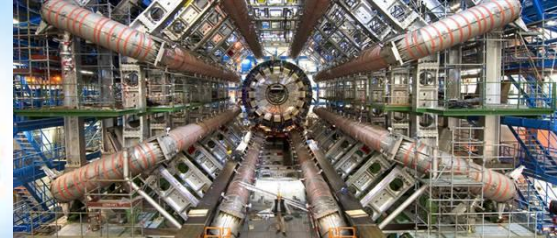




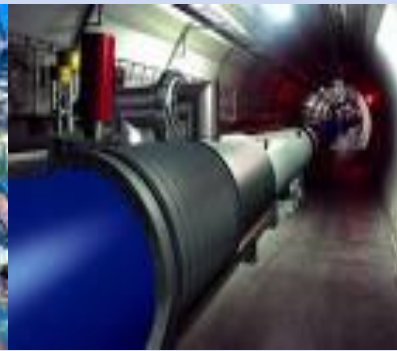
Royal Holloway
University of London

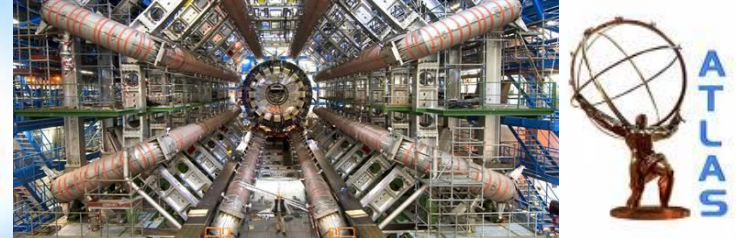


Energy Resolution Outliers

Daniel Hayden

4th March 2010.





Input:

All Reprocessed L1Calo Stream in the Good Runs List, with COLL CAND Tag, passing any Trigger, and requiring a pass of L1_EM3 to obtain L1CaloEM. Also only taking Good Runs List Lumi Blocks.

List of Run Samples:

141811, 141794, 142149, 142154, 142165, 142166, 142171, 142174, 142189, 142193, 142195, 142383.

Amounting to:

Events: 1136

Summary

L1 vs L2

EM Objects: 620

Outliers: 67

L1 vs EF

EM Objects: 585

Outliers: 53

L2 vs EF

EM Objects: 591

Outliers: 42

L1 vs L2

EM Objects: 620

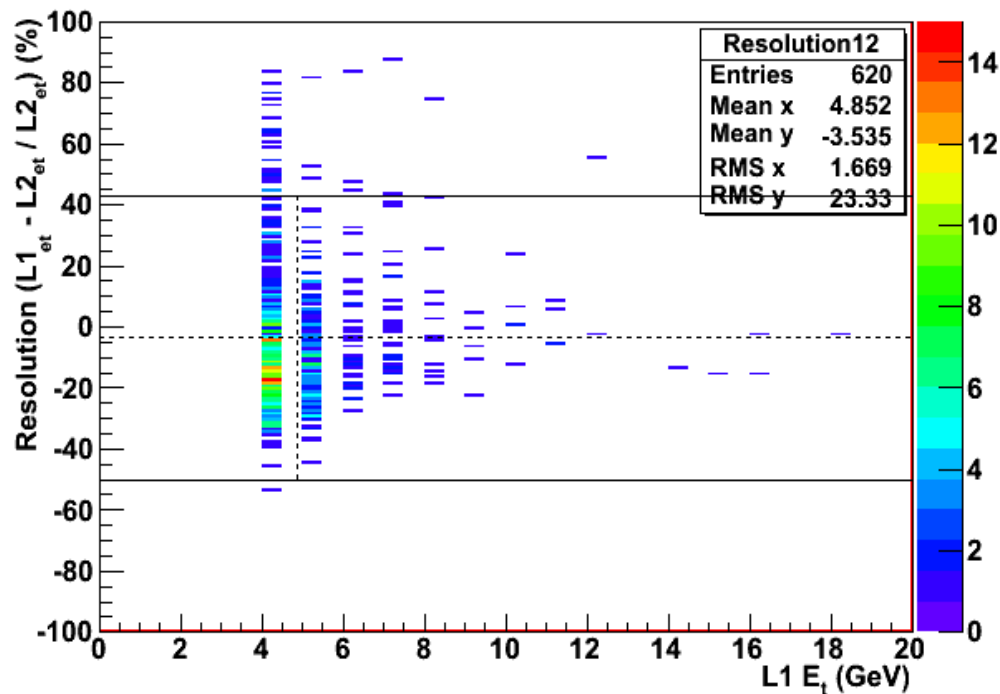
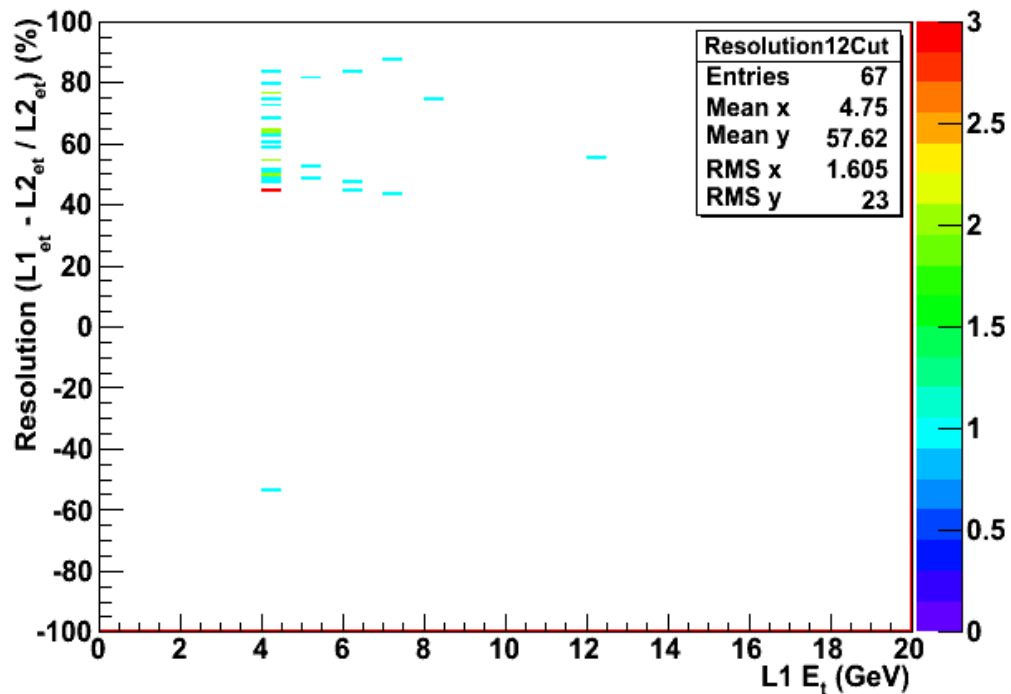
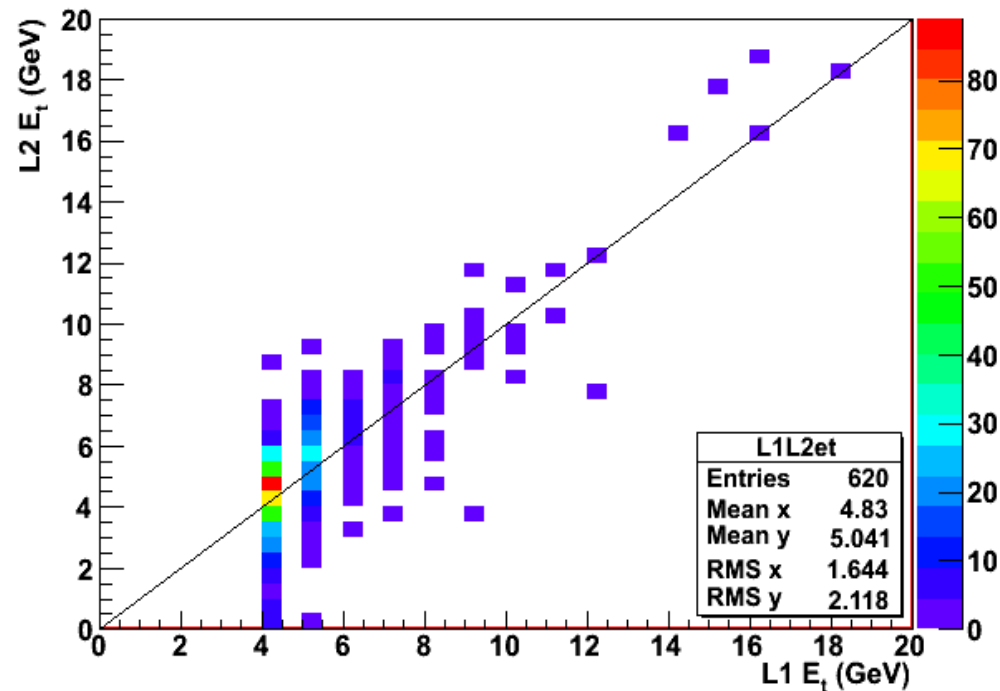
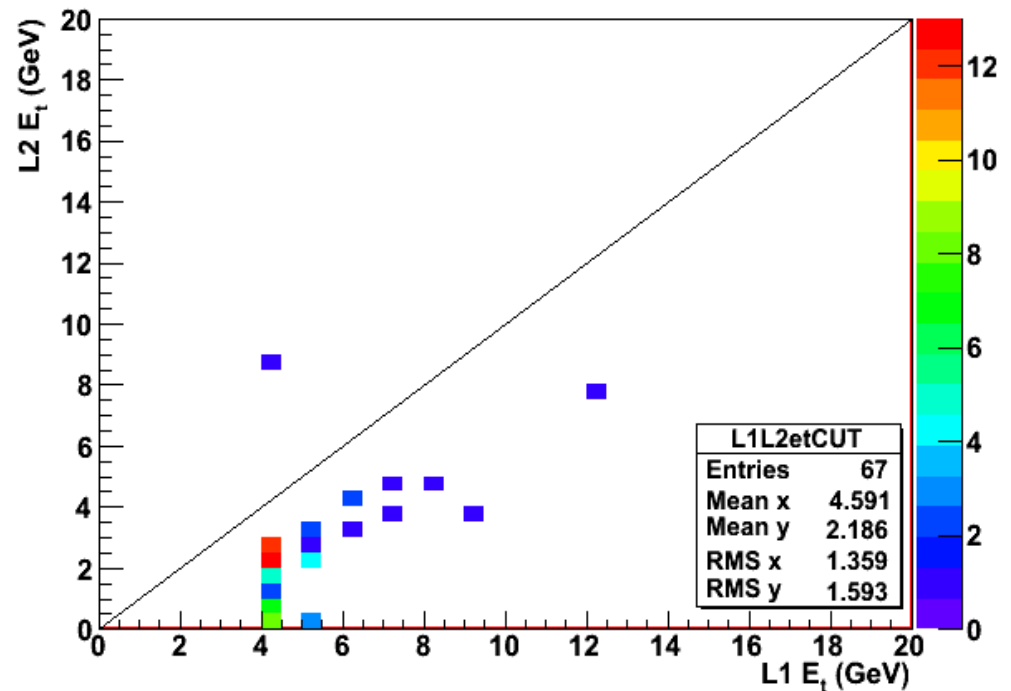
Outliers: 67

