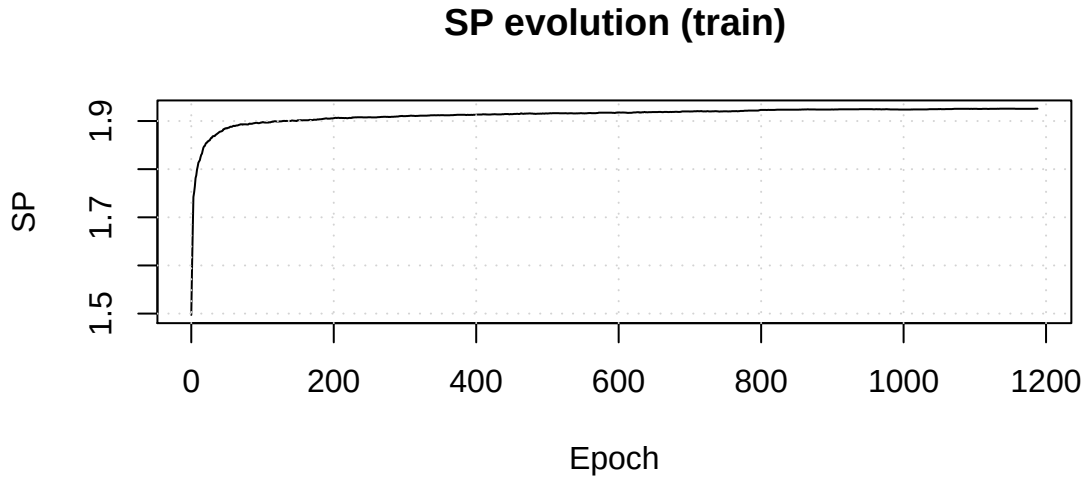
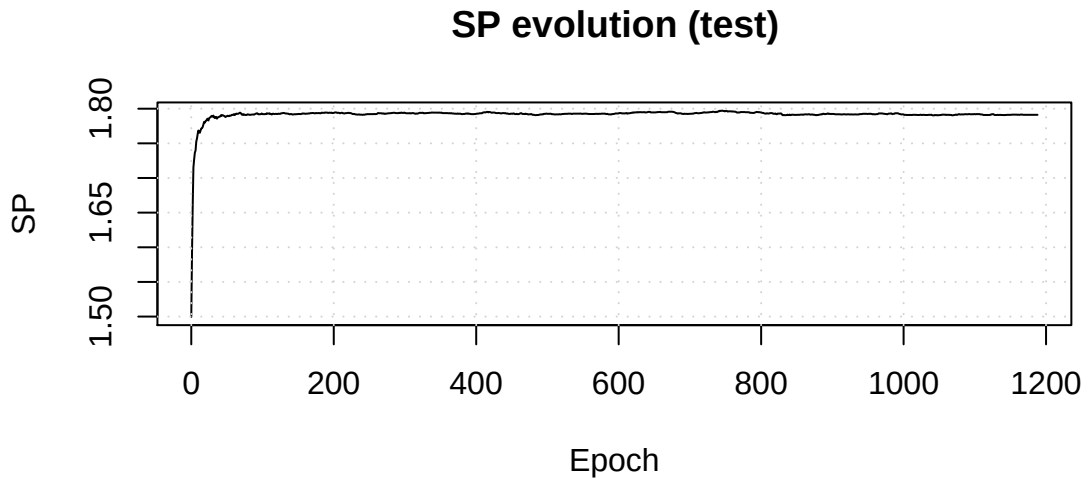
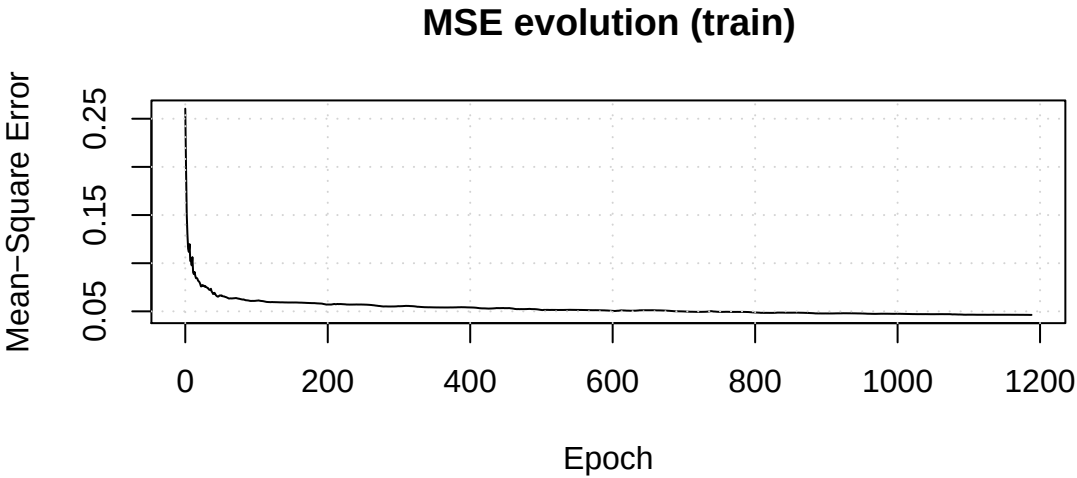
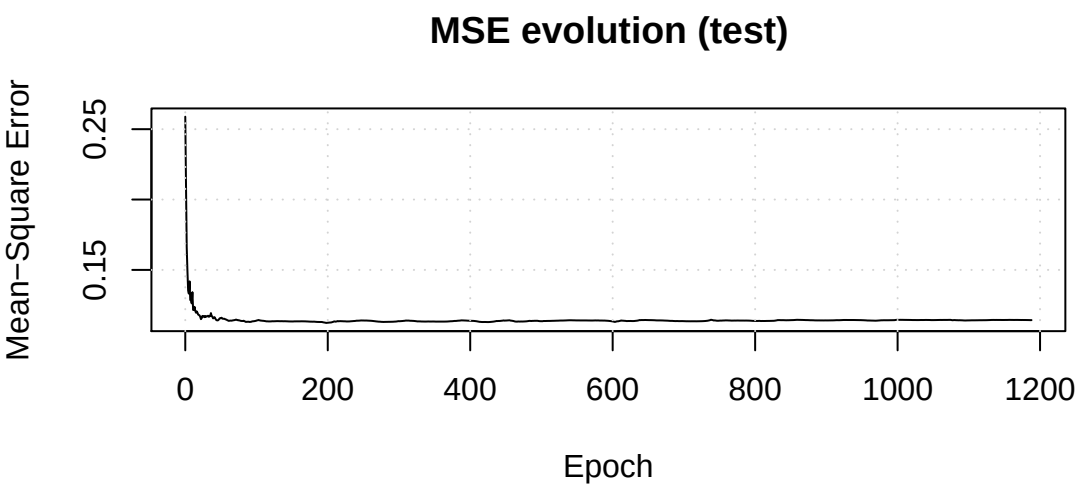
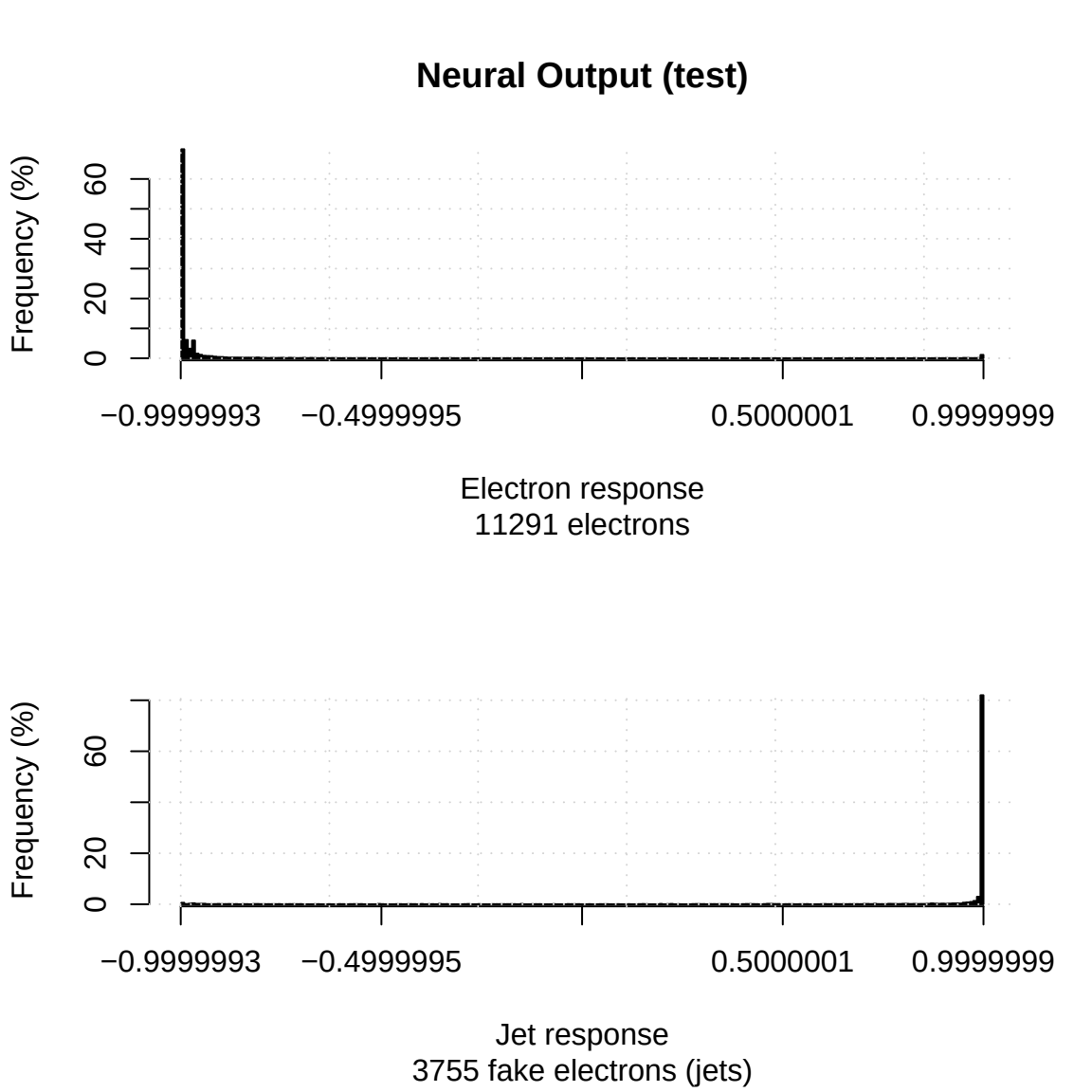
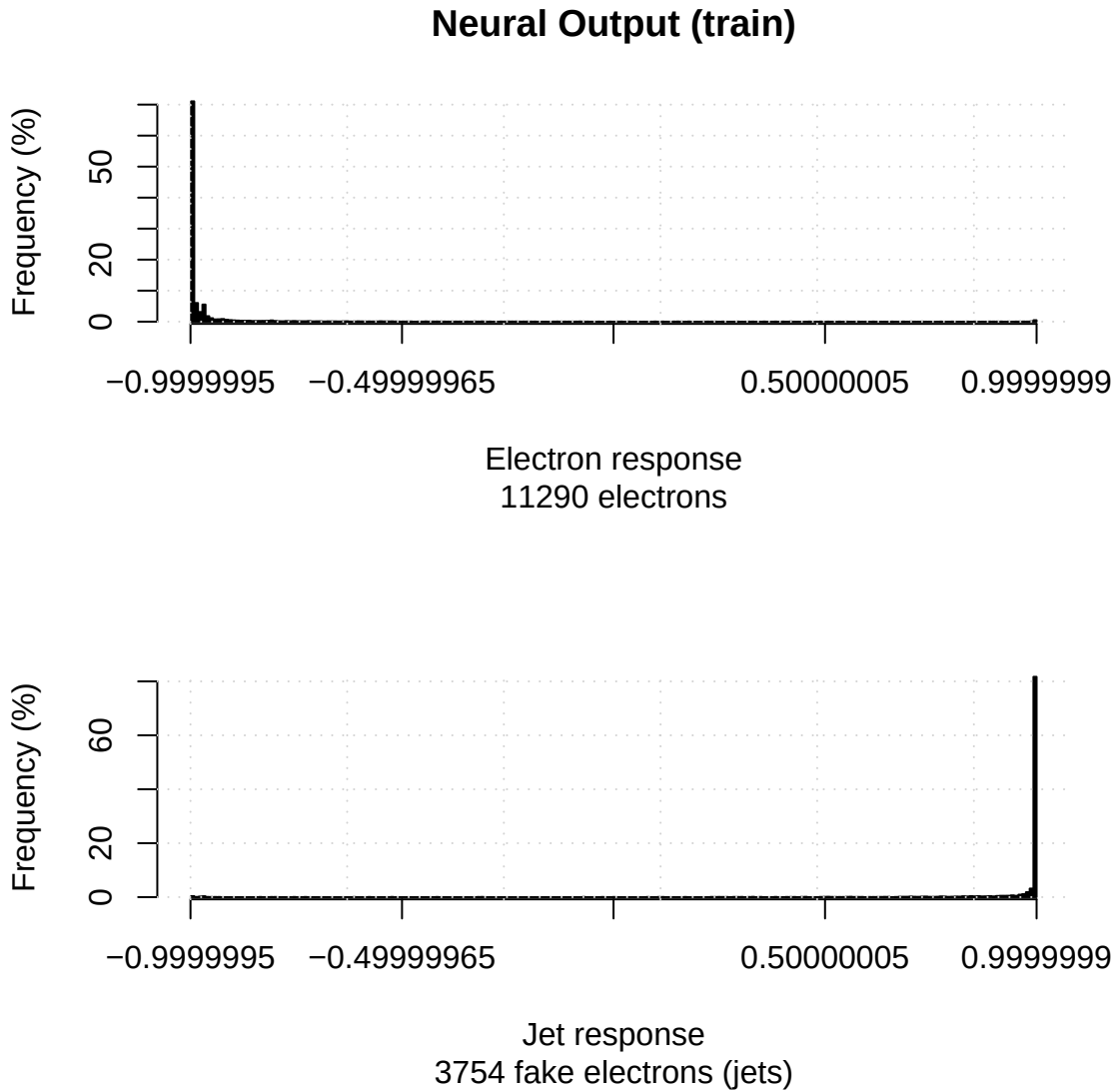

