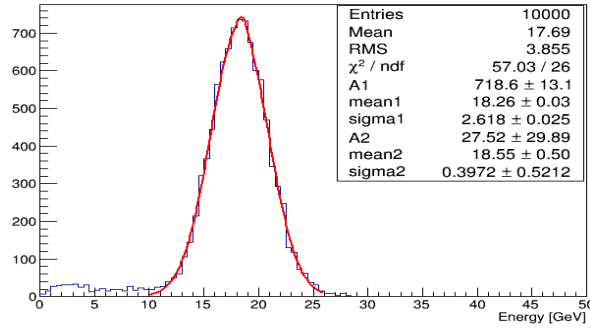


Pions : FCal Energy Resolution

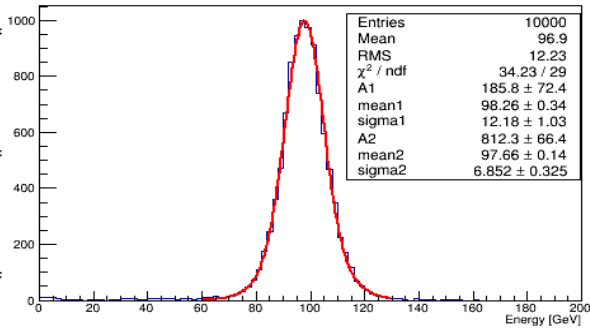
Total cluster Energy for 10 GeV



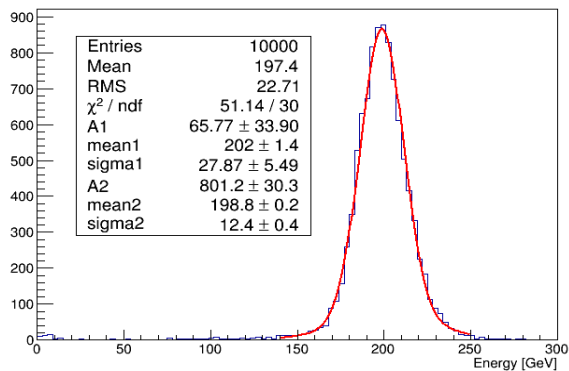
Total cluster Energy for 20 GeV



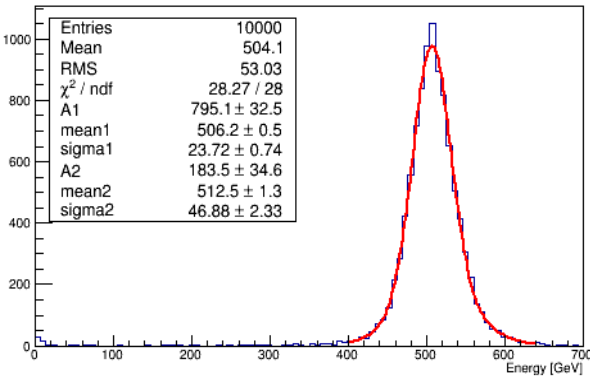