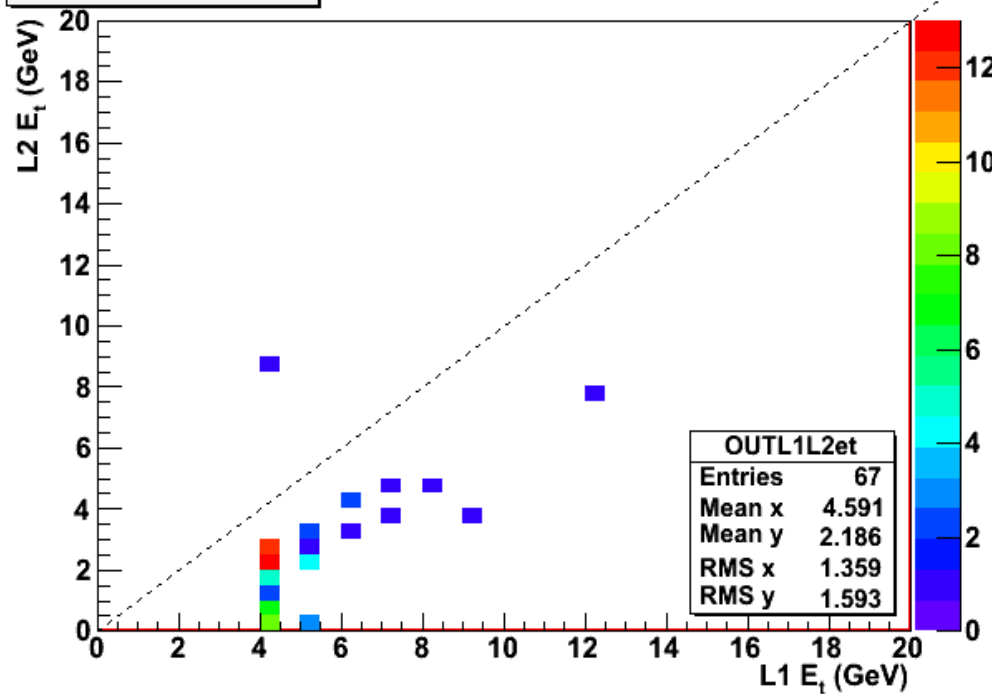
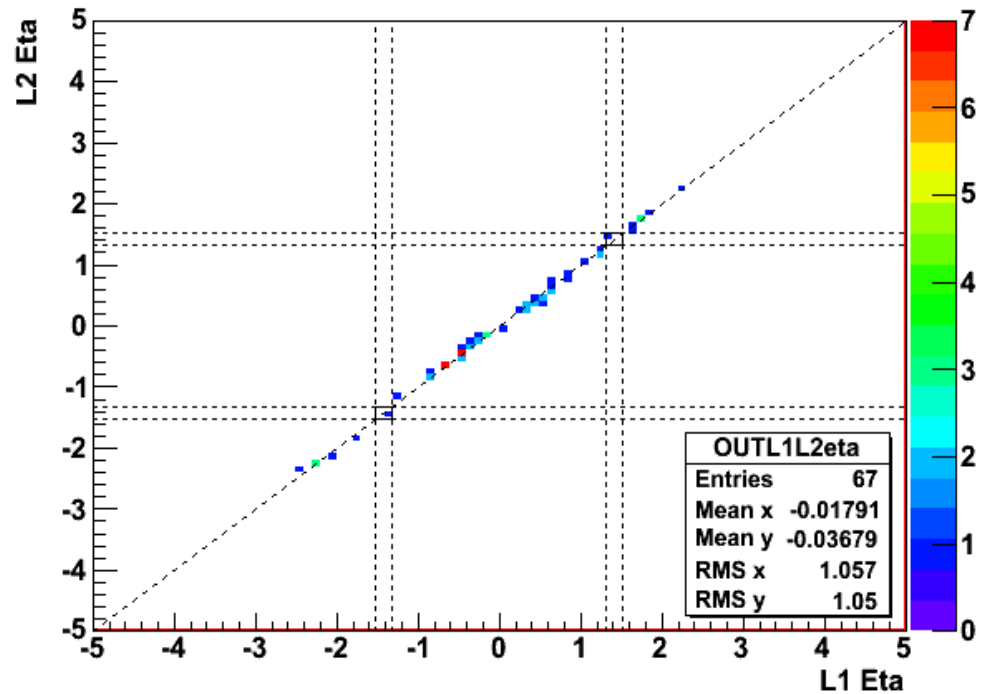
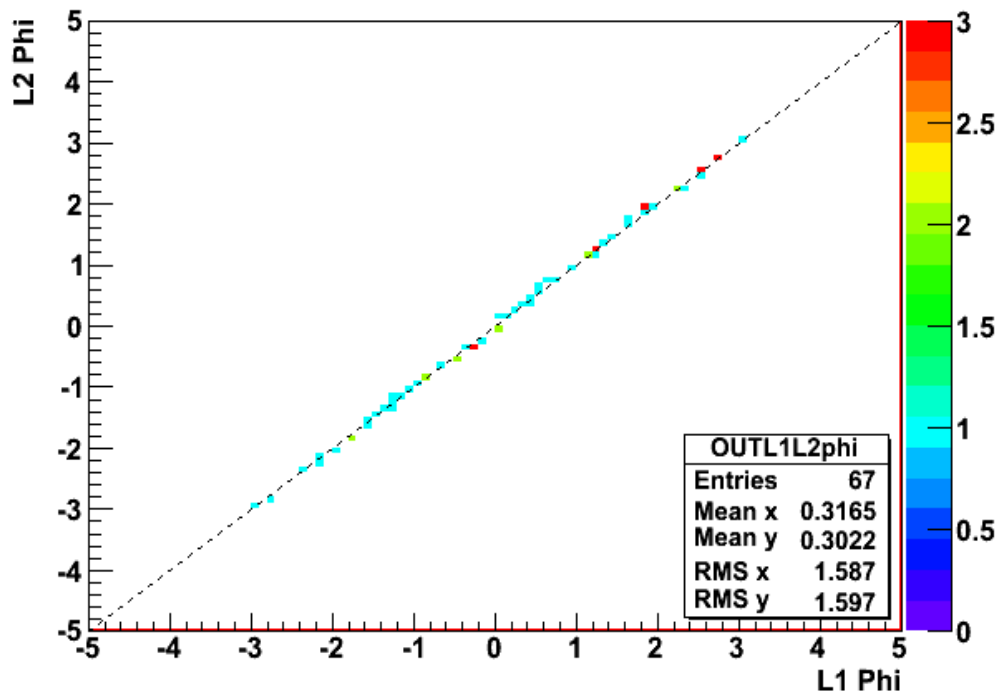
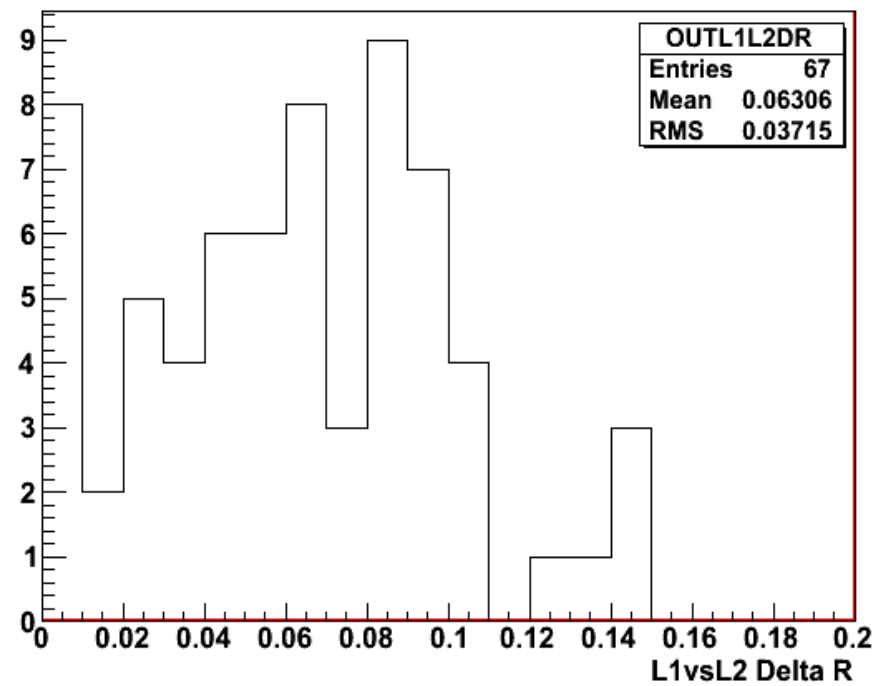
EM Objects are those that passed $|\eta| < 2.5$ & $DR < 0.15$
(DR Between L1 and L2)