SP evolution (train)
SP
1.5
1.7
1.9
0
200
400
600
800
1000
1200
Epoch

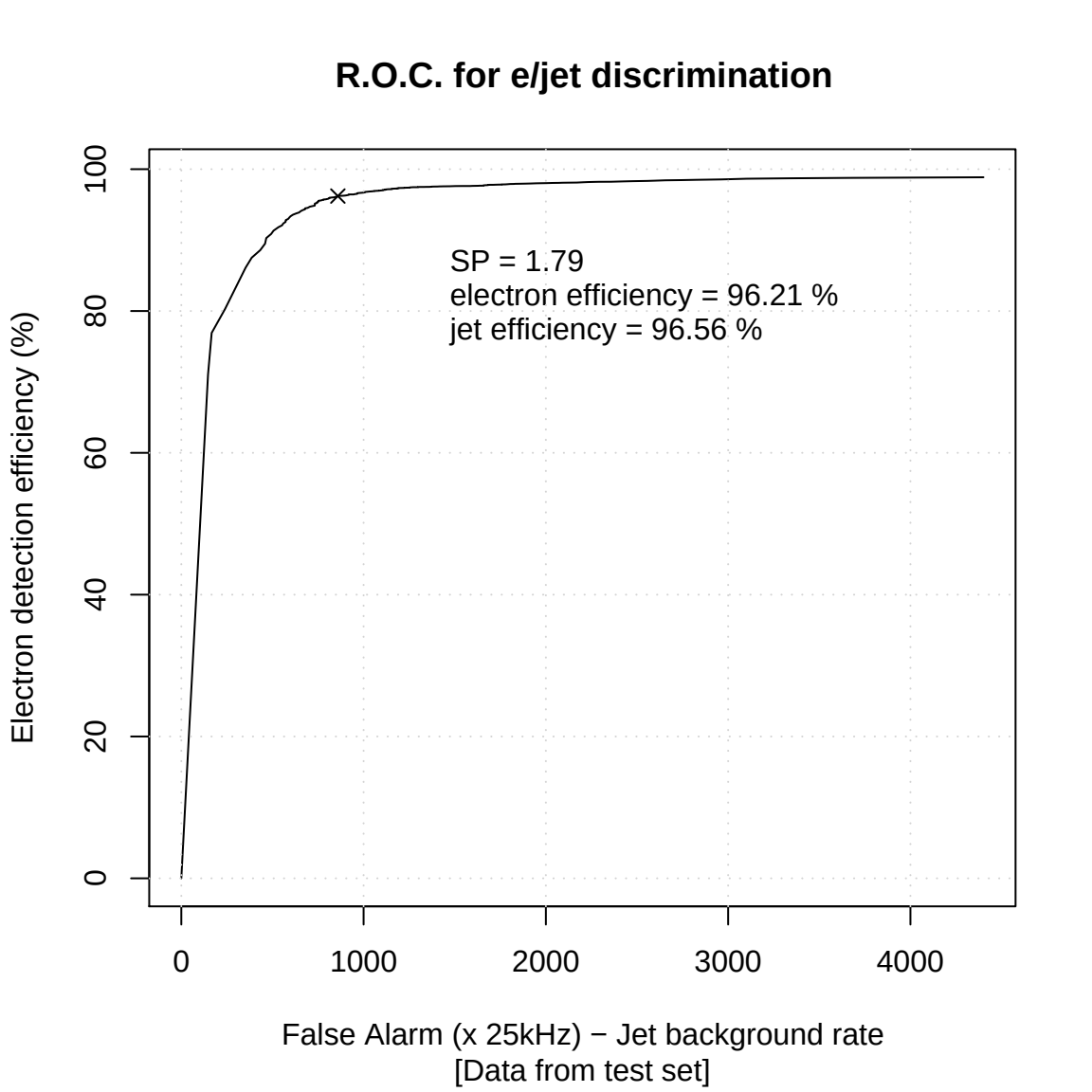

SP evolution (test)
SP
1.50
1.65
1.80
0
200
400
600
800
1000
1200
Epoch

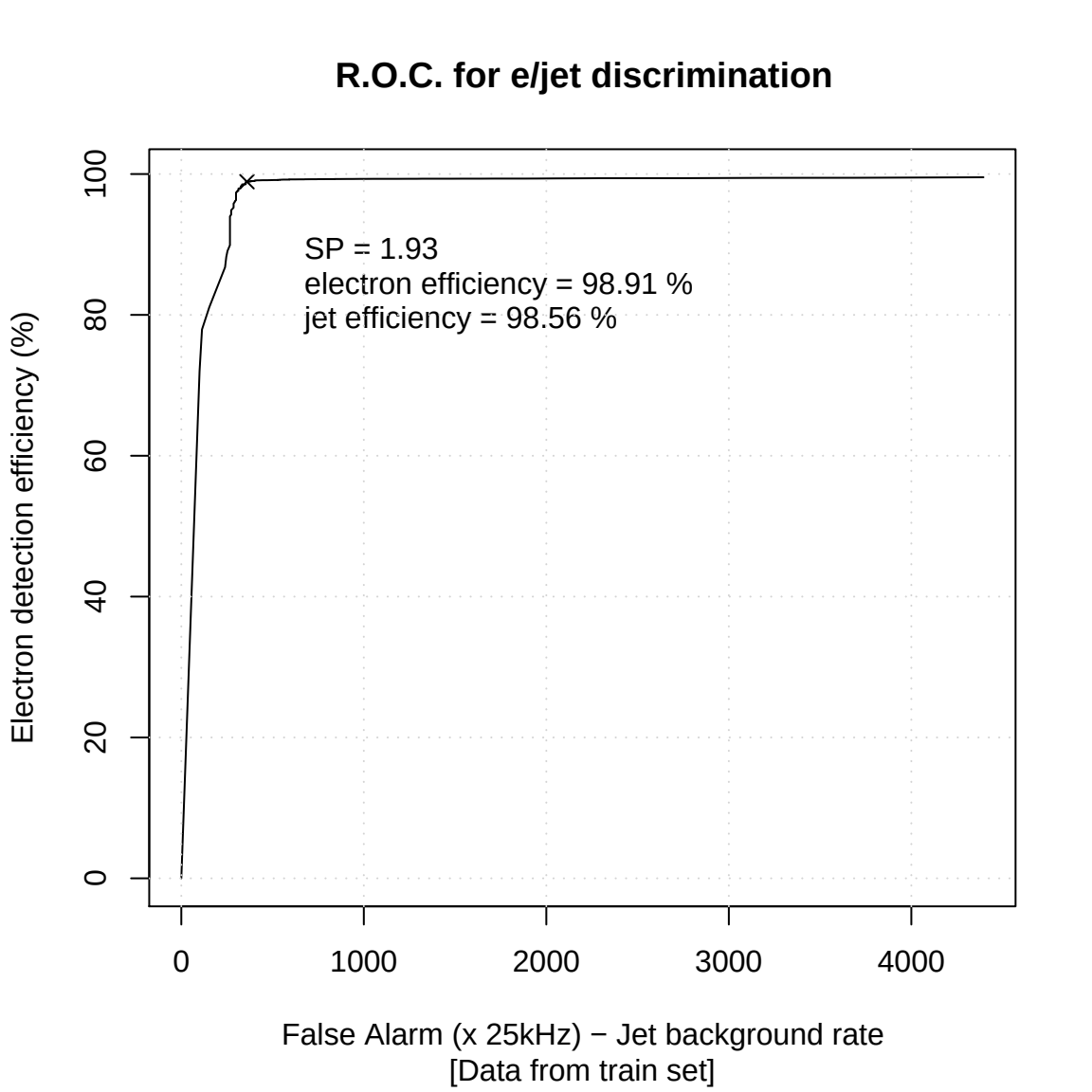

MSE evolution (train)
Mean−Square Error
0.05
0.15
0.25
0
200
400
600
800
1000
1200
Epoch

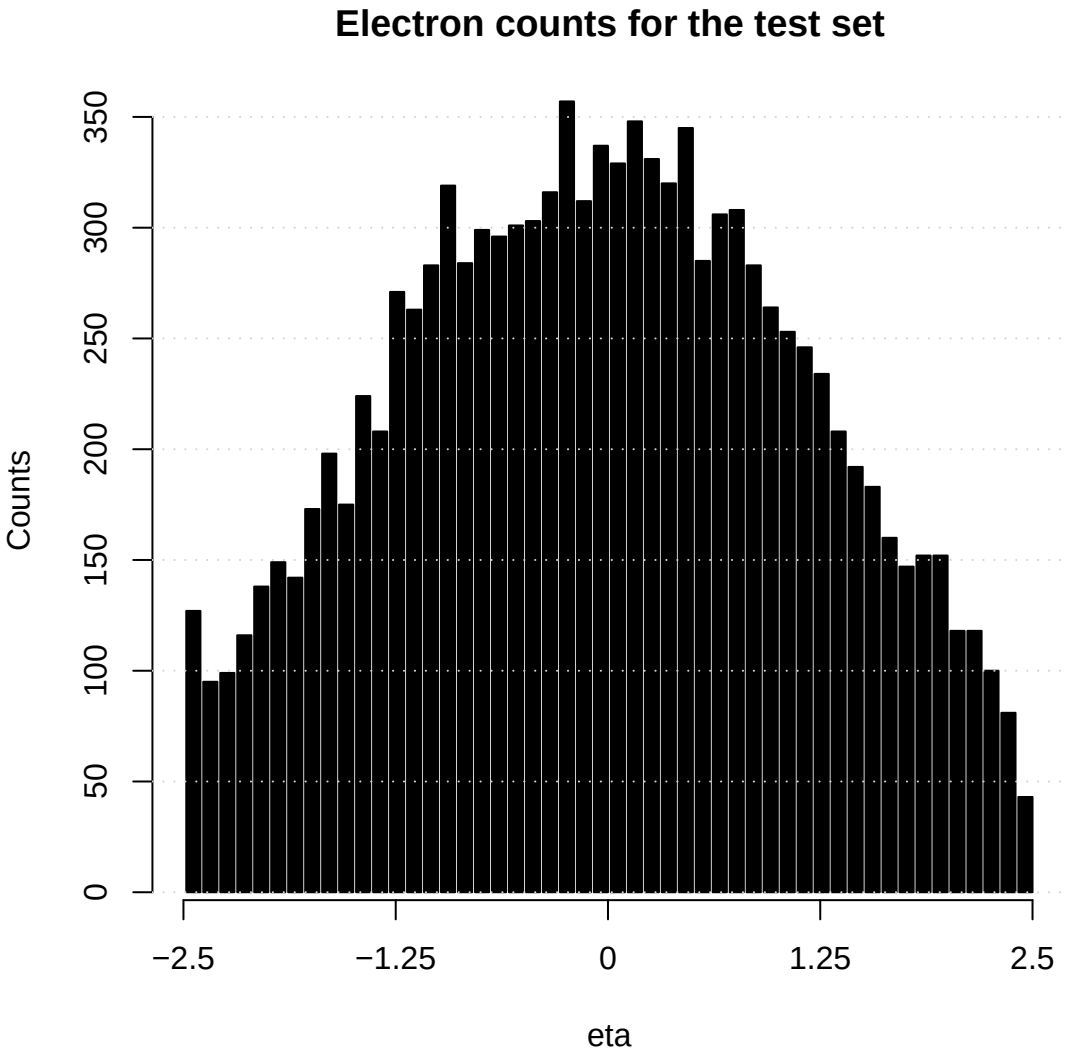

MSE evolution (test)
Mean−Square Error
0.15
0.25
0
200
400
600
800
1000
1200
Epoch

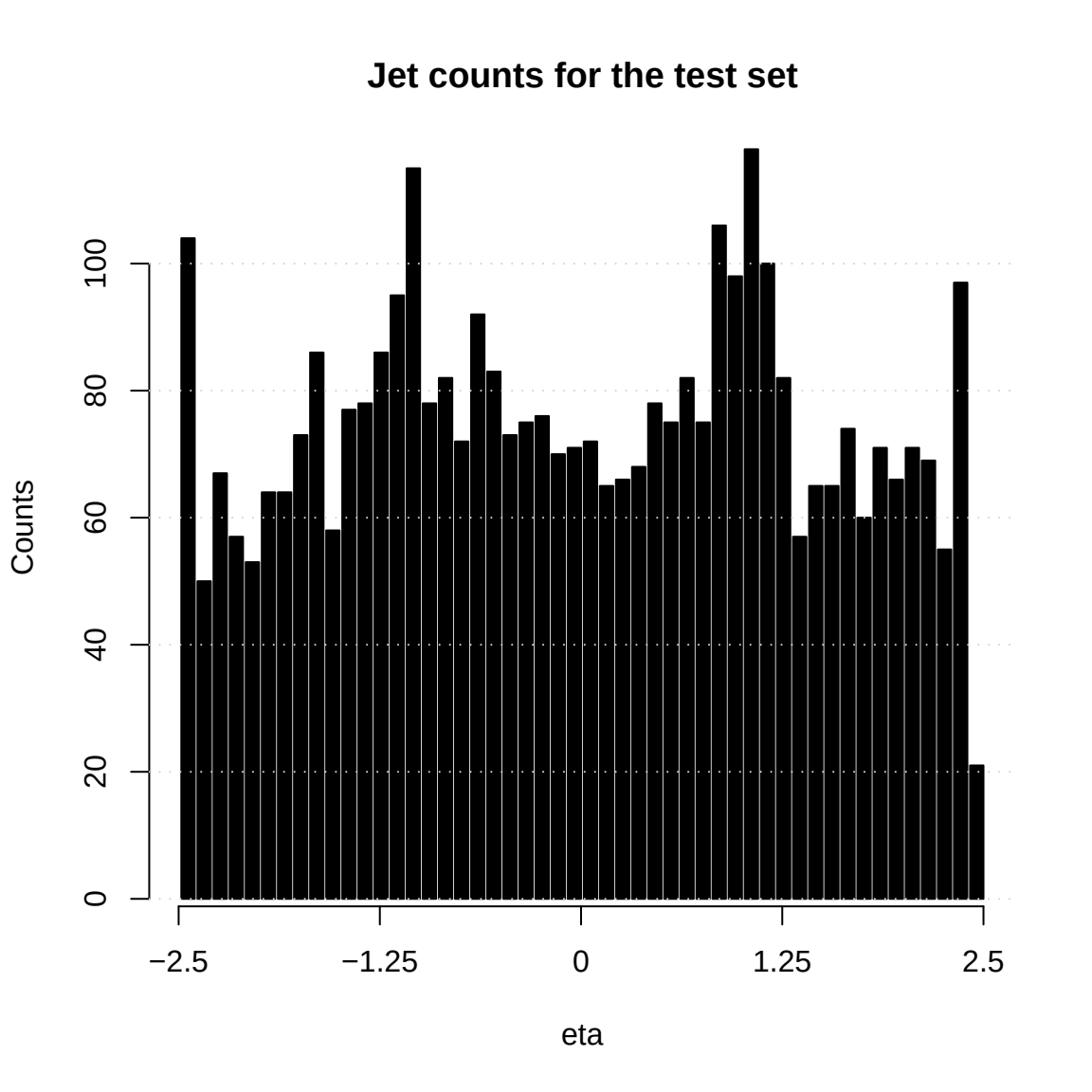

Neural Output (test)
Frequency (%)
0
20
40
60
−0.9999993
−0.4999995
0.5000001
0.9999999
Electron response
11291 electrons
Frequency (%)
0
20
60
−0.9999993
−0.4999995
0.5000001
0.9999999
Jet response
3755 fake electrons (jets)