Total cluster Energy for 100 GeV



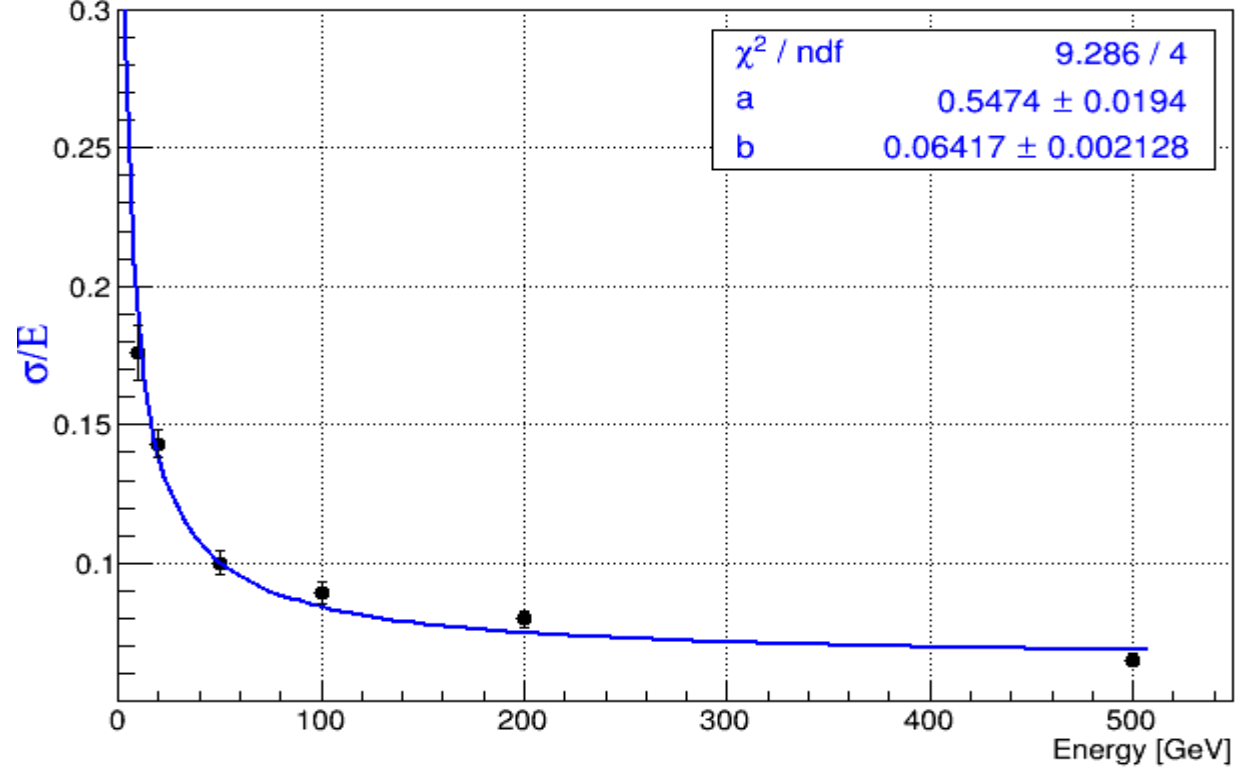
Total cluster Energy for 200 GeV



Total cluster Energy for 500 GeV



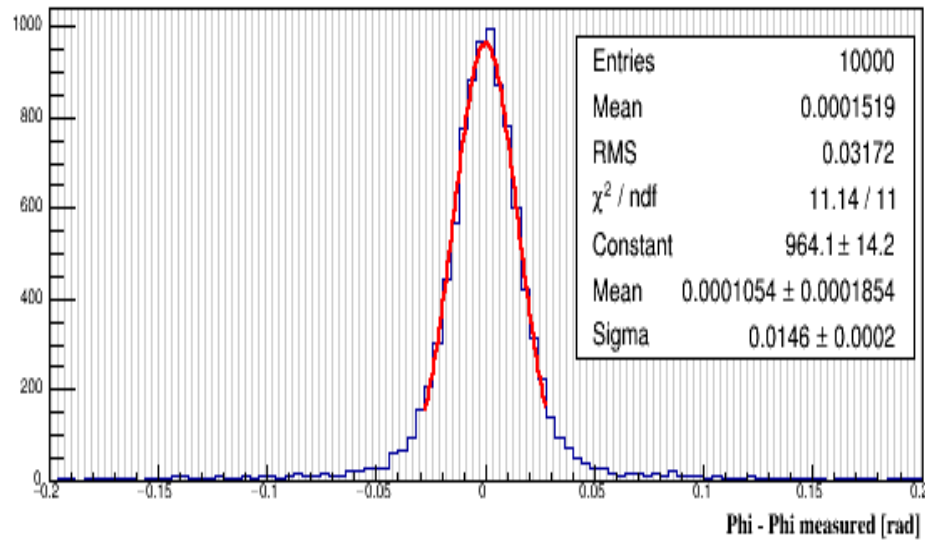
Fcal Pions Energy Resolution





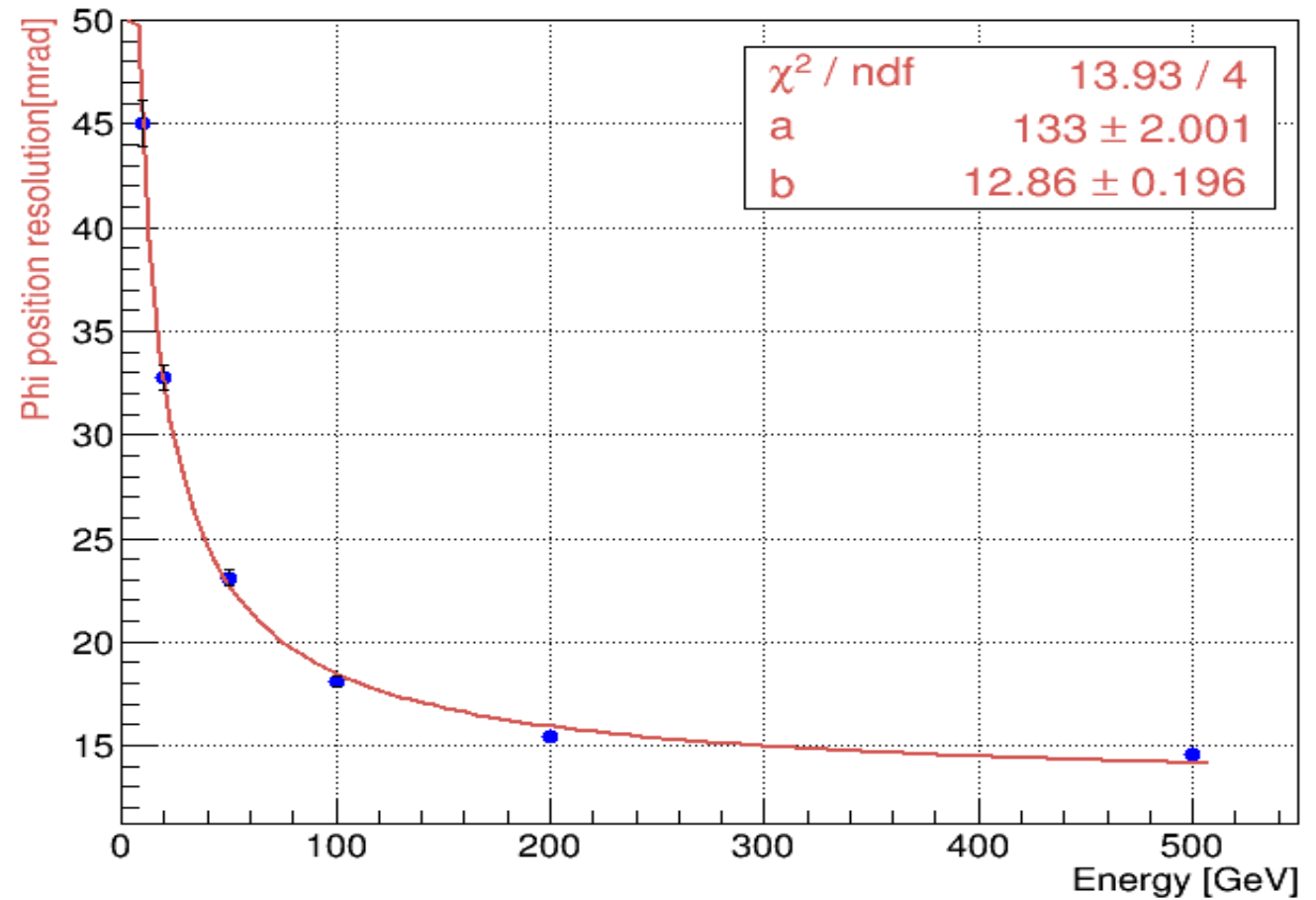
Pions : FCal Phi Position Resolution

Difference of Phi truth - Phi measured for 500 GeV pion



- $3.5 < \eta_{\text{truth}} < 4.5$
- $0 < \varphi < 2\pi$

Fcal - Phi position Resolution for pions





Pions : sFCal Energy Resolution

FUNCTION MUST BE MINIMIZED BEFORE CALLING MINOS

MIGRAD MINIMIZATION HAS CONVERGED.