Outlier Definition:

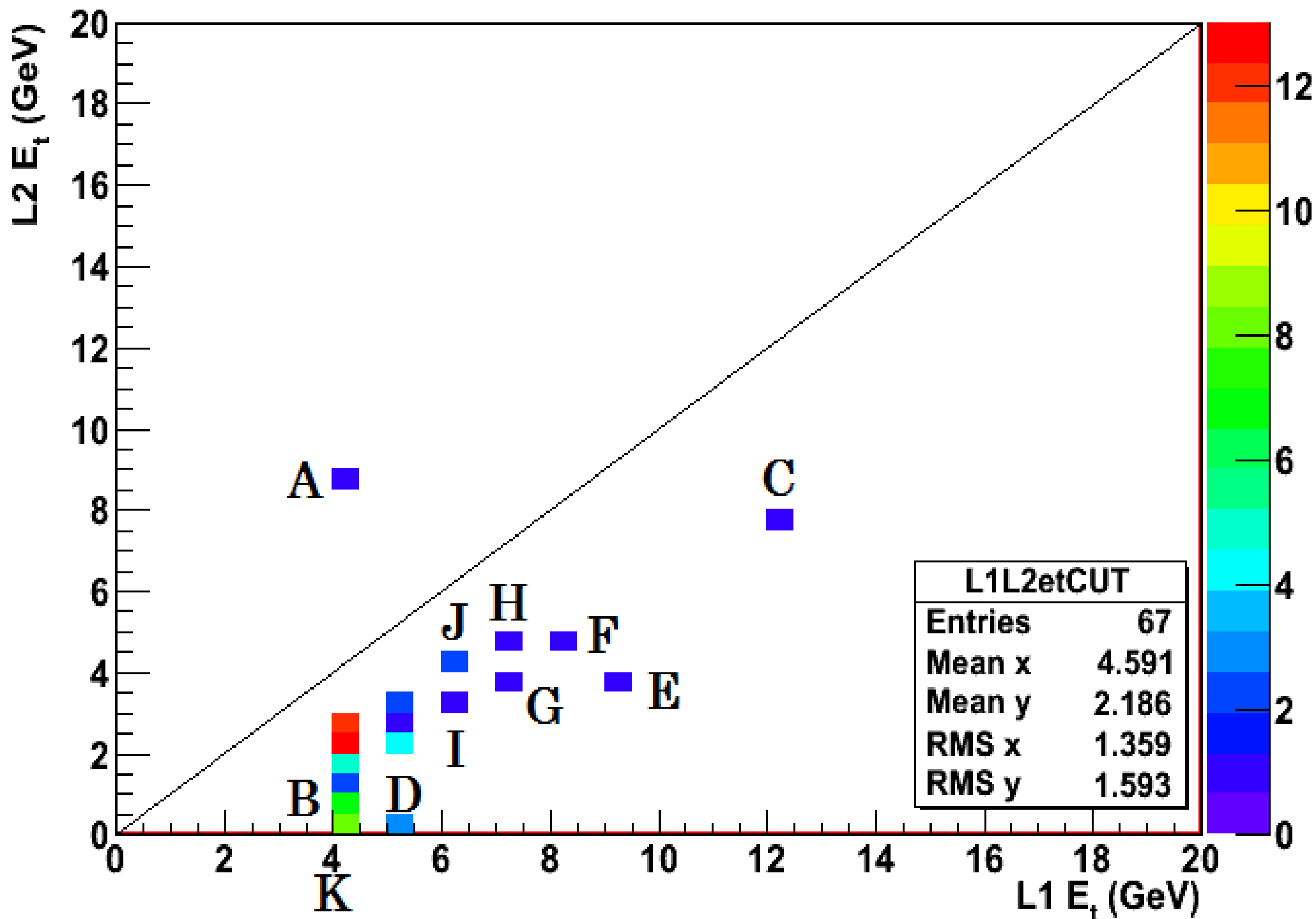
Take the Mean of $(L1-L2)/L2$ et
Objects ± 2 Sigma from the Mean are Outliers.

Each object is a L1ROI, matched to a L2 EMCluster,
i.e. able to have multiple entries per event, but each is unique.

L1 vs L2 Energy Resolution

Interesting Events L1vsL2 E Resolution

L1 vs L2 Et

L1 vs L2 Et


L1 vs L2 Outlier E_t **L1 vs L2 Outlier Eta****L1 vs L2 Outlier Phi****L1vsL2 Outlier Delta R**

L1 vs L2 Et



A

C

B

K

D

J

I

H

G

F

E

Outlier	Run	Event	Lumi	Eta Phi (L1_ROI)	L1 L2 EF OFF Et (GeV)	Comment	Comment (2)	Seen Again	Catagory
A	142165	1329234	201	1.40 0.49	4 8.7 11.8 17.9	Crack		L1vsEF (B)	Crack
B	142166	844700	101	-1.40 1.28	4 0.7 0.1 0.2	Crack	L1>L2	L1vsEF (K) L2(B)	Crack
C	142193	844664	75	-0.60 -0.32	12 7.7 8.6 6.4		L1>L2	L1vsEF (D)	Unknown
D	141811	96499	101	0.30 -1.37	5 0.07 0 0	EF eta = -999	L1>L2		Unknown
E	142193	164417	34	-2.10 -0.38	9 3.8 12.8 17.1	Many Close EF Cl	L1>>L2		Nearby Cluster
F	142193	115593	27	0.00 1.18	8 4.6 5.2 6		L1>L2	L1vsEF(G)	Unknown
G	142165	995889	178	-2.3 1.91	7 3.7 6.4 6.5	Many Close EF Cl	L1>>L2		Nearby Cluster
H	142166	174733	40	-0.10 2.55	7 4.9 6.8 6.8	Many Close EF Cl	L1>L2		Nearby Cluster
I	142193	1508443	115	1.80 -2.16	6 3.3 4.1 3.9		L1>>L2		Unknown (Eta>1.8)
J	142195	345112	30	-1.20 0.79	6 4.2 4 3.6		L1>L2		Unknown
J	142195	477867	38	0.30 1.18	6 4.1 4.2 5.2	Bad Channel	L1>L2		Bad Channel
						D.Hayden@rhul.ac.uk			8
K	142193	252169	39	-0.40 -1.57	4 -0.01 4.2 4.3	L2et -ive	L1>>L2	L2vsEF (K)	L2 Problem

Outlier Category	No. Events (Out of 67)
Resolution ($>100 <-100$)	31
Crack ($1.37 < \text{Eta} < 1.52$)	2
$E_t < 0$ GeV	1
Known Bad Channel (L1Calo)	1
Other Closeby Clusters	3
$E_t < 4$ GeV	62
$L1 > L2 (E_t)$	66
f3	0
EF Out	0

Trigger Level	Total Outliers	141749	141811	142149	142154	142165	142166	142171	142174	142189	142193	142195	142383
L1 vs L2	67	0	4	1	0	10	6	7	7	6	20	4	2
L1 vs EF	53	0	3	0	0	12	6	5	1	3	17	4	2
L2 vs EF	42	0	2	0	0	8	9	3	1	2	14	2	1