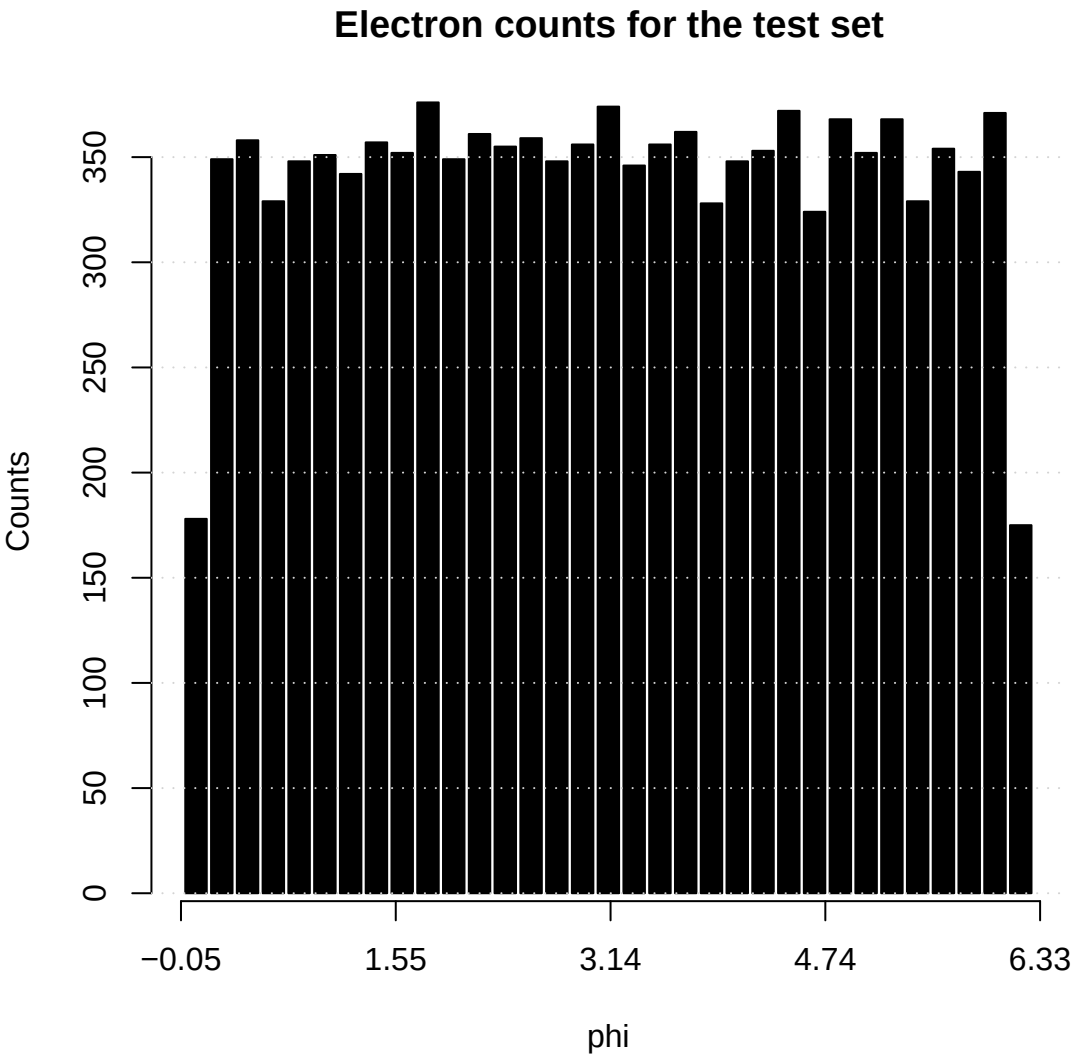

Neural Output (train)
Frequency (%)
0
20
50
−0.9999995
−0.49999965
0.50000005
0.9999999
Electron response
11290 electrons
Frequency (%)
0
20
60
−0.9999995
−0.49999965
0.50000005
0.9999999
Jet response
3754 fake electrons (jets)

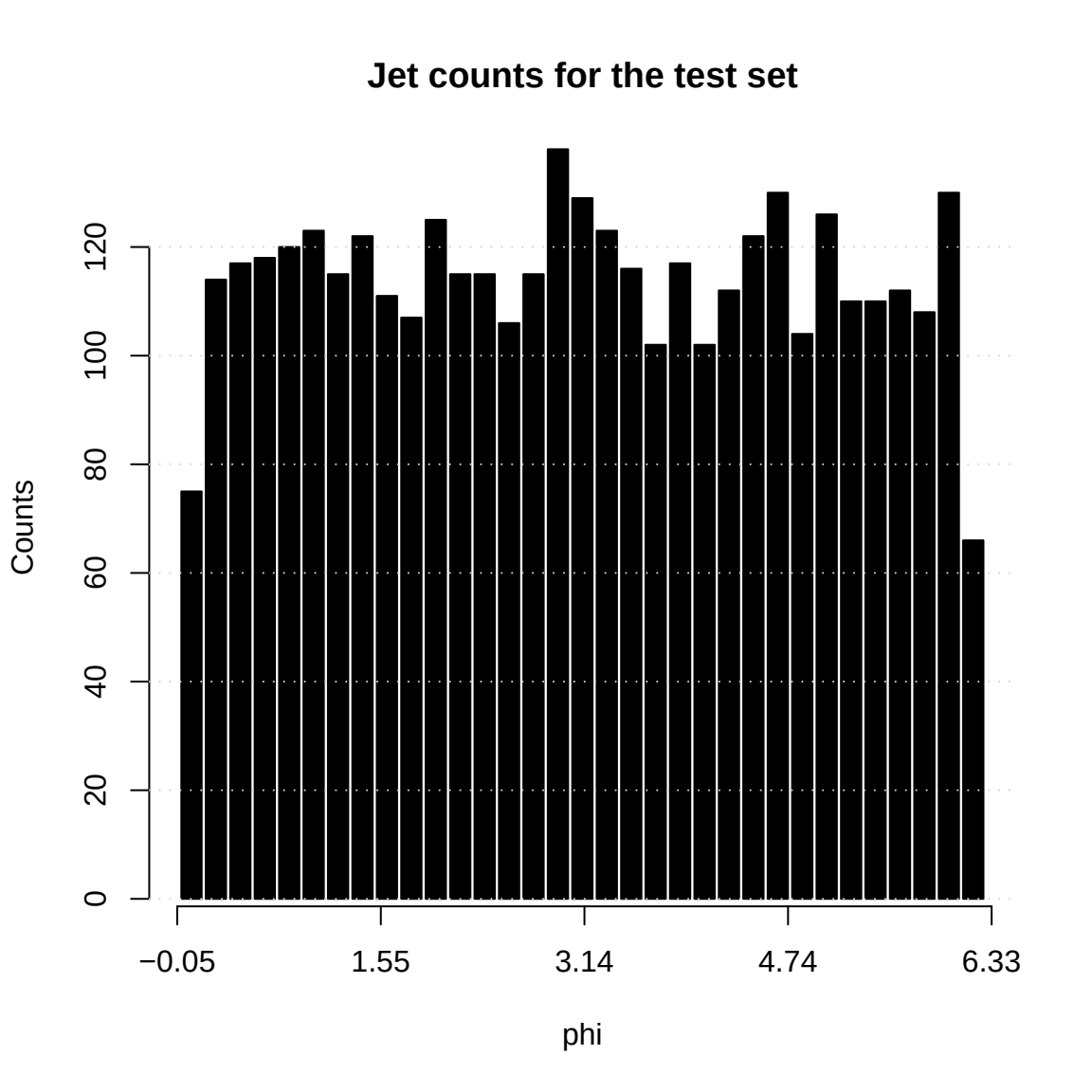

R.O.C. for e/jet discrimination
SP = 1.79
electron efficiency = 96.21 %
jet efficiency = 96.56 %
Electron detection efficiency (%)
0
20
40
60
80
100
0
1000
2000
3000
4000
False Alarm (x 25kHz) − Jet background rate
[Data from test set]

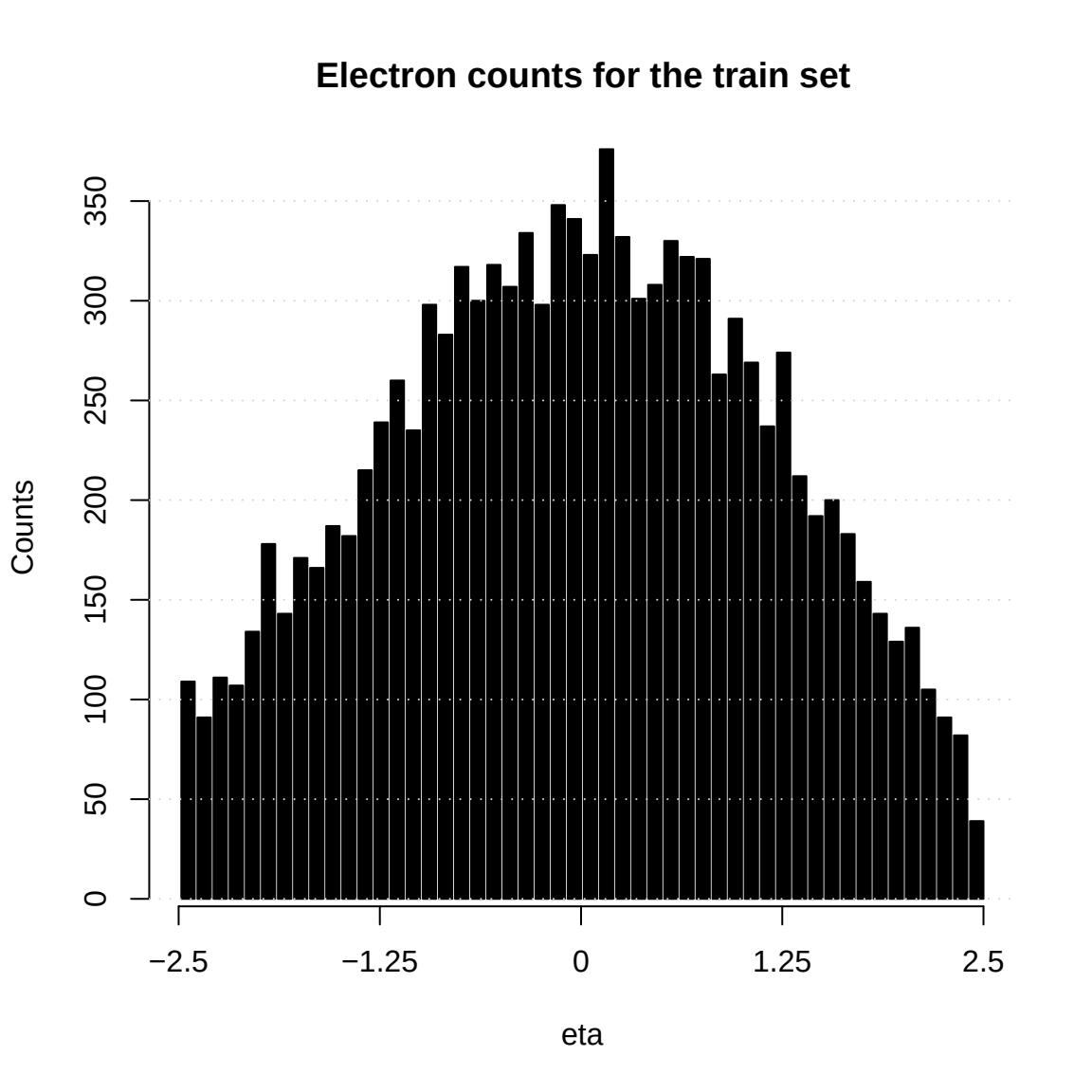

R.O.C. for e/jet discrimination
SP = 1.93
electron efficiency = 98.91 %
jet efficiency = 98.56 %
Electron detection efficiency (%)
0
20
40
60
80
100
0
1000
2000
3000
4000
False Alarm (x 25kHz) − Jet background rate
[Data from train set]