MIGRAD WILL VERIFY CONVERGENCE AND ERROR MATRIX.

FCN=4.63341e+06 FROM MIGRAD STATUS=CONVERGED 70 CALLS 71 TOTAL

EDM=2.85592e-14 STRATEGY= 1 ERROR MATRIX ACCURATE

EXT PARAMETER

NO.	NAME	VALUE	ERROR	STEP SIZE	FIRST DERIVATIVE
1	a1	1.91627e-01	1.76206e-05	1.61361e-05	-9.37894e-03
2	a2	1.73070e-01	2.39860e-05	1.95941e-05	3.44597e-03
3	a3	1.49162e-01	6.54339e-05	6.02638e-05	2.51129e-03

FCN=4.63341e+06 FROM MINOS STATUS=SUCCESSFUL 16 CALLS 87 TOTAL

EDM=2.85592e-14 STRATEGY= 1 ERROR MATRIX ACCURATE

EXT PARAMETER

NO.	NAME	VALUE	ERROR	PARABOLIC NEGATIVE	MINOS ERRORS POSITIVE
1	a1	1.91627e-01	1.76206e-05	-1.76206e-05	1.76206e-05
2	a2	1.73070e-01	2.39860e-05		
3	a3	1.49162e-01	6.54339e-05		

Print results from minuit

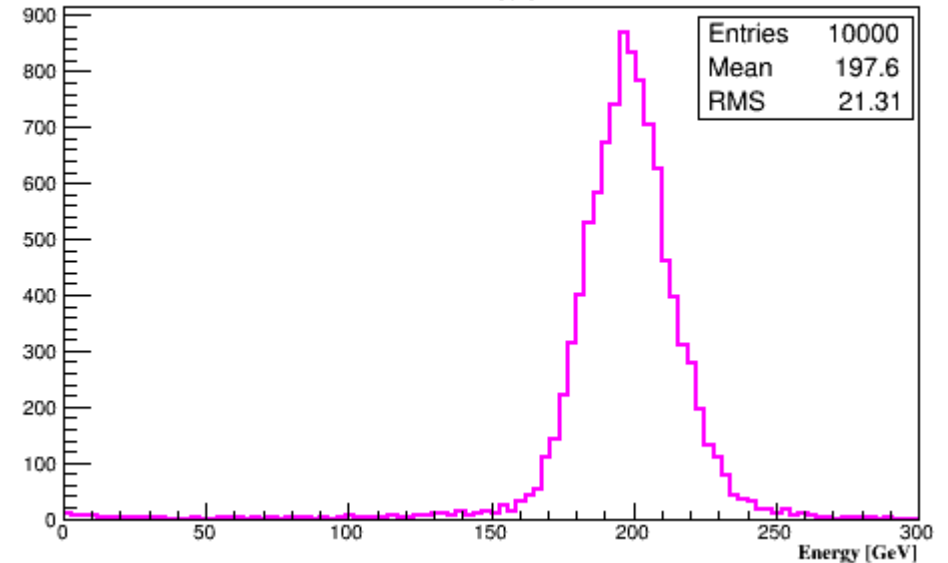
a1=0.191627

a2=0.17307

a3=0.149162

chi2 / ndf = 4.63341e+06/869997 = 5.32578

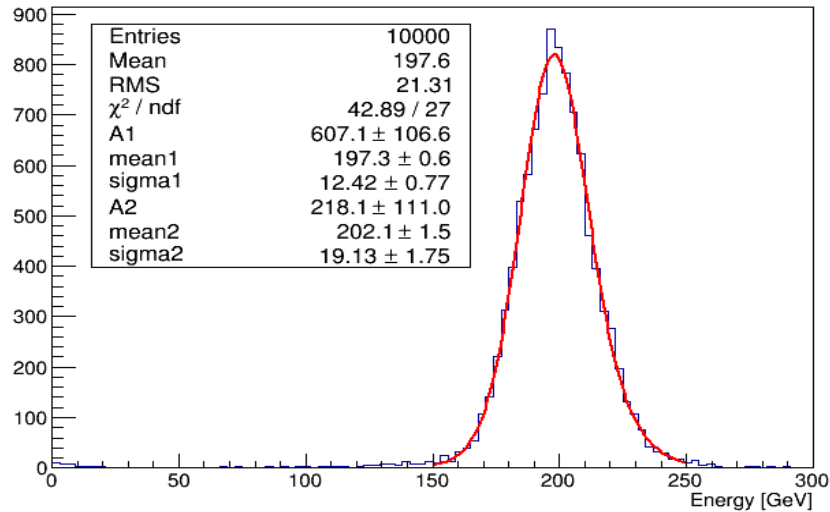
Total cluster Energy for 200 GeV - sFCal