L1 vs EF

EM Objects: 585

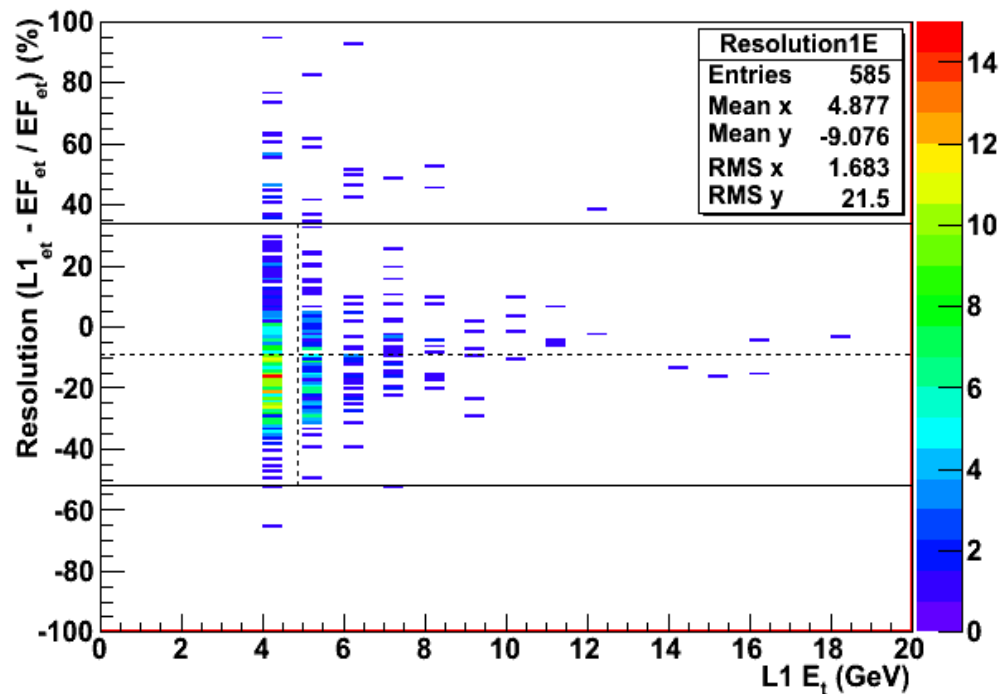
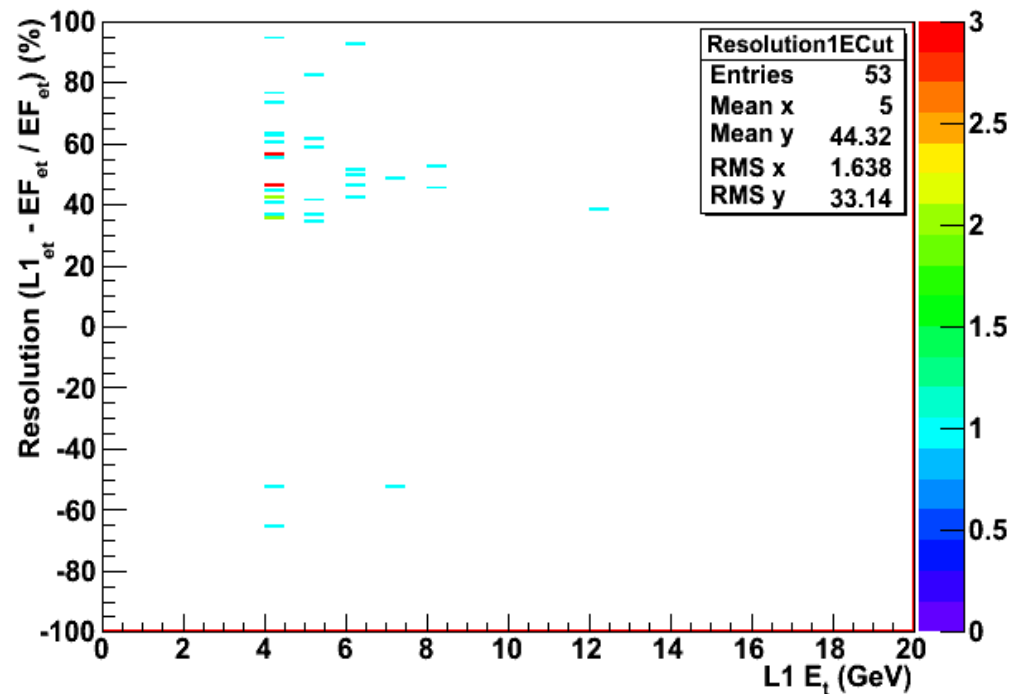
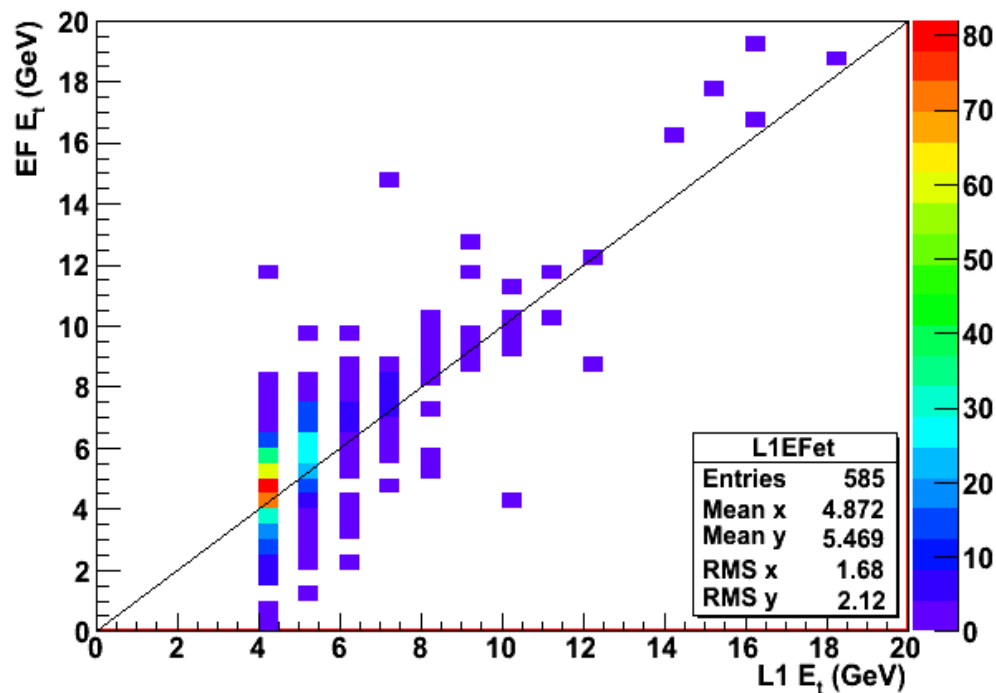
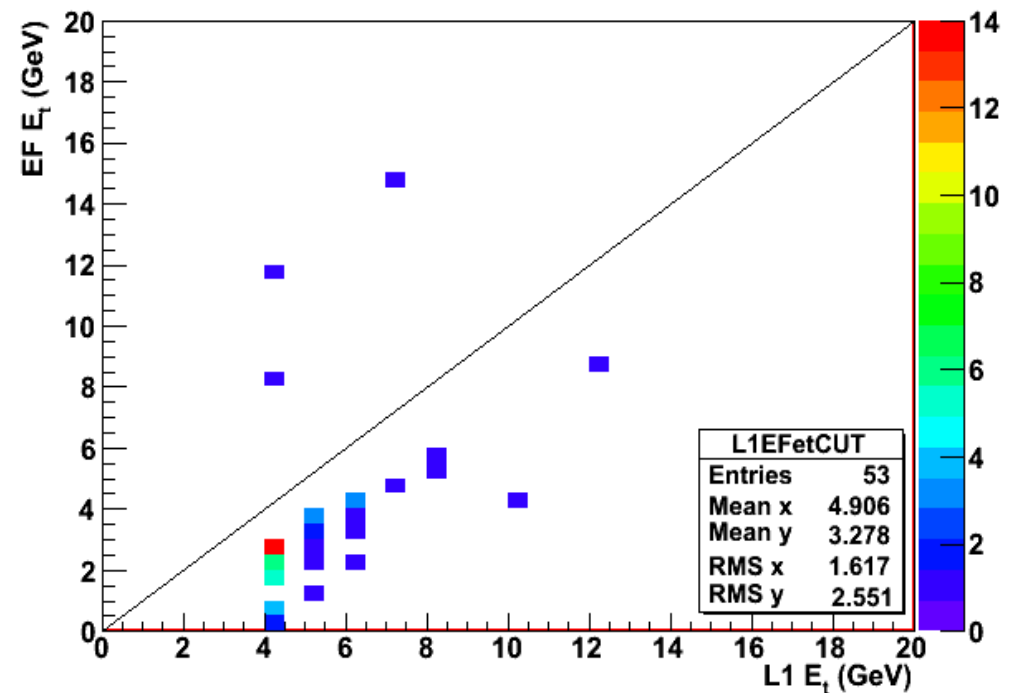
Outliers: 53