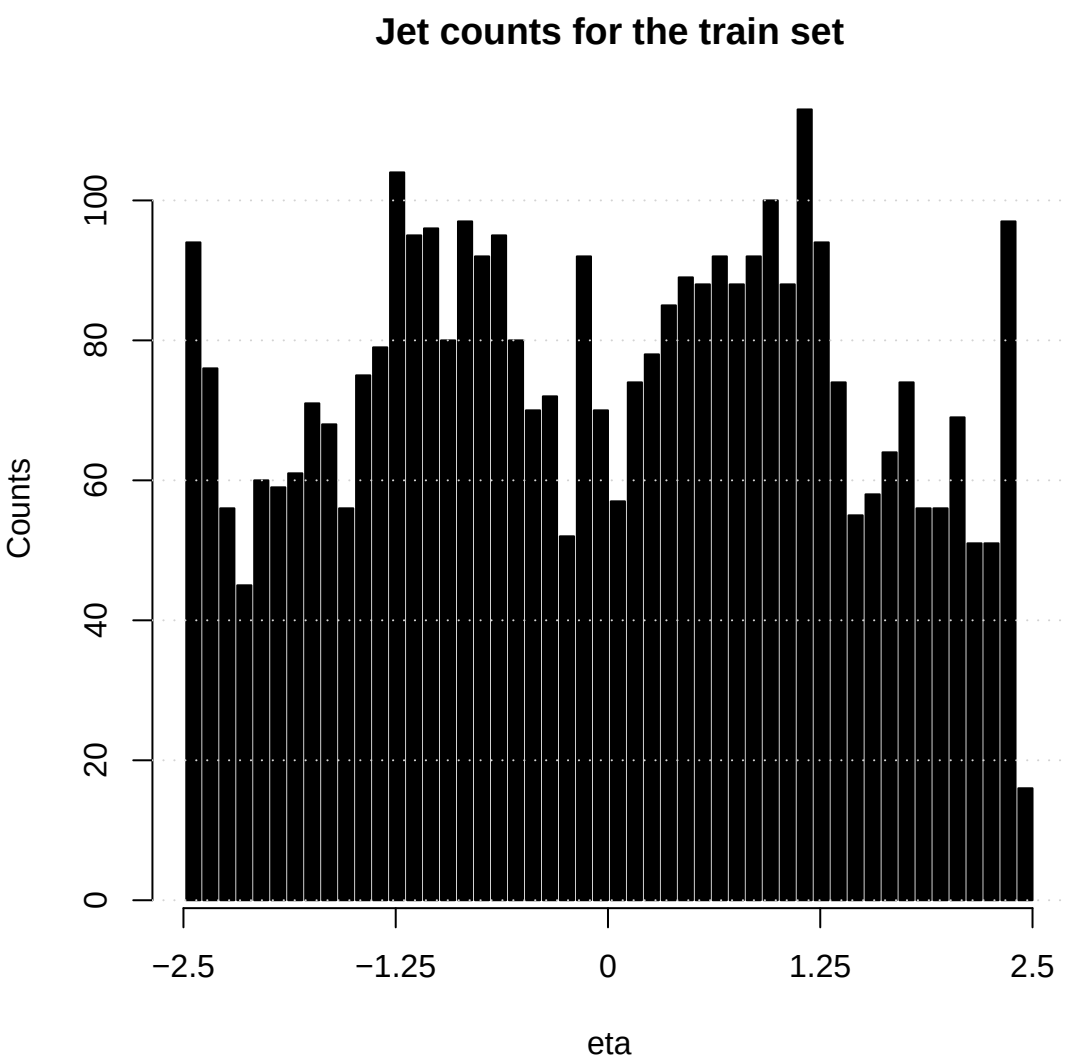

Electron counts for the test set
Counts
0
50
100
150
200
250
300
350
−2.5
−1.25
0
1.25
2.5
eta

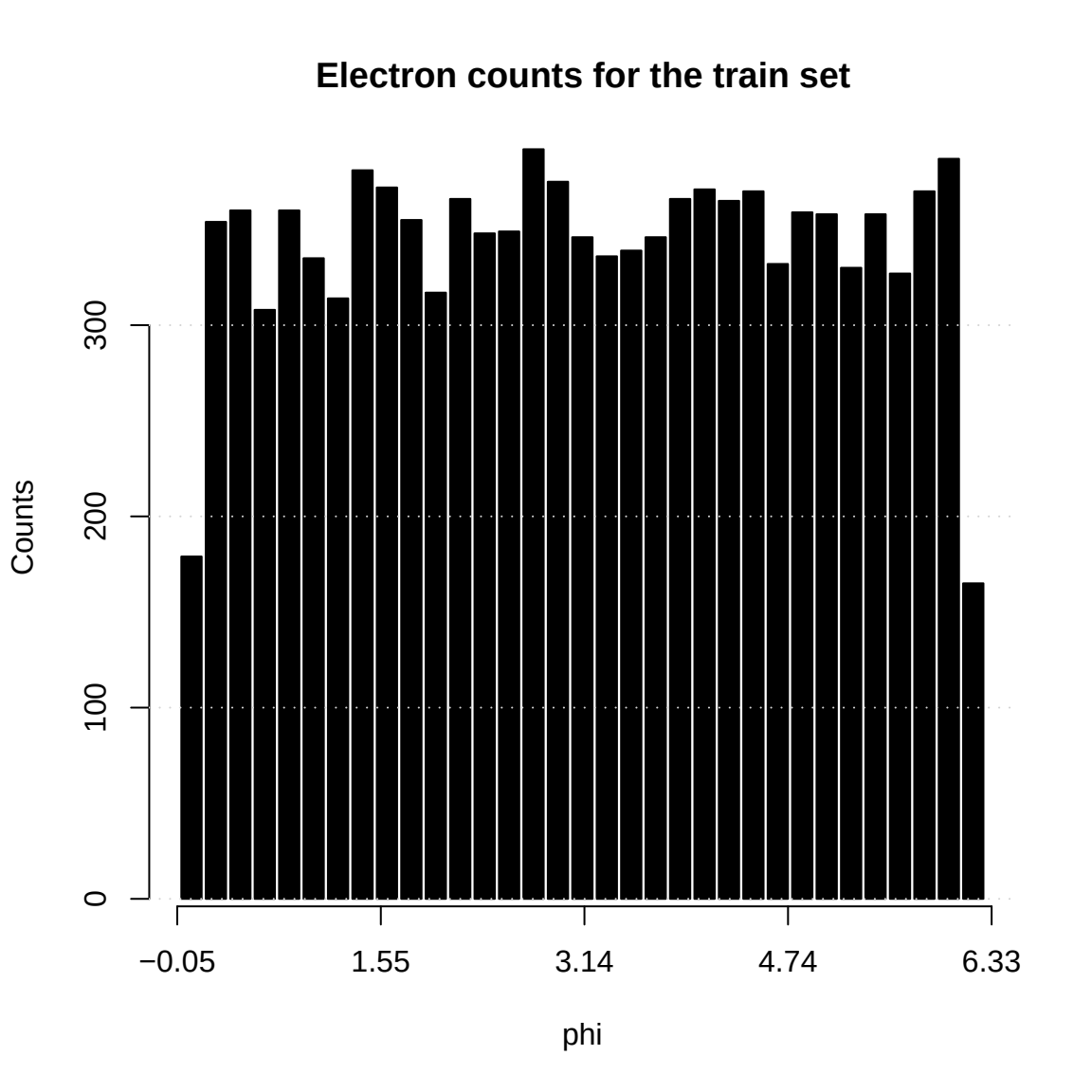

Jet counts for the test set
Counts
0
20
40
60
80
100
−2.5
−1.25
0
1.25
2.5
eta

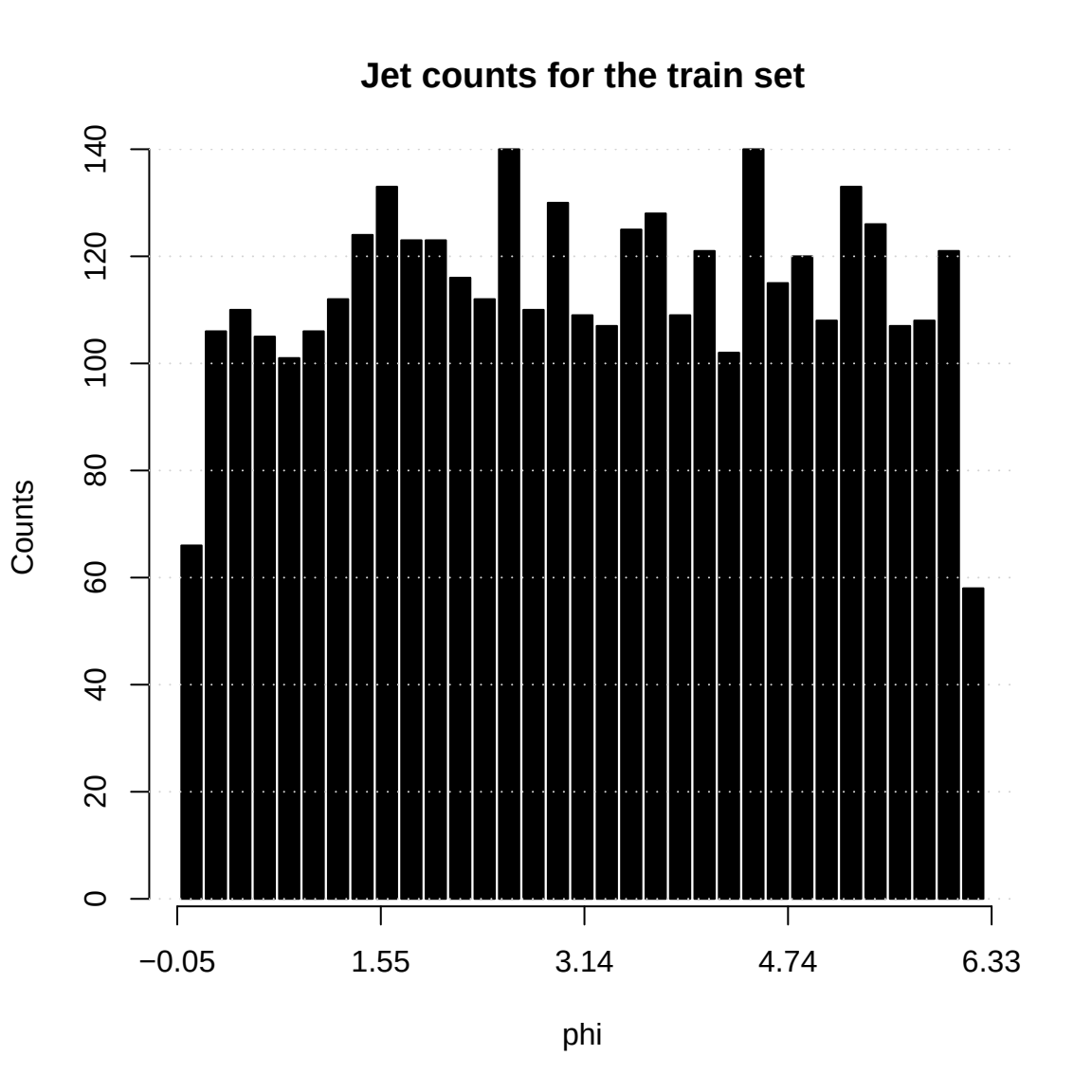

Electron counts for the test set
Counts
0
50
100
150
200
250
300
350
−0.05
1.55
3.14
4.74
6.33
phi

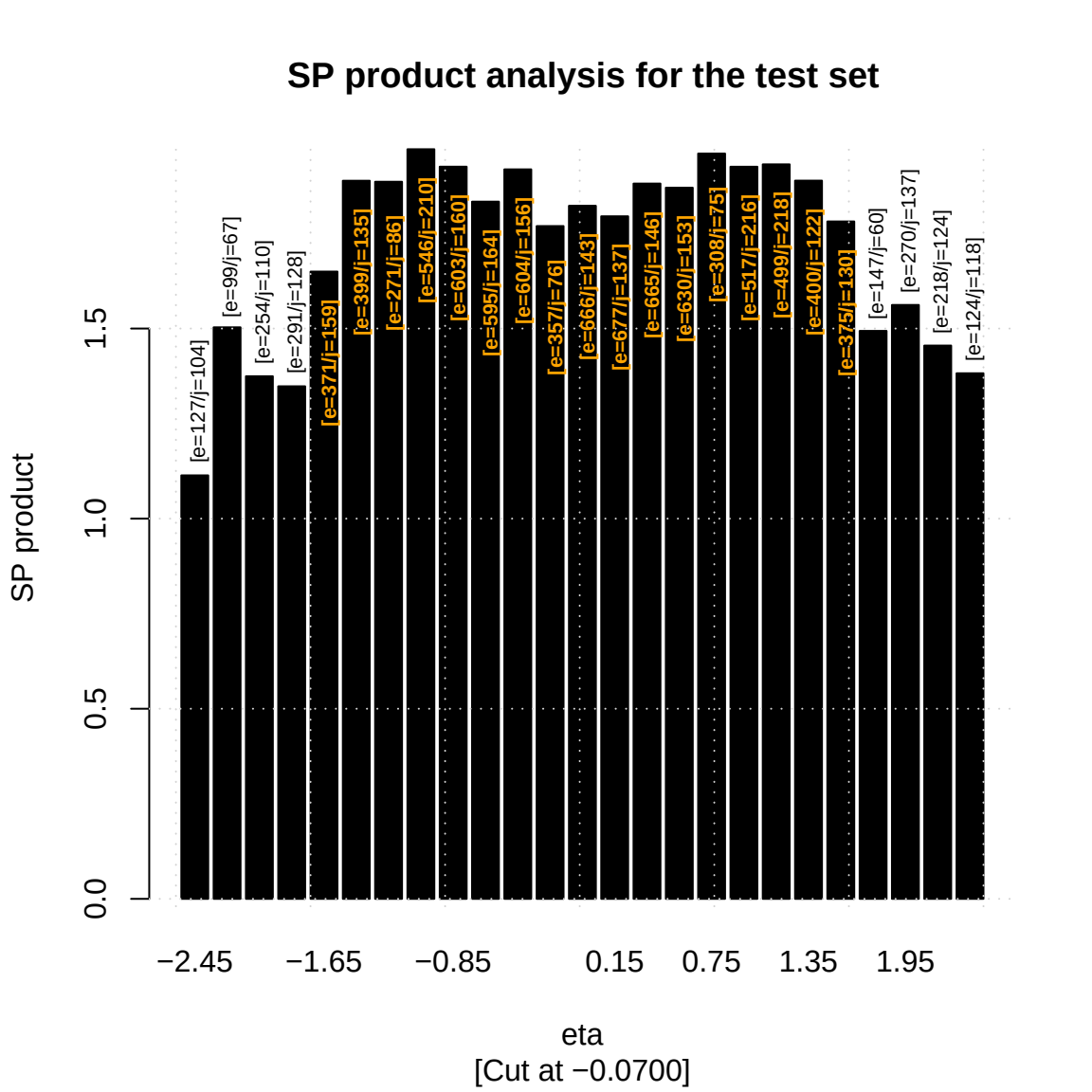

Jet counts for the test set
Counts
0
20
40
60
80
100
120
−0.05
1.55
3.14
4.74
6.33
phi