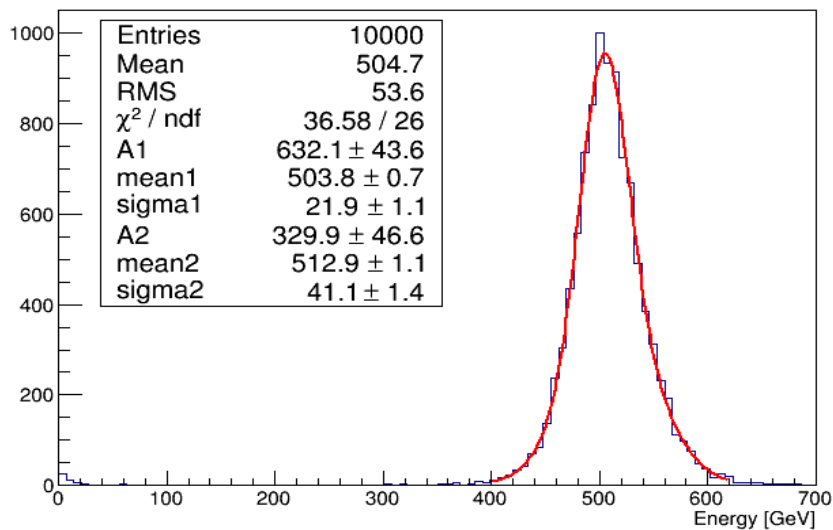


Pions : sFCal Energy Resolution

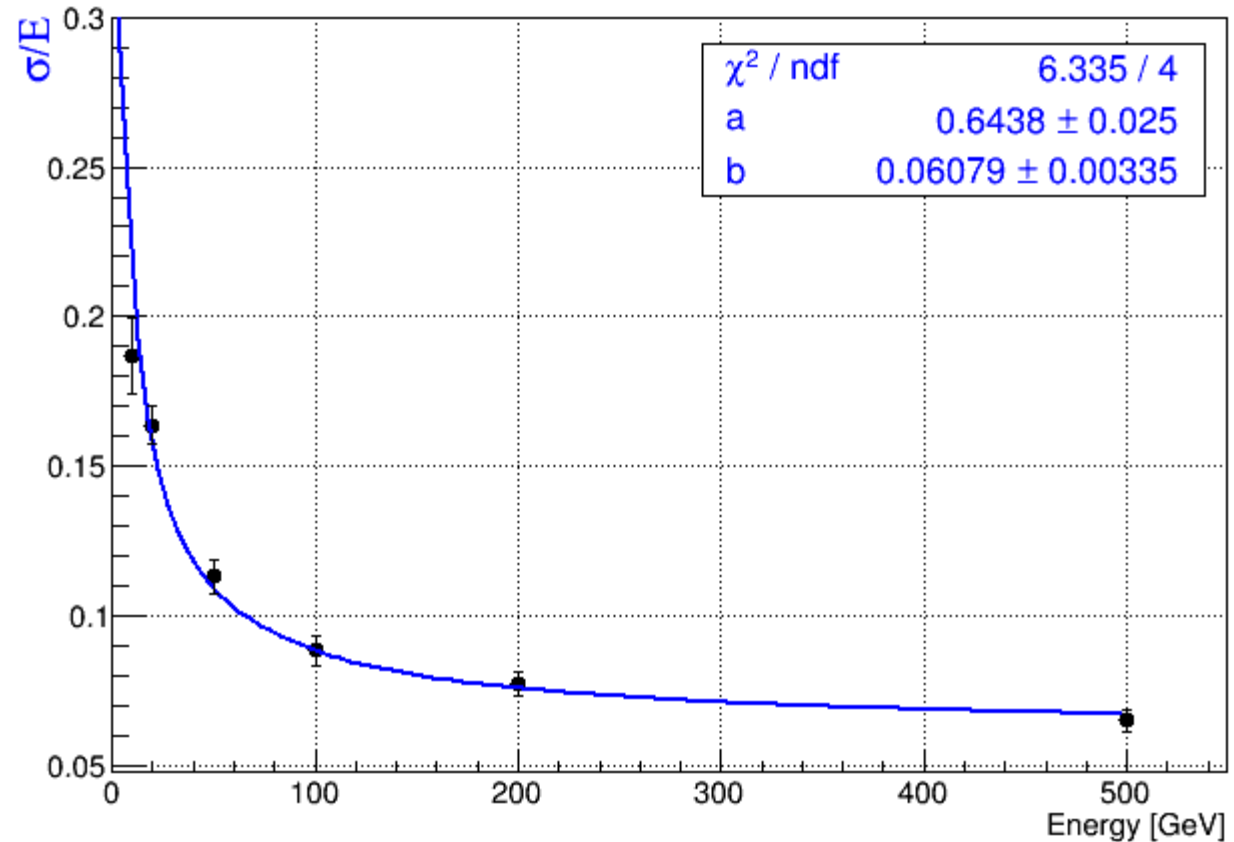
Total cluster Energy for 200 GeV



Total cluster Energy for 500 GeV



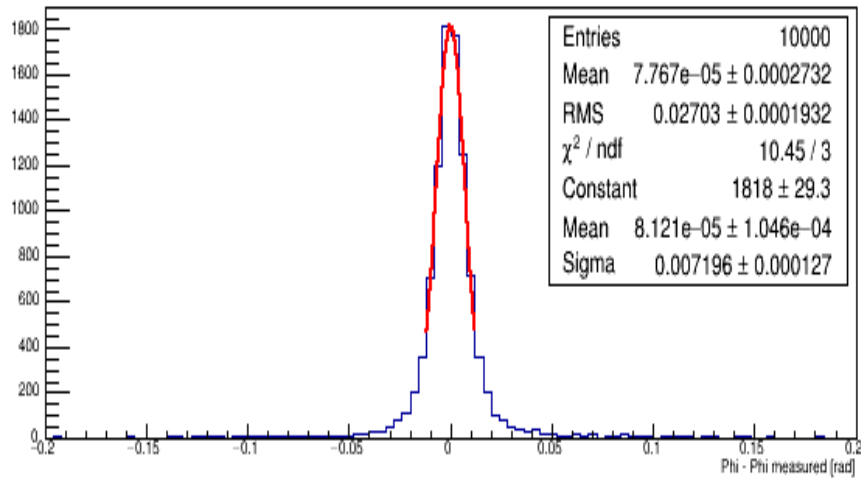
sFCal Pions Energy Resolution





Pions : sFCal Phi Position Resolution

Diff Phi truth - Phi measured for 500 GeV Pions - sFCal



- $3.5 < \eta_{\text{truth}} < 4.5$
- $0 < \varphi < 2\pi$

Phi position resolution for pions at fine Granularity