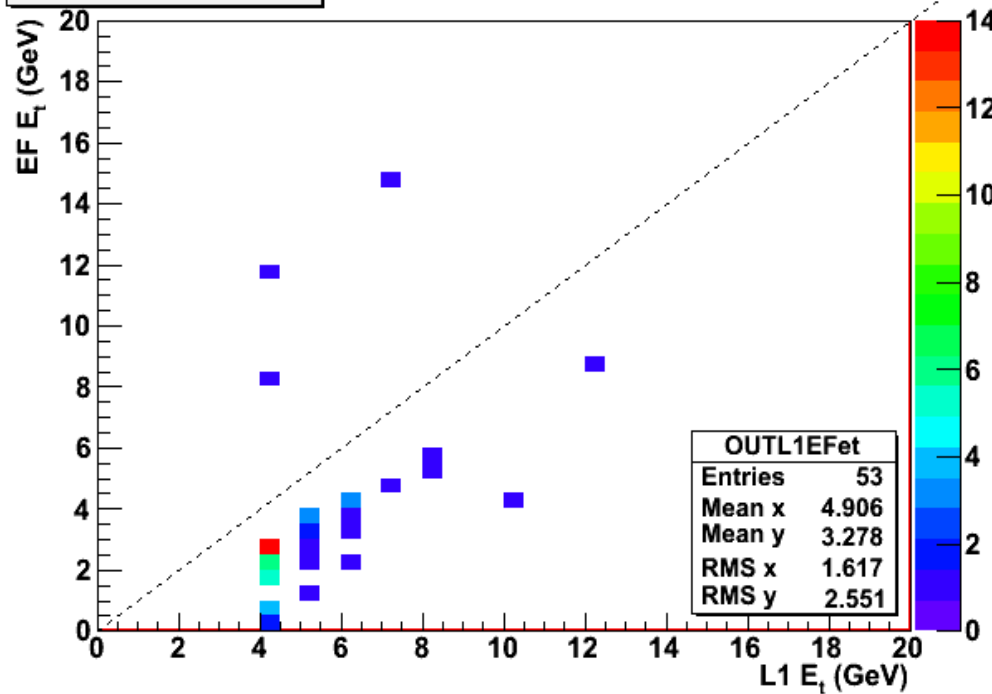
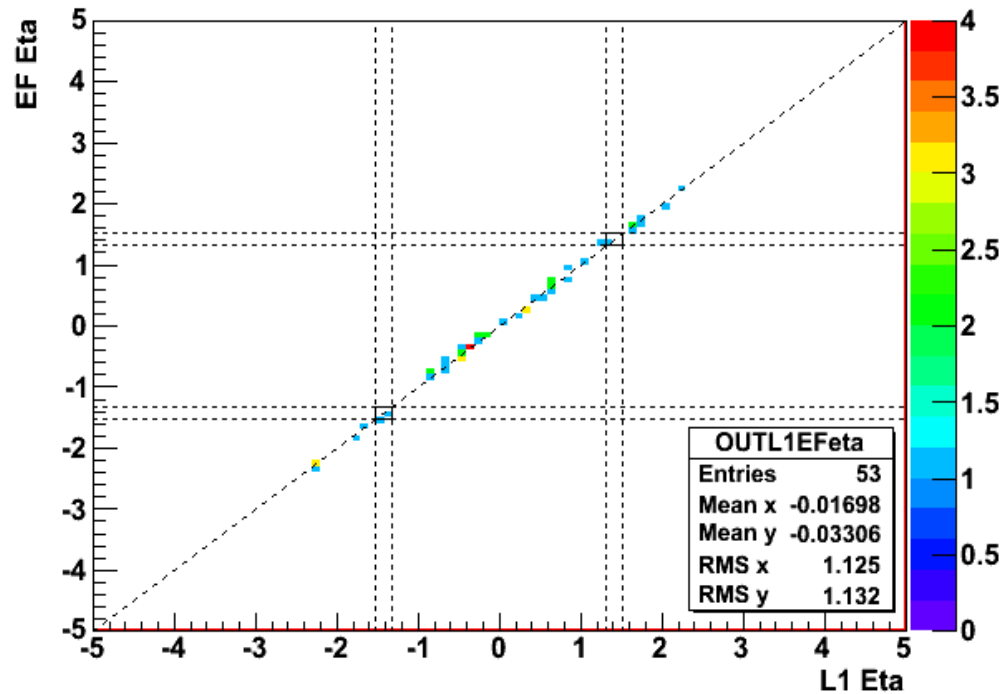
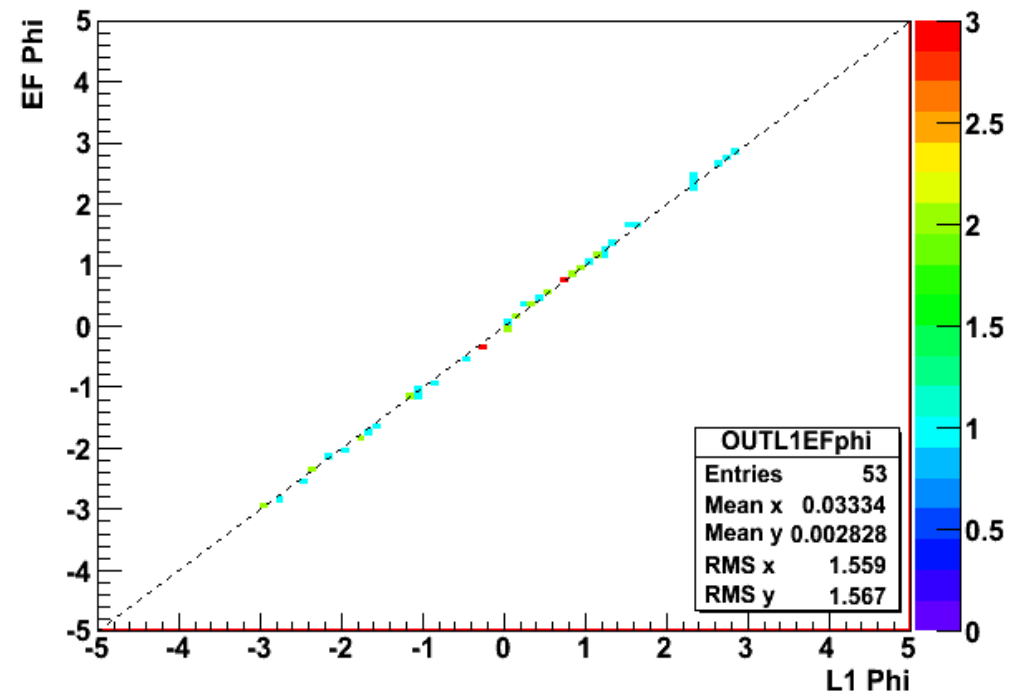
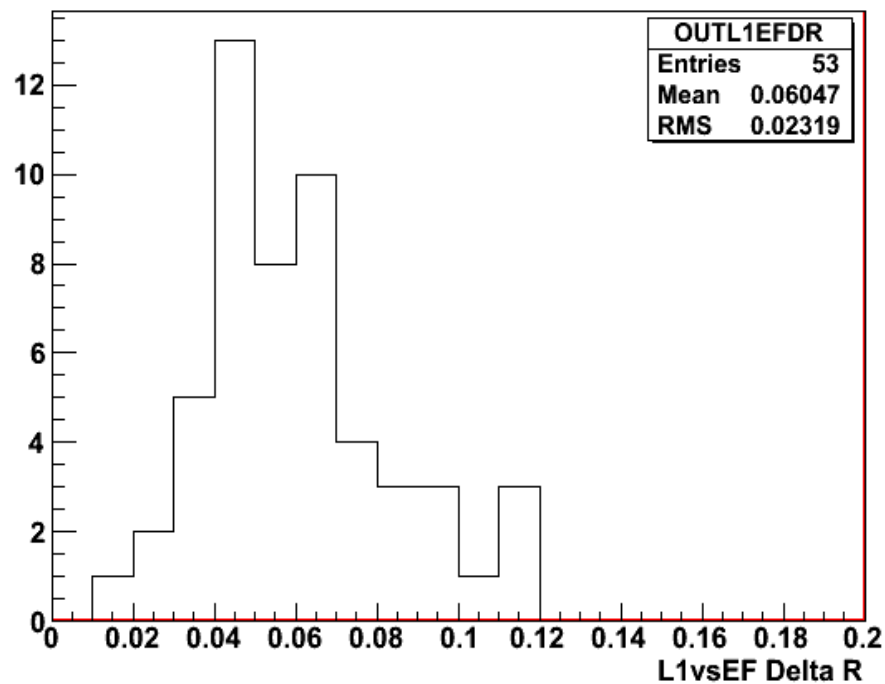
EM Objects are those that passed $|\eta| < 2.5$ & $DR < 0.15$
(DR Between L1 and EF)

Outlier Definition:

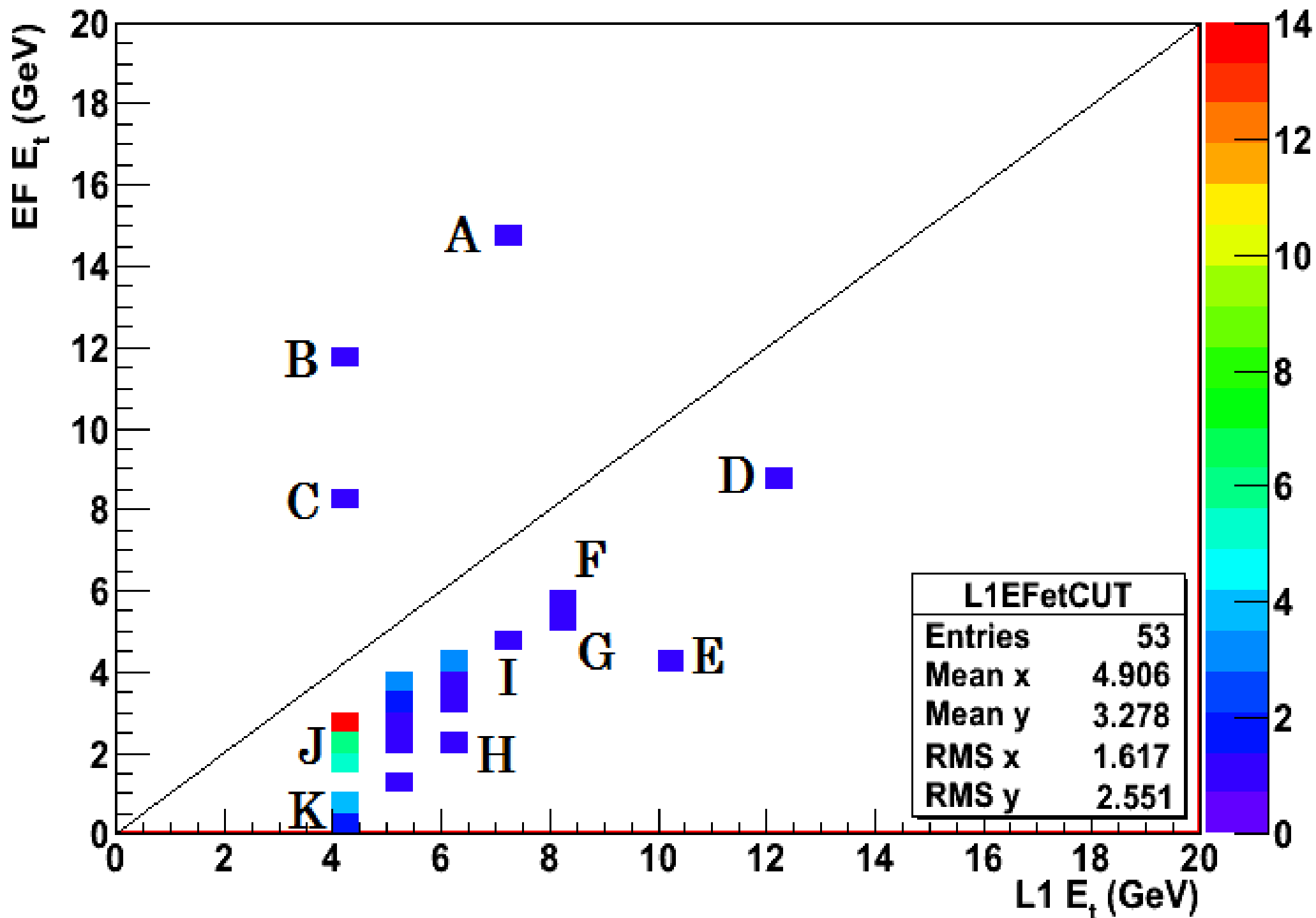
Take the Mean of $(L1-EF)/EF$ et
Objects ± 2 Sigma from the Mean are Outliers.

Each object is a L1ROI, matched to a EF CaloCluster,
i.e. able to have multiple entries per event, but each is unique.