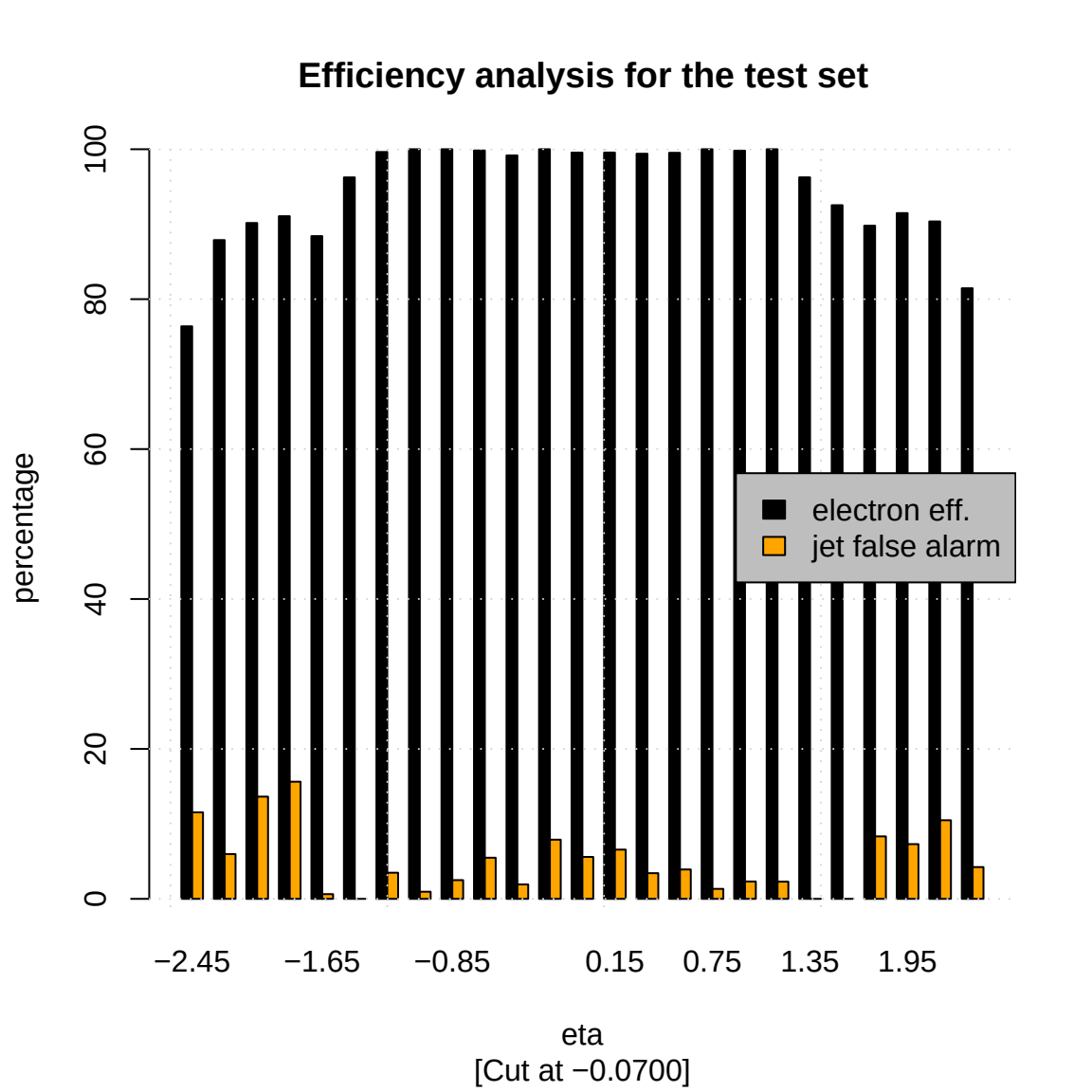

Electron counts for the train set
Counts
0
50
100
150
200
250
300
350
−2.5
−1.25
0
1.25
2.5
eta


Jet counts for the train set
Counts
0
20
40
60
80
100
−2.5
−1.25
0
1.25
2.5
eta

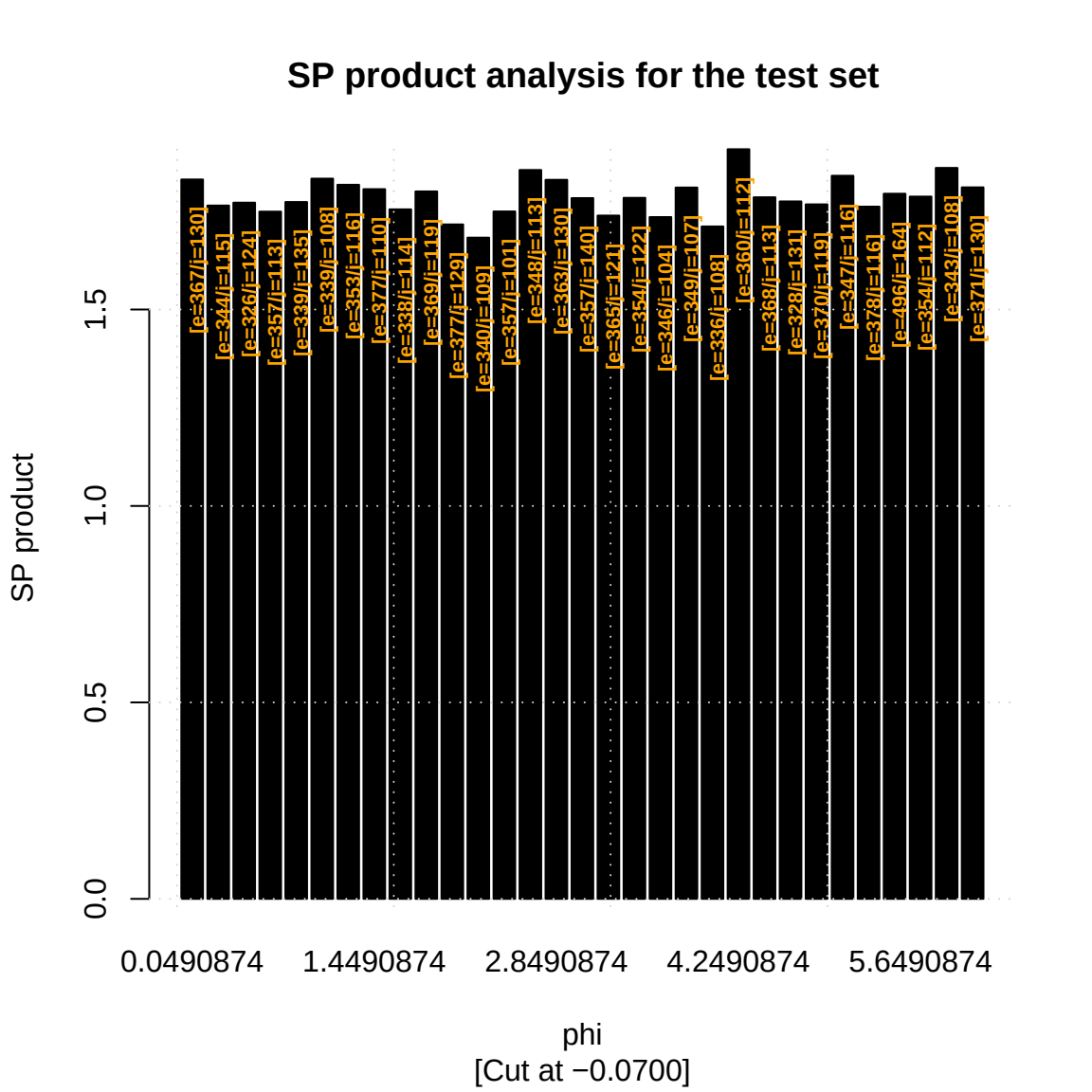

Electron counts for the train set
Counts
0
100
200
300
−0.05
1.55
3.14
4.74
6.33
phi

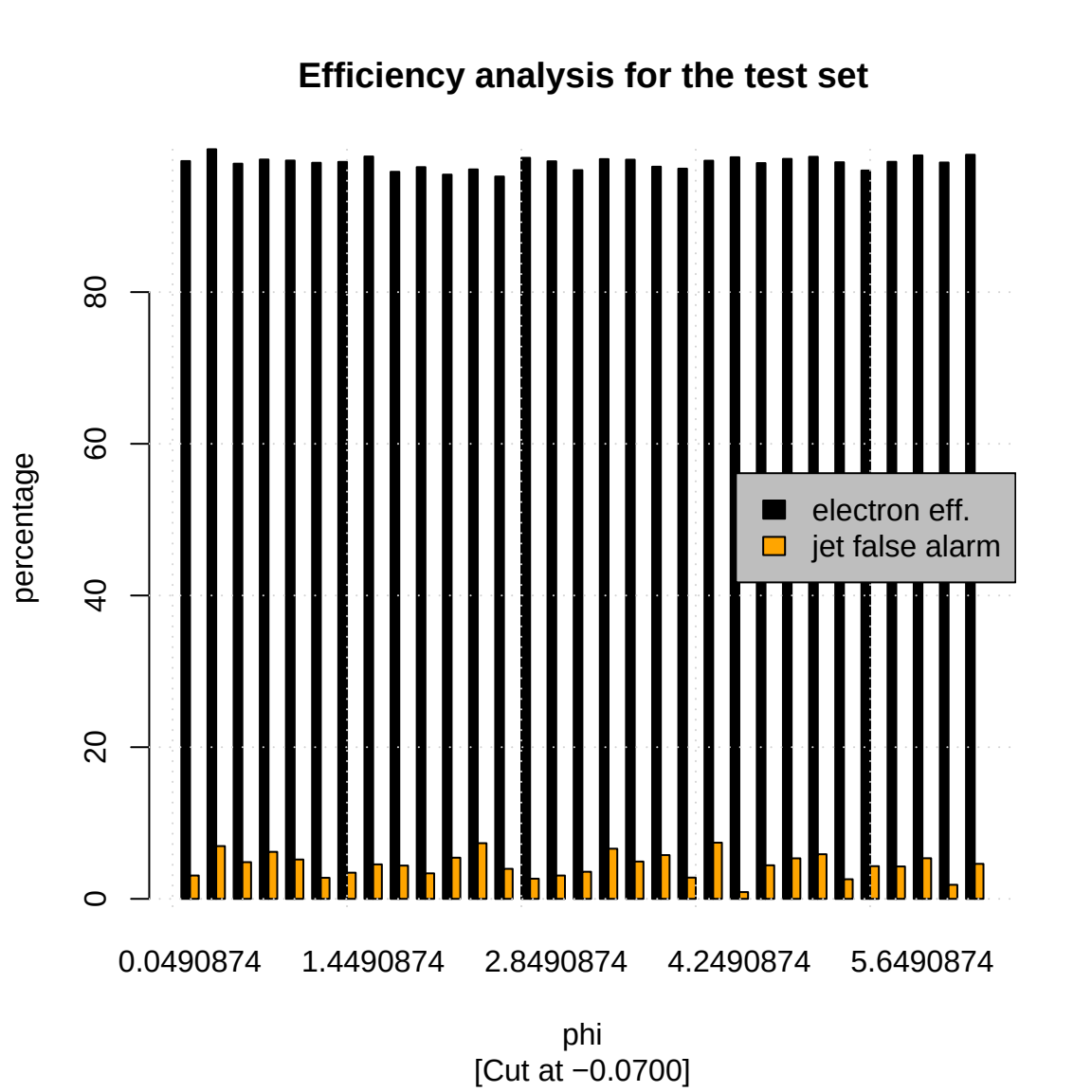

Jet counts for the train set
Counts
0
20
40
60
80
100
120
140
−0.05
1.55
3.14
4.74
6.33
phi

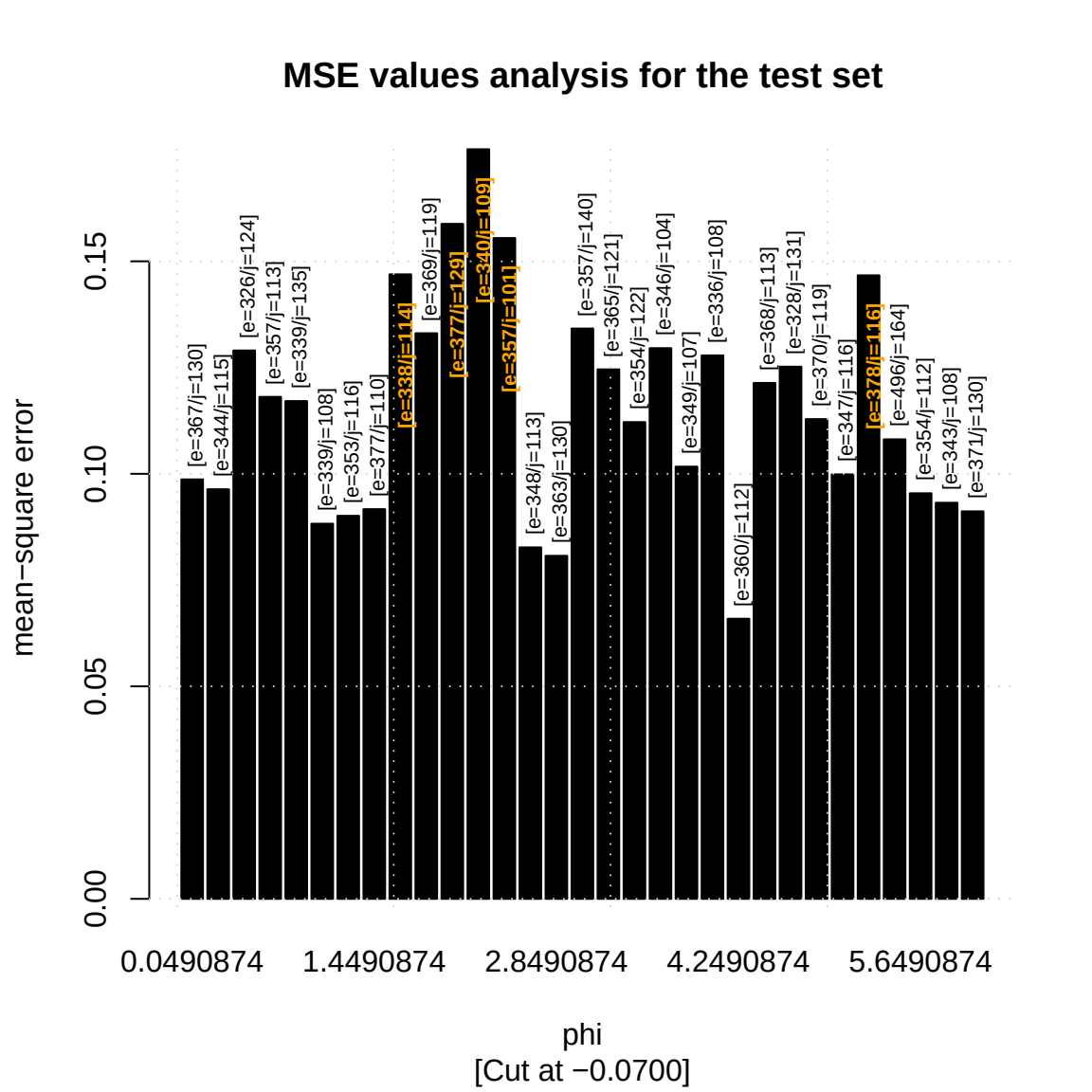

SP product analysis for the test set
SP product
0.0
0.5
1.0
1.5
[e=127/j=104]
[e=99/j=67]
[e=254/j=110]
[e=291/j=128]
[e=371/j=159]
[e=399/j=135]
[e=271/j=86]
[e=546/j=210]
[e=603/j=160]
[e=595/j=164]
[e=604/j=156]
[e=357/j=76]
[e=666/j=143]
[e=677/j=137]
[e=665/j=146]
[e=630/j=153]
[e=308/j=75]
[e=517/j=216]
[e=499/j=218]
[e=400/j=122]
[e=375/j=130]
[e=147/j=60]
[e=270/j=137]
[e=218/j=124]
[e=124/j=118]
−2.45
−1.65
−0.85
0.15
0.75
1.35
1.95
eta
[Cut at −0.0700]

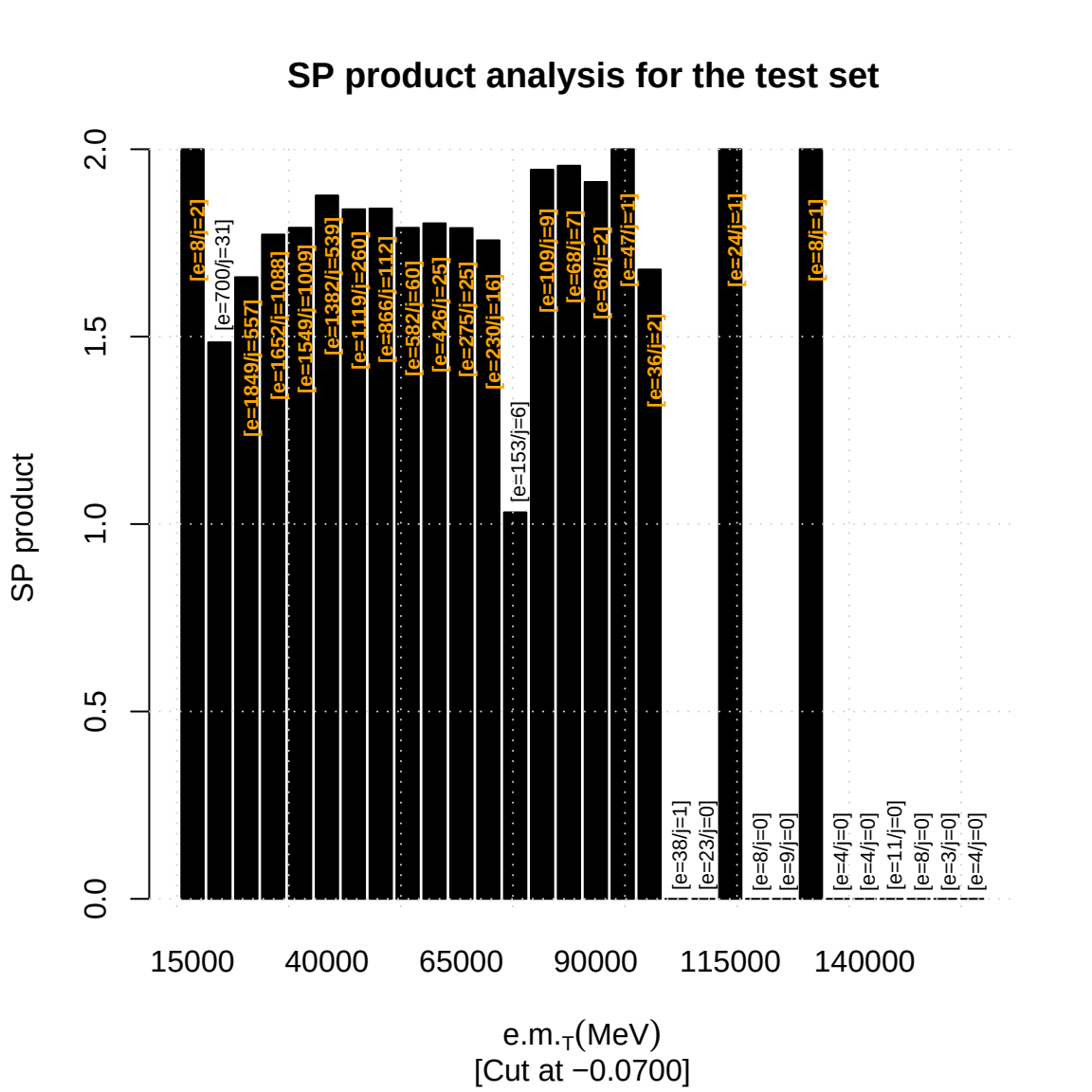

Efficiency analysis for the test set
percentage
0
20
40
60
80
100
electron eff.
jet false alarm
−2.45
−1.65
−0.85
0.15
0.75
1.35
1.95
eta
[Cut at −0.0700]

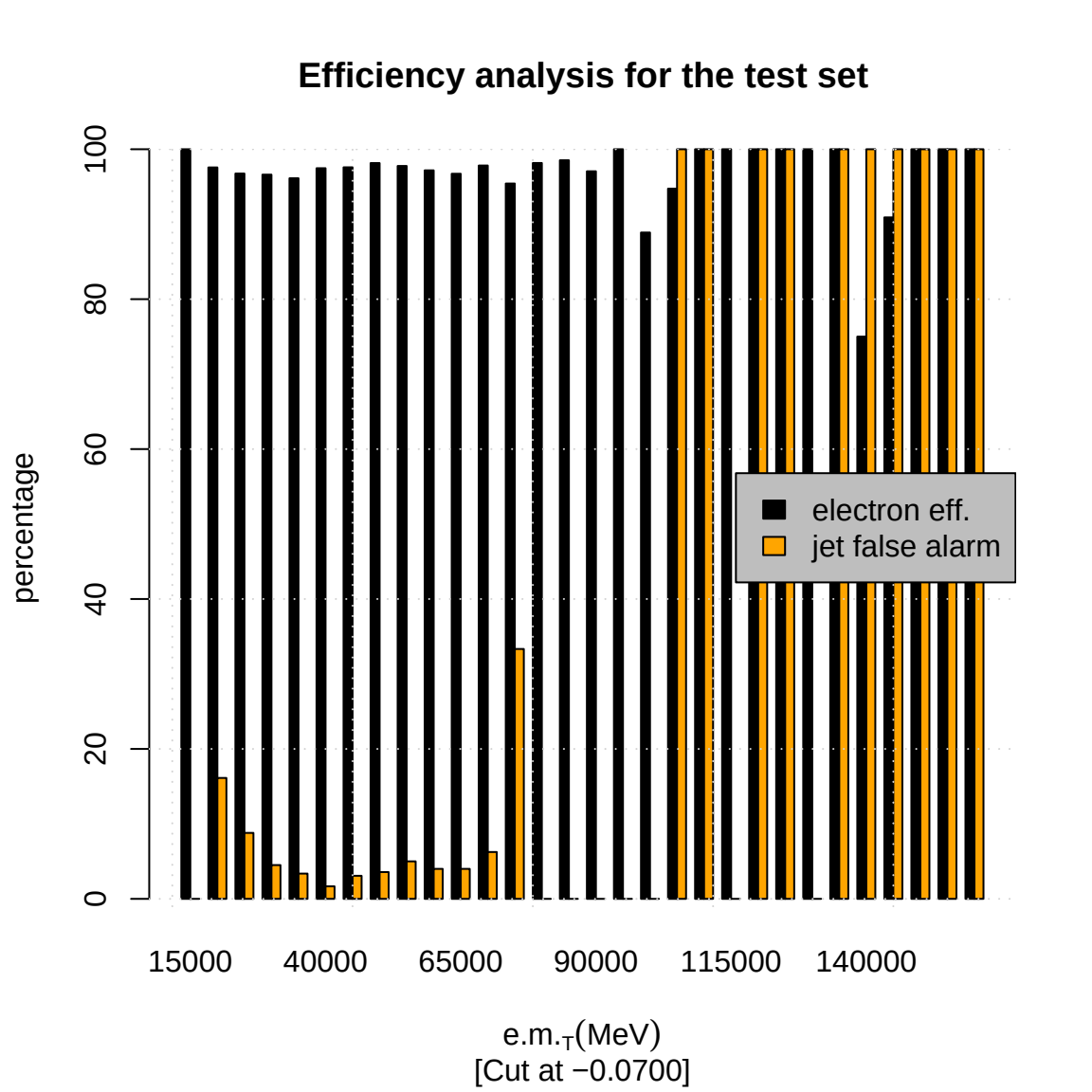
MSE values analysis for the test set

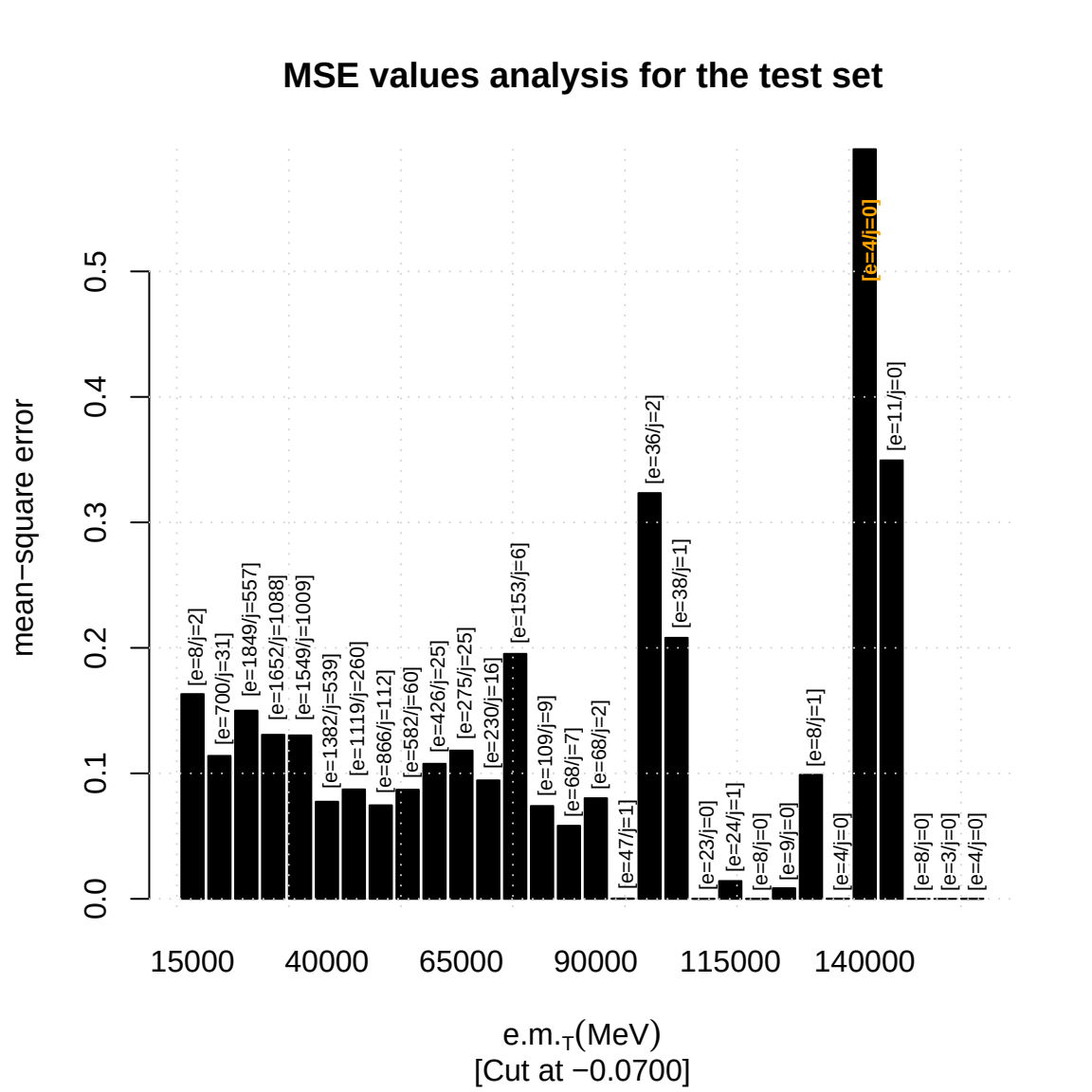

SP product analysis for the test set
SP product
0.0
0.5
1.0
1.5
[e=367/i=130]
[e=344/i=115]
[e=326/i=124]
[e=357/i=113]
[e=339/i=135]
[e=339/i=108]
[e=353/i=116]
[e=377/i=110]
[e=338/i=114]
[e=369/i=119]
[e=377/i=129]
[e=340/i=109]
[e=357/i=101]
[e=348/i=113]
[e=363/i=130]
[e=357/i=140]
[e=365/i=121]
[e=354/i=122]
[e=346/i=104]
[e=349/i=107]
[e=336/i=108]
[e=360/i=112]
[e=368/i=113]
[e=328/i=131]
[e=370/i=119]
[e=347/i=116]
[e=378/i=116]
[e=496/i=164]
[e=354/i=112]
[e=343/i=108]
[e=371/i=130]
0.0490874
1.4490874
2.8490874
4.2490874
5.6490874
phi
[Cut at −0.0700]