L1 vs EF Energy Resolution

Interesting Events L1vsEF E Resolution

L1 vs EF Et

L1 vs EF Et


L1 vs EF Outlier E_t **L1 vs EF Outlier Eta****L1 vs EF Outlier Phi****L1vsEF Outlier Delta R**

L1 vs EF Et



Outlier	Run	Event	Lumi	Eta Phi (L1_ROI)	L1 L2 EF OFF Et (GeV)	Comment	Comment (2)	Seen Again	Catagory
A	142193	894091	78	1.30 -2.36	7 6 14.9 14.8	f3	L1>L2	L2vsEF(C)	f3
B	142165	1329234	201	1.40 0.49	4 8.7 11.8 17.9	Crack		L1vsL2 (A)	Crack
C	142383	430598	265	2.30 -1.67	4 3.5 8.4 7		L1>L2	L2vsEF (J)	Unknown (Eta>1.8)
D	142193	844664	75	-0.60 -0.29	12 7.7 8.6 9.8		L1>L2	L1vsL2 (C)	
E	142165	366495	87	-0.50 -1.08	10 8 4 8		L1>L2		Unknown
F	142171	111762	87	-0.30 0.79	8 5.6 5.5 6.8		L1>L2		Unknown
G	142193	115593	27	0.00 1.18	8 4.6 5.2 6		L1>L2	L1vsL2 (F)	Unknown
H	142165	467735	134	-1.60 -0.29	6 5.4 2.3 5.7	EF <	L1>L2		EF Out
I	142189	454010	729	0.90 1.28	7 5.8 4.7 7.2		L1>L2		Unknown
J	142171	299411	193	-1.50 0.79	4 2.8 2.9 3.8	Crack	L1>L2		Crack
K	142166	844700	101	-1.40 1.28	4 0.73 0.14 0.23	Crack	L1>L2	L1vsL2 (B) EF(B)	14 Crack

Outlier Category	No. Events (Out of 53)
Resolution ($>100 <-100$)	15
Crack ($1.37 < \text{Eta} < 1.52$)	3
Et < 0 GeV	0
Known Bad Channel (L1Calo)	0
Other Closeby Clusters	0
Et < 4 GeV	45
L1 $> L2$ (Et)	47
f3	1
EF Out	1

Trigger Level	Total Outliers	141749	141811	142149	142154	142165	142166	142171	142174	142189	142193	142195	142383
L1 vs L2	67	0	4	1	0	10	6	7	7	6	20	4	2
L1 vs EF	53	0	3	0	0	12	6	5	1	3	17	4	2
L2 vs EF	42	0	2	0	0	8	9	3	1	2	14	2	1

L2 vs EF

EM Objects: 591

Outliers: 42

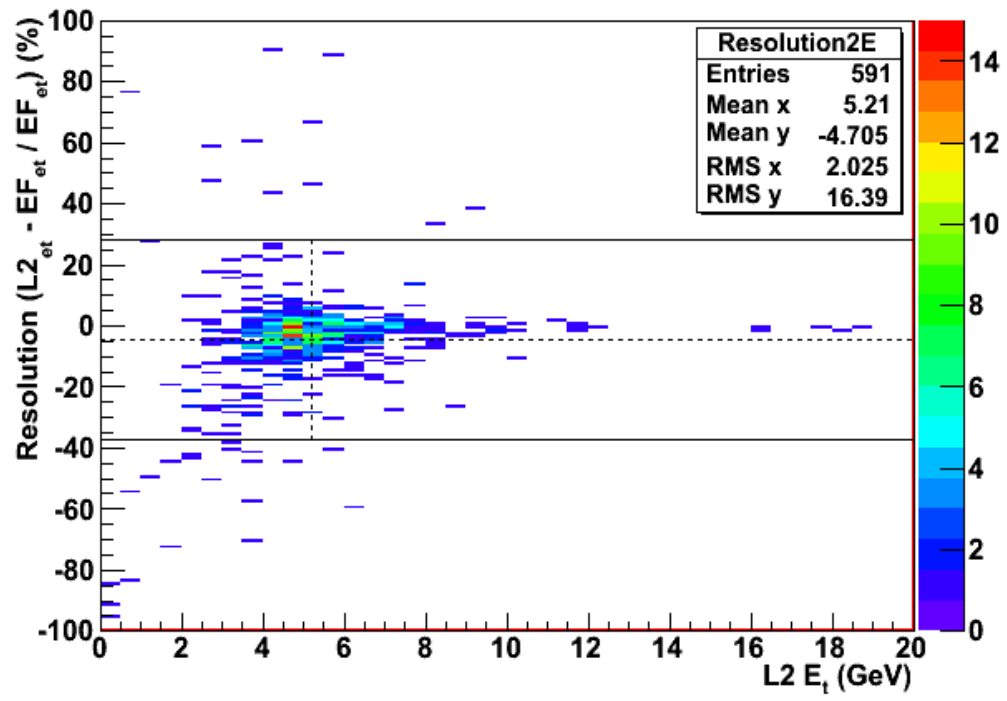
EM Objects are those that passed $|\eta| < 2.5$ & $DR < 0.15$
(DR Between L2 and EF)

Outlier Definition:

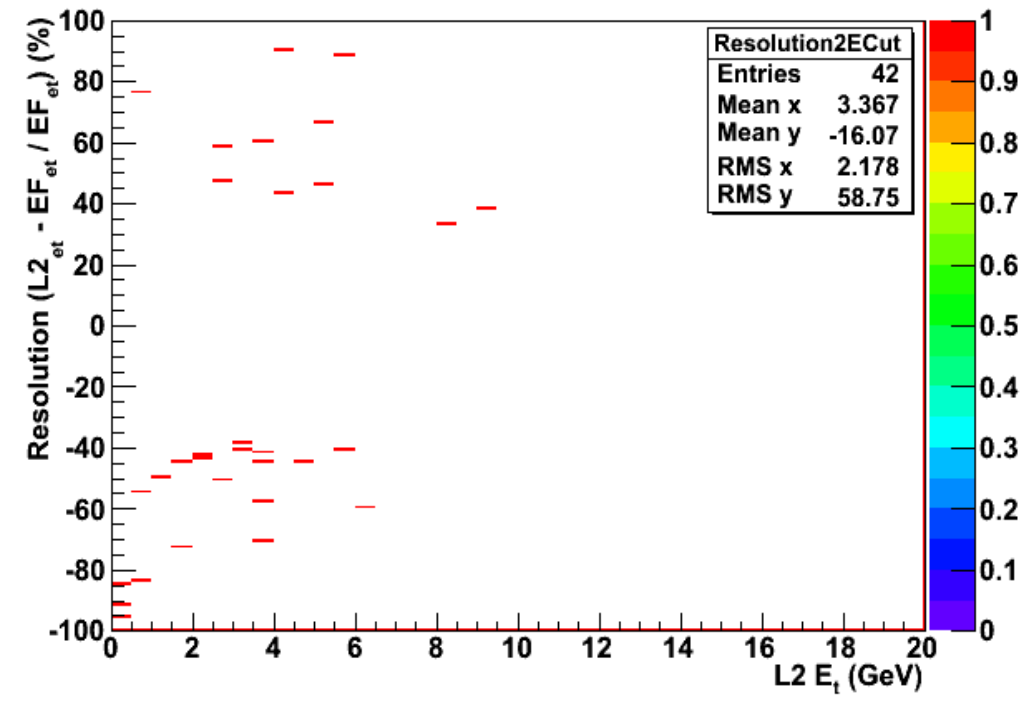
Take the Mean of $(L2-EF)/EF$ et
Objects ± 2 Sigma from the Mean are Outliers.

Each object is a L2 EM Cluster, matched to a EF CaloCluster,
i.e. able to have multiple entries per event, but each is unique.