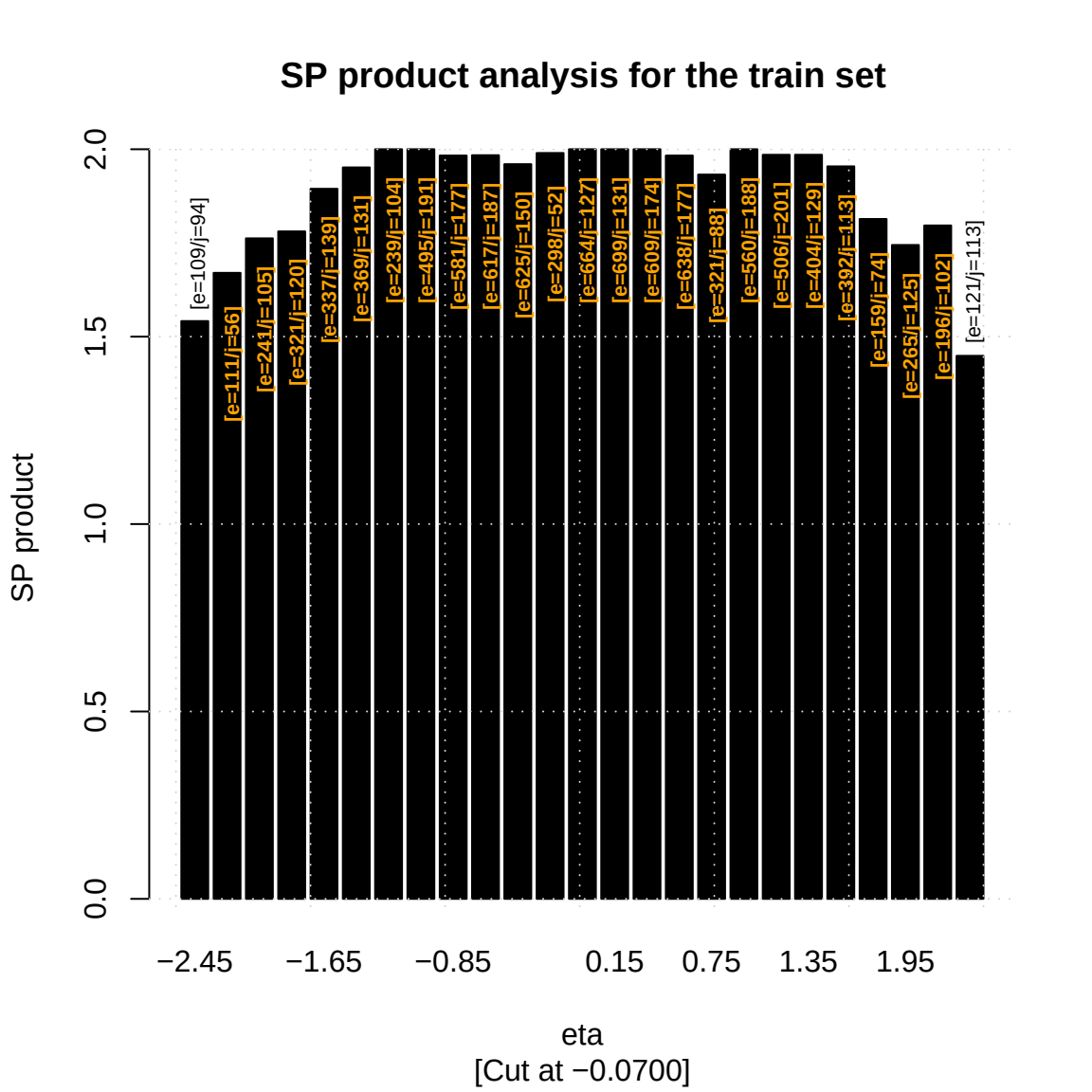

Efficiency analysis for the test set
percentage
0
20
40
60
80
electron eff.
jet false alarm
0.0490874
1.4490874
2.8490874
4.2490874
5.6490874
phi
[Cut at −0.0700]

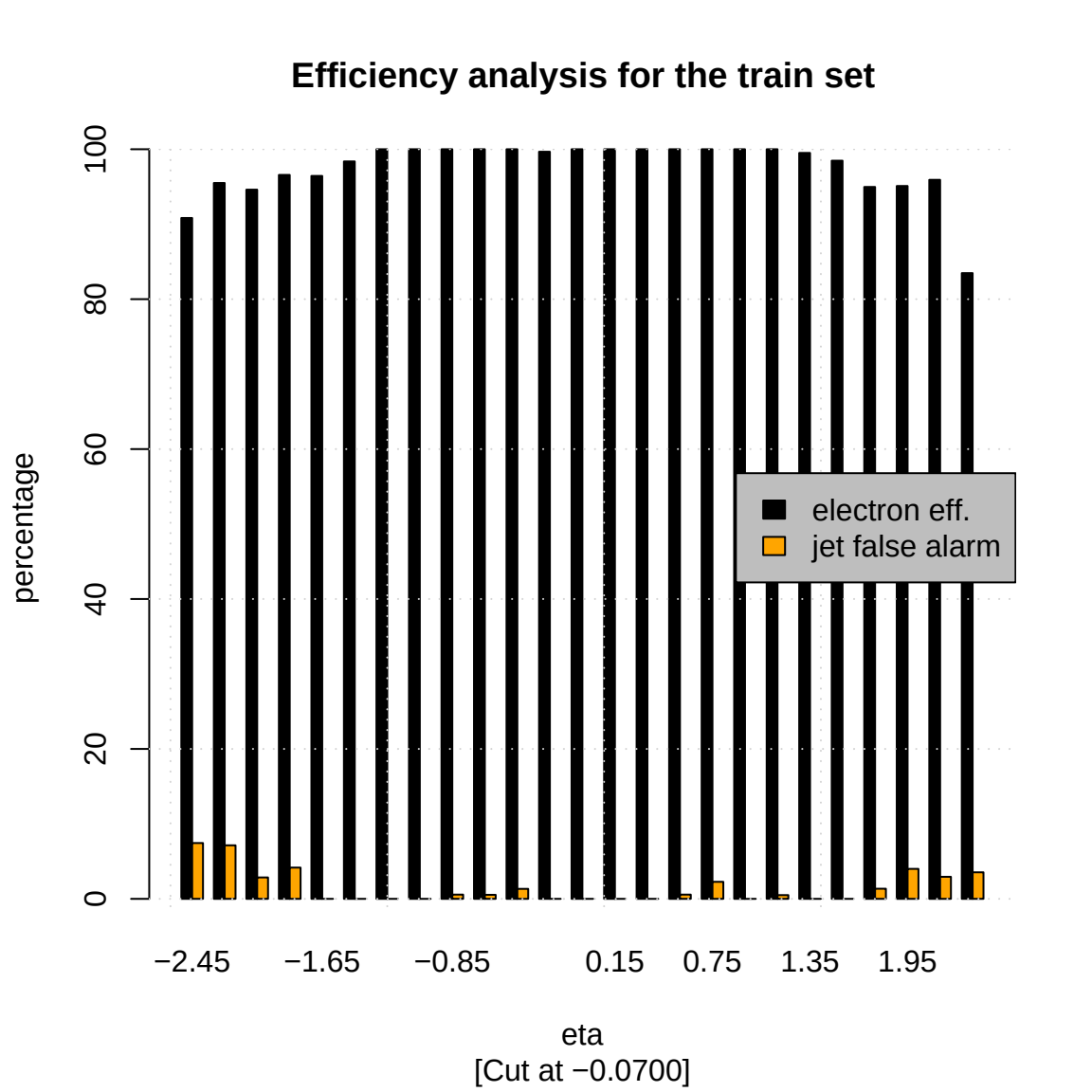

MSE values analysis for the test set
mean−square error
0.00
0.05
0.10
0.15
[e=367/j=130]
[e=344/j=115]
[e=326/j=124]
[e=357/j=113]
[e=339/j=135]
[e=339/j=108]
[e=353/j=116]
[e=377/j=110]
[e=338/j=114]
[e=369/j=119]
[e=377/j=129]
[e=340/j=109]
[e=357/j=101]
[e=348/j=113]
[e=363/j=130]
[e=357/j=140]
[e=365/j=121]
[e=354/j=122]
[e=346/j=104]
[e=349/j=107]
[e=336/j=108]
[e=360/j=112]
[e=368/j=113]
[e=328/j=131]
[e=370/j=119]
[e=347/j=116]
[e=378/j=116]
[e=496/j=164]
[e=354/j=112]
[e=343/j=108]
[e=371/j=130]
0.0490874
1.4490874
2.8490874
4.2490874
5.6490874
phi
[Cut at −0.0700]


SP product analysis for the test set
SP product
0.0
0.5
1.0
1.5
2.0
15000
40000
65000
90000
115000
140000
e.m.$_T$(MeV)
[Cut at −0.0700]
[e=8/j=2]
[e=700/j=31]
[e=1849/j=557]
[e=1652/j=1088]
[e=1549/j=1009]
[e=1382/j=539]
[e=1119/j=260]
[e=866/j=112]
[e=582/j=60]
[e=426/j=25]
[e=275/j=25]
[e=230/j=16]
[e=153/j=6]
[e=109/j=9]
[e=68/j=7]
[e=68/j=2]
[e=47/j=1]
[e=36/j=2]
[e=38/j=1]
[e=23/j=0]
[e=24/j=1]
[e=8/j=0]
[e=9/j=0]
[e=8/j=1]
[e=4/j=0]
[e=4/j=0]
[e=11/j=0]
[e=8/j=0]
[e=3/j=0]
[e=4/j=0]

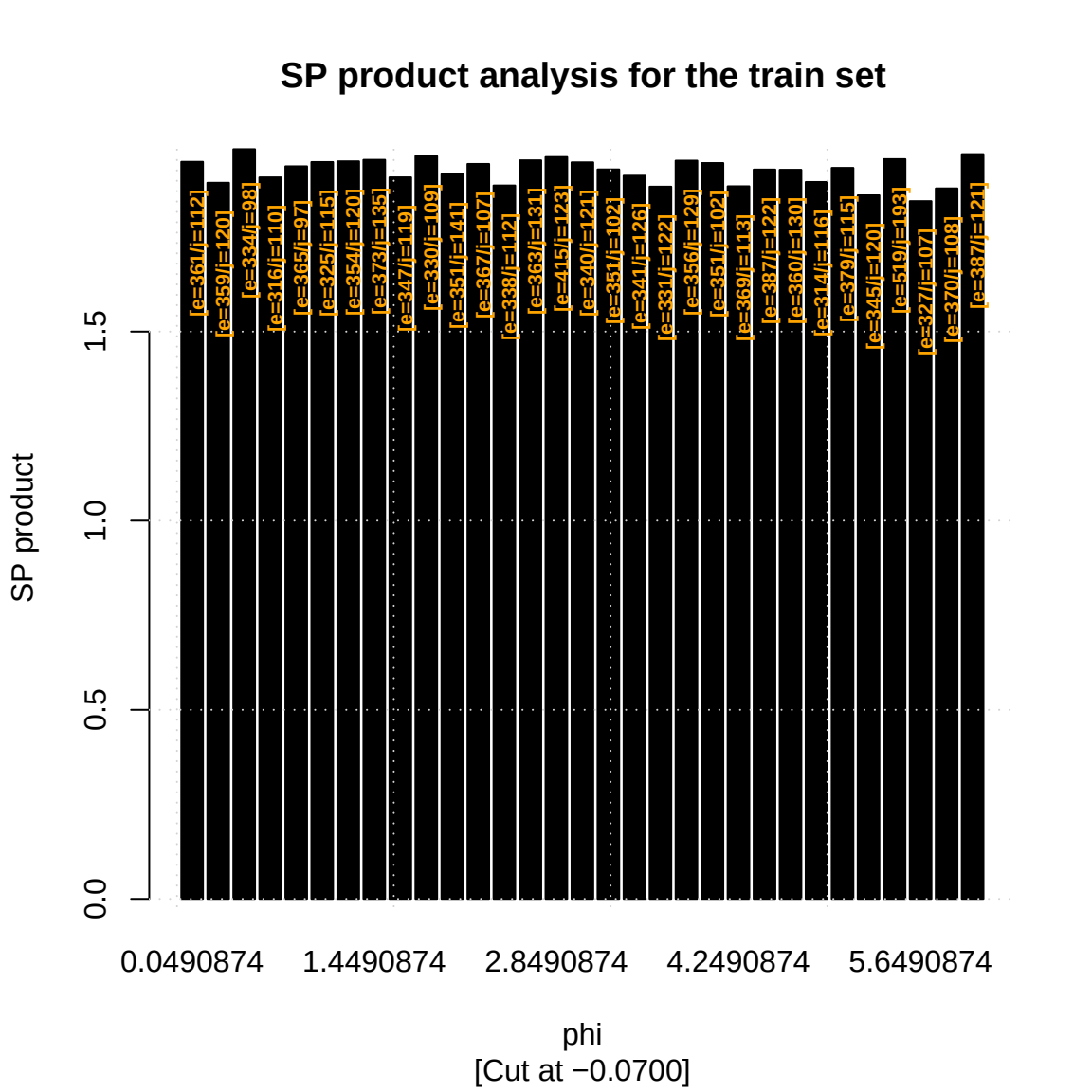

Efficiency analysis for the test set
percentage
0
20
40
60
80
100
15000
40000
65000
90000
115000
140000
electron eff.
jet false alarm
e.m.$_T$(MeV)
[Cut at −0.0700]