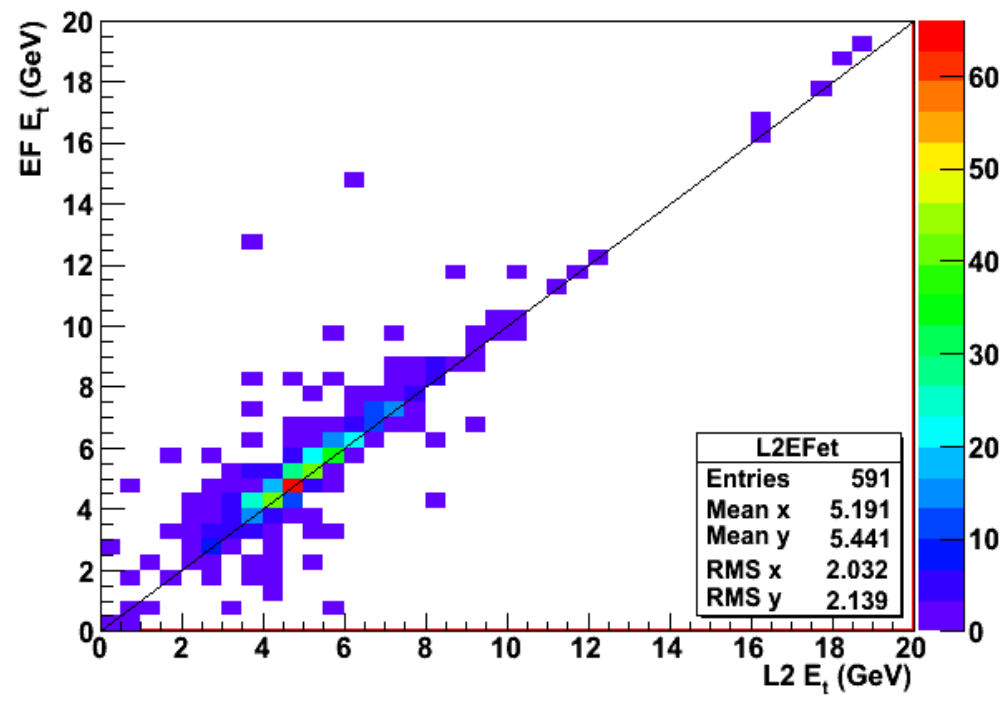
L2 vs EF Energy Resolution



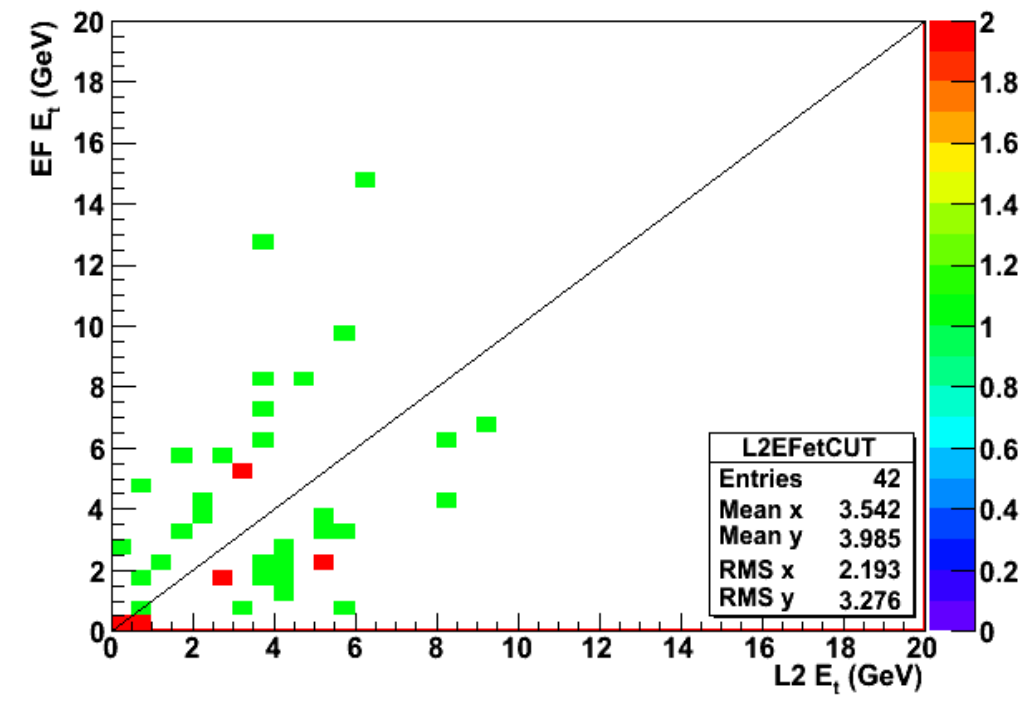
Interesting Events L2vsEF E Resolution

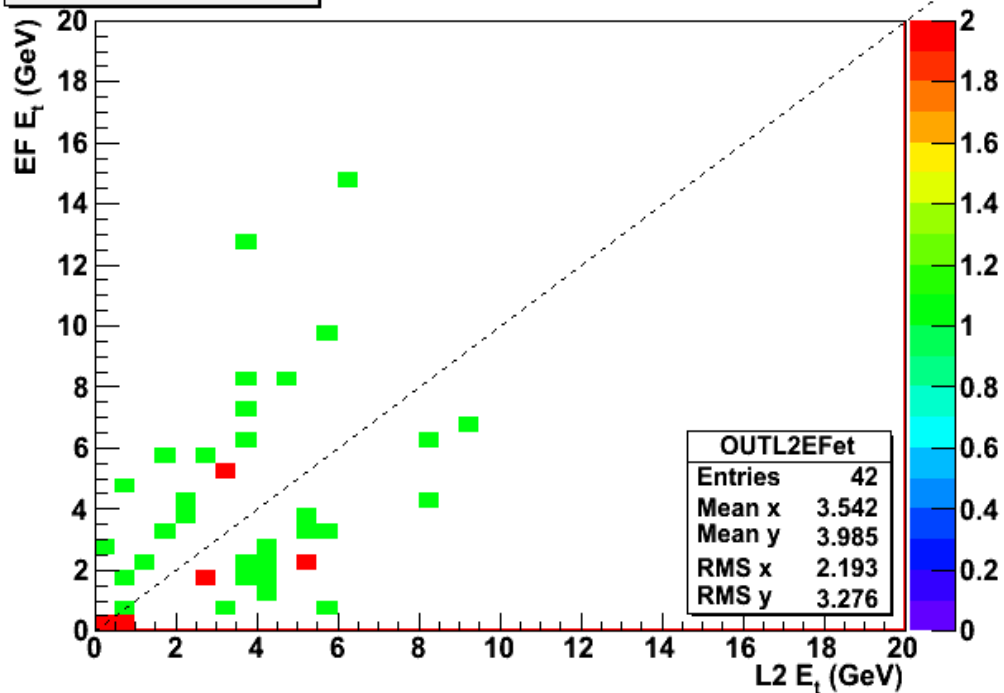


L2 vs EF Et

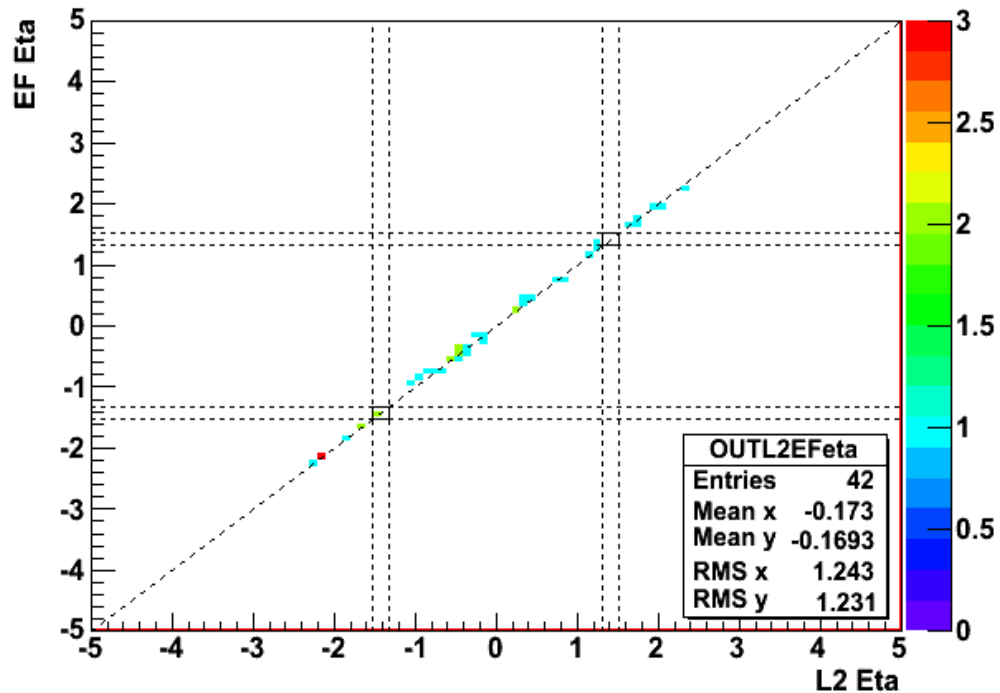


L2 vs EF Et

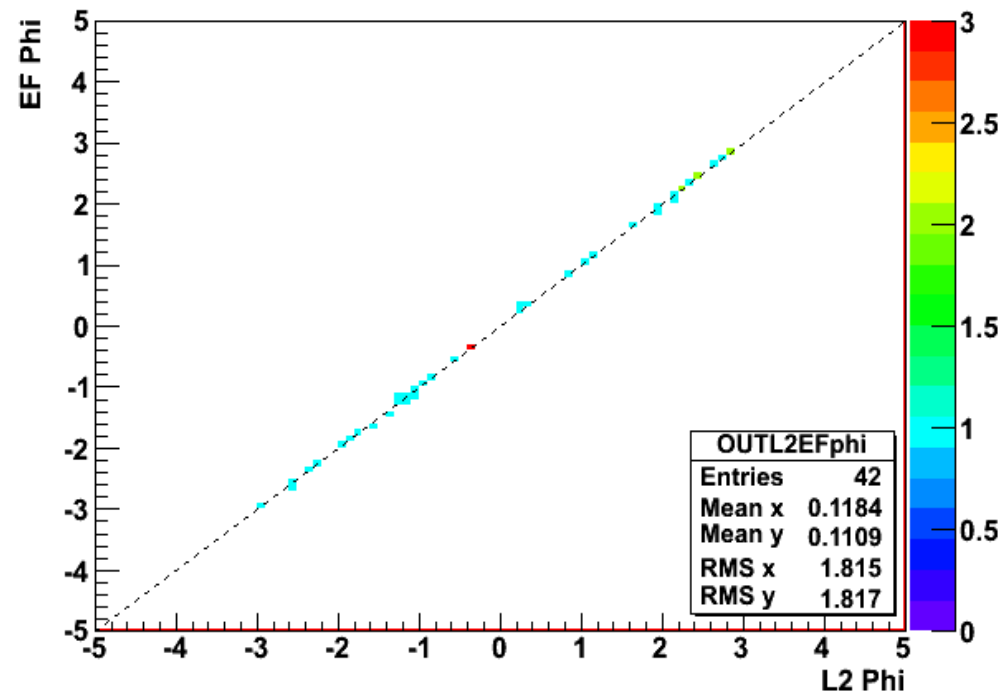


L2 vs EF Outlier E_t 

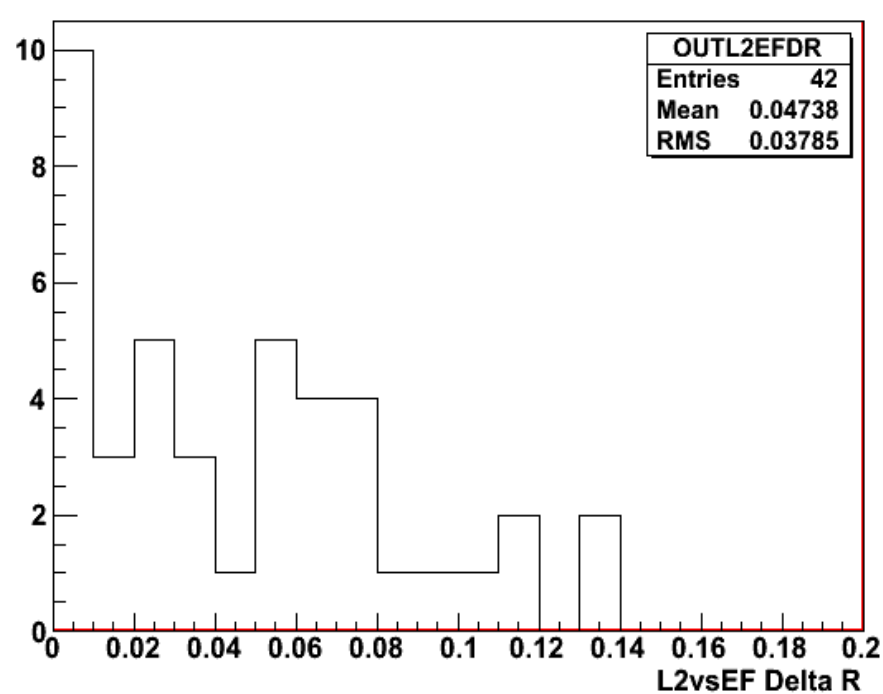
L2 vs EF Outlier Eta



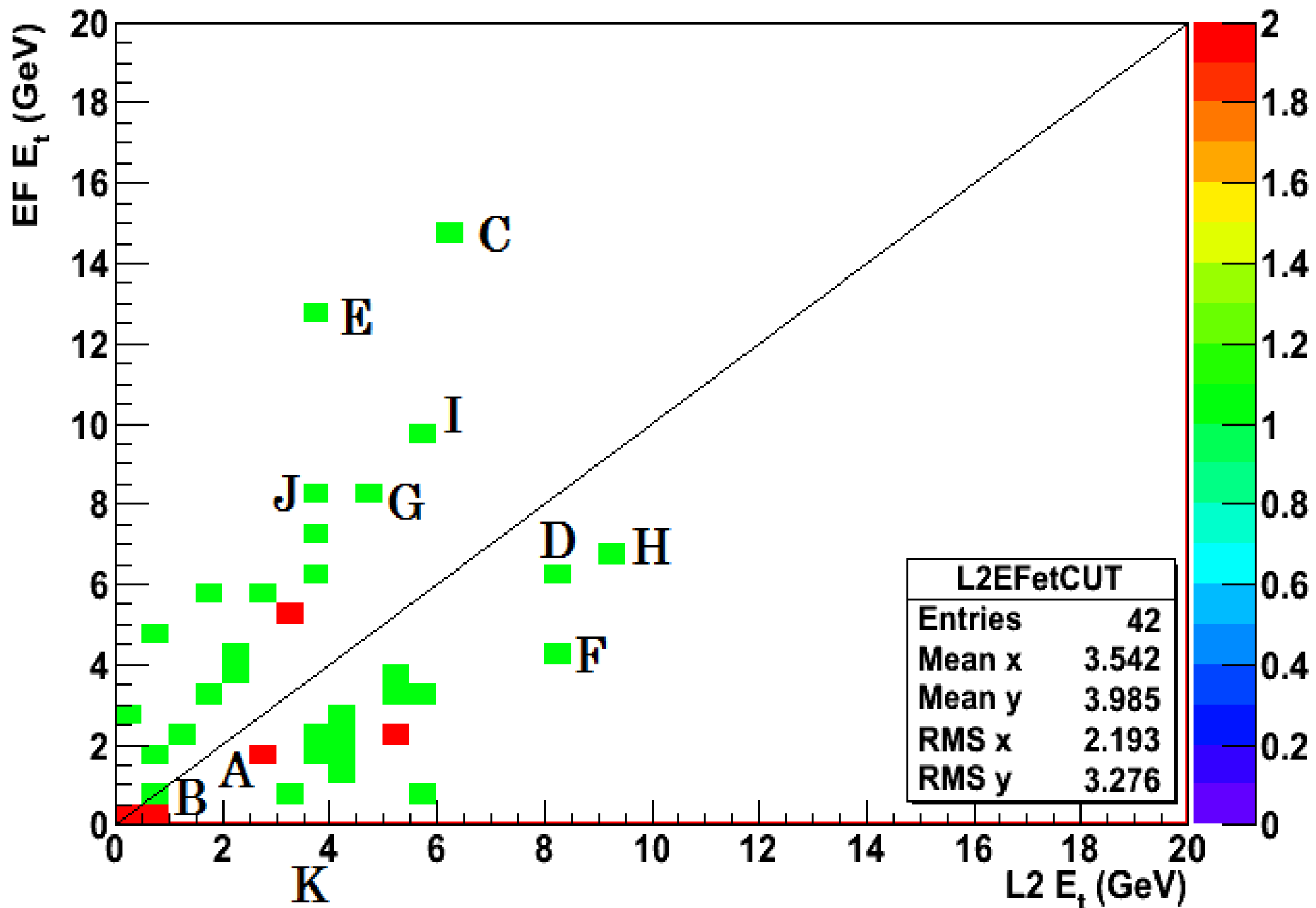
L2 vs EF Outlier Phi



L2vsEF Outlier Delta R



L2 vs EF Et



Outlier	Run	Event	Lumi	Eta Phi (L1_ROI)	L1 L2 EF OFF Et (GeV)	Comment	Comment (2)	Seen Again	Catagory
A	142166	816392	95	-1.40 -0.30	4 2.7 1.7 3.1	Crack	L1>L2		Crack
B	142166	844700	101	-1.40 1.28	4 0.73 0.14 0.23	Crack	L1>L2	L1vsL2(B) EF(K)	Crack
C	142193	894091	78	1.30 -2.36	7 6 14.9 14.8	f3	L1>L2	L1vsEF (A)	f3
D	142193	954394	81	-1.60 2.95	5 8 6 7.9				Unknown
E	142193	164417	34	-2.10 -0.29	9 3.8 12.8 17.1		L1>>L2		Unknown (Eta>1.8)
F	142165	366495	87	-0.5 -1.08	10 8 4 7.9	EF <	L1>L2		EF Out
G	142166	34578	23	-2.1 -2.65	6 4.6 8.3 5		L1>L2		Unknown
H	142166	475902	66	-0.70 -1.96	5/9/6.5/6.5				Unknown (Eta>1.8)
I	142193	1654098	124	1.80 0.29	5 5.9 10 10.4	f3			Unknown (Eta>1.8)
J	142383	430598	265	2.30 -1.67	4 3.5 8.4 7		L1>L2	L1vsEF (C)	Unknown (Eta>1.8)
K	142193	252169	39	-0.40 -1.57	4 -0.01 4.3 4.3	L2et -ve	L1>L2	L1vsL2 (K)	L2 Problem

Outlier Category	No. Events (Out of 42)
Resolution ($>100 <-100$)	11
Crack ($1.37 < \text{Eta} < 1.52$)	2
Et < 0 GeV	1
Known Bad Channel (L1Calo)	0
Other Closeby Clusters	0
Et < 4 GeV	36
L1 $>$ L2 (Et)	32
f3	1
EF Out	1

Trigger Level	Total Outliers	141749	141811	142149	142154	142165	142166	142171	142174	142189	142193	142195	142383
L1 vs L2	67	0	4	1	0	10	6	7	7	6	20	4	2
L1 vs EF	53	0	3	0	0	12	6	5	1	3	17	4	2
L2 vs EF	42	0	2	0	0	8	9	3	1	2	14	2	1



Run Number: 142189

1 x L1ROI

Event Number: 358870

1 x L2_EMCluster

Lumiblock: 127

3 x EF_CaloCluster

Information on L1Cluster 0

Eta= -0.3 , Phi= 2.35619

RoIWord= 392691715

Core= 5000 , EM_et= 5000 , HadCore= 0

Information on TrigEMCluster 0

Energy= 5547.77 , Et= 5192.19

Eta= -0.371065 , Phi= 2.43937

Shower shape parameter:

E237= 2448 , E277= 2778 , fracs1= 0.33288 , weta2= 0.0103438

ehad1= -64.5963 , Eta1= -0.370553 , emaxs1= 710 , e2tsts1= 160



Run Number: 142189

Event Number: 358870

Lumiblock: 127

1 x L1ROI

1 x L2_EMCluster

3 x EF_CaloCluster

Information on CaloCluster 0

EF_Et= 3534.11

EF_e= 3785.53

EF_Pt= 3534.11

EF_Eta= -0.374998 , EF_Phi= 2.42082

OFFEF_Et= 5027.83

OFFEF_e= 5377.87

Information on CaloCluster 1

EF_Et= 6012.19

EF_e= 6431.72

EF_Pt= 6012.19

EF_Eta= -0.371439 , EF_Phi= 2.41748

OFFEF_Et= 3411.5

OFFEF_e= 3778.78

CaloCluster 0 with Energy 3785.53

CaloCluster 1 with Energy 6431.72



Run Number: 142165

Event Number: 366495

Lumiblock: 187

1 x L1ROI

1 x L2_EMCluster

1 x EF_CaloCluster

4 x OFF CaloCluster

Information on CaloCluster 0
EF_Et= 4003.08
EF_e= 4515.38
EF_Pt= 4003.08
EF_Eta= -0.500673 , EF_Phi= -
1.12194
OFFEF_Et= 7915.46
OFFEF_e= 8687.17

Information on CaloCluster 2
EF_Et= 4003.08
EF_e= 4515.38
EF_Pt= 4003.08
EF_Eta= -0.500673 , EF_Phi= -
1.12194
OFFEF_Et= 8119.22
OFFEF_e= 8910.17

Information on CaloCluster 1
EF_Et= 4003.08
EF_e= 4515.38
EF_Pt= 4003.08
EF_Eta= -0.500673 , EF_Phi= -
1.12194
OFFEF_Et= 4186.15
OFFEF_e= 4762.33

Information on CaloCluster 3
EF_Et= 4003.08
EF_e= 4515.38
EF_Pt= 4003.08
EF_Eta= -0.500673 , EF_Phi= -
1.12194
OFFEF_Et= 4465.1
OFFEF_e= 5078.5