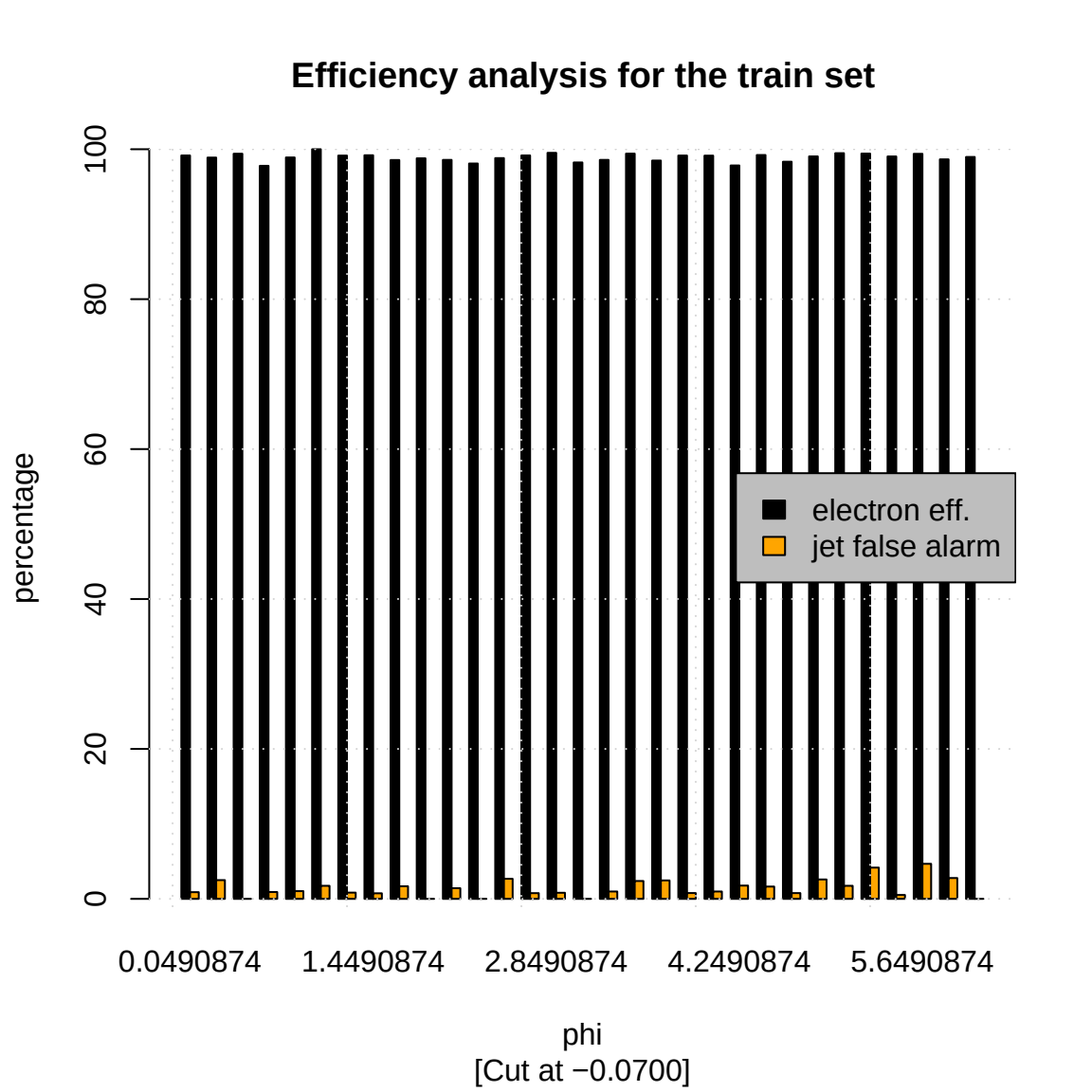

MSE values analysis for the test set
mean−square error
0.0
0.1
0.2
0.3
0.4
0.5
[e=8/j=2]
[e=700/j=31]
[e=1849/j=557]
[e=1652/j=1088]
[e=1549/j=1009]
[e=1382/j=539]
[e=1119/j=260]
[e=866/j=112]
[e=582/j=60]
[e=426/j=25]
[e=275/j=25]
[e=230/j=16]
[e=153/j=6]
[e=109/j=9]
[e=68/j=7]
[e=68/j=2]
[e=47/j=1]
[e=36/j=2]
[e=38/j=1]
[e=23/j=0]
[e=24/j=1]
[e=8/j=0]
[e=9/j=0]
[e=8/j=1]
[e=4/j=0]
[e=4/j=0]
[e=11/j=0]
[e=8/j=0]
[e=3/j=0]
[e=4/j=0]
15000
40000
65000
90000
115000
140000
e.m.$_T$(MeV)
[Cut at −0.0700]

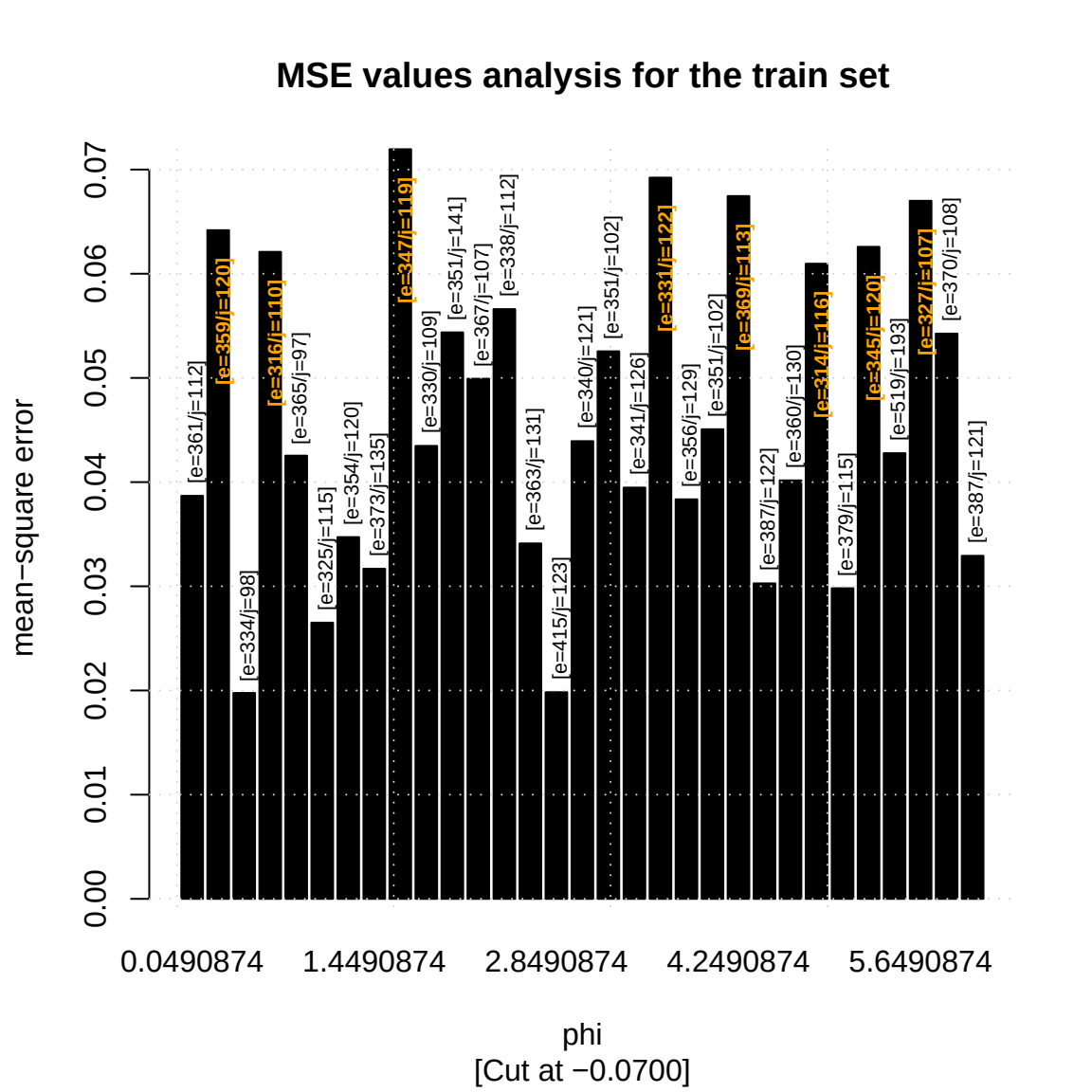

SP product analysis for the train set
SP product
0.0
0.5
1.0
1.5
2.0
[e=109/j=94]
[e=111/j=56]
[e=241/j=105]
[e=321/j=120]
[e=337/j=139]
[e=369/j=131]
[e=239/j=104]
[e=495/j=191]
[e=581/j=177]
[e=617/j=187]
[e=625/j=150]
[e=298/j=52]
[e=664/j=127]
[e=699/j=131]
[e=609/j=174]
[e=638/j=177]
[e=321/j=88]
[e=560/j=188]
[e=506/j=201]
[e=404/j=129]
[e=392/j=113]
[e=159/j=74]
[e=265/j=125]
[e=196/j=102]
[e=121/j=113]
−2.45
−1.65
−0.85
0.15
0.75
1.35
1.95
eta
[Cut at −0.0700]

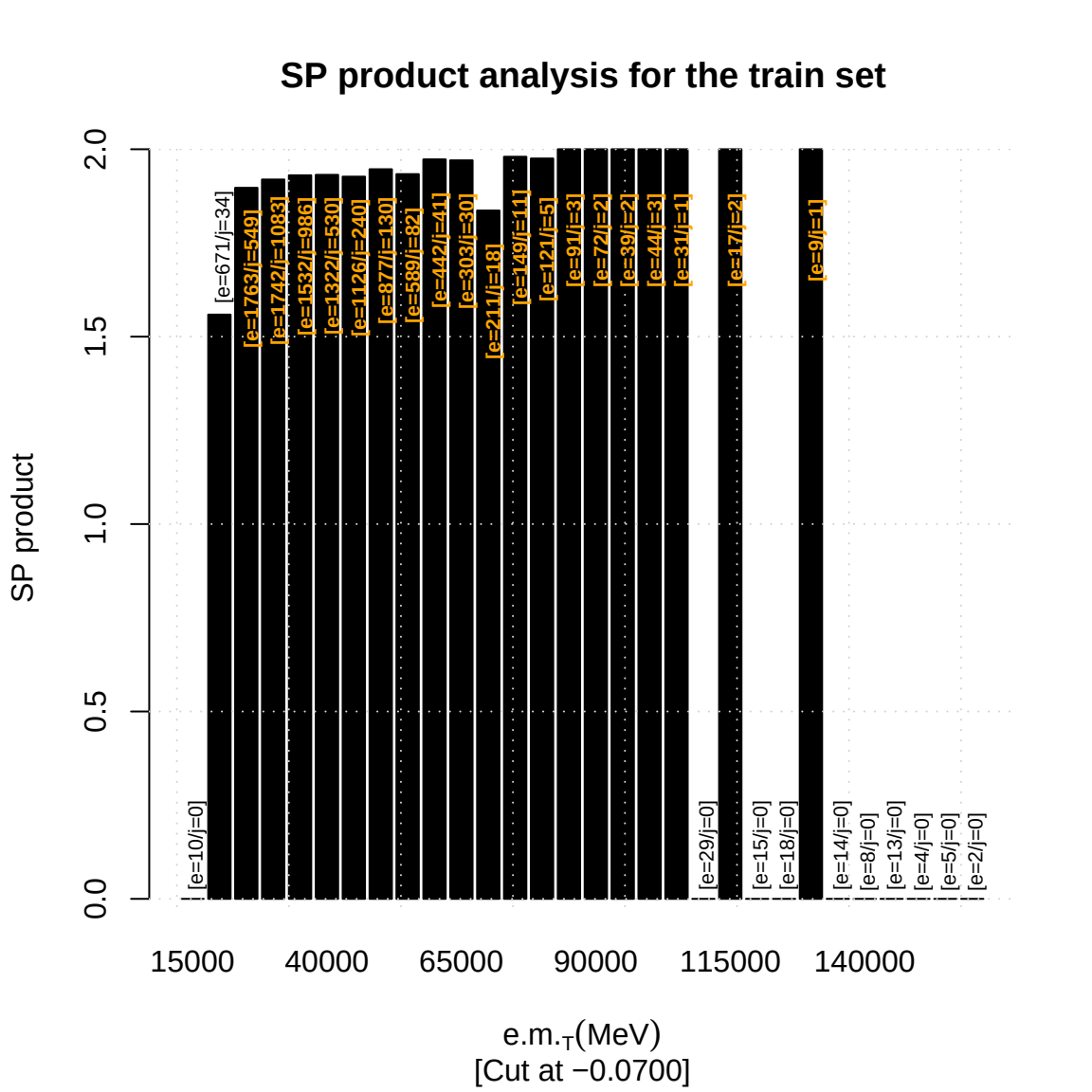

Efficiency analysis for the train set
percentage
0
20
40
60
80
100
electron eff.
jet false alarm
−2.45
−1.65
−0.85
0.15
0.75
1.35
1.95
eta
[Cut at −0.0700]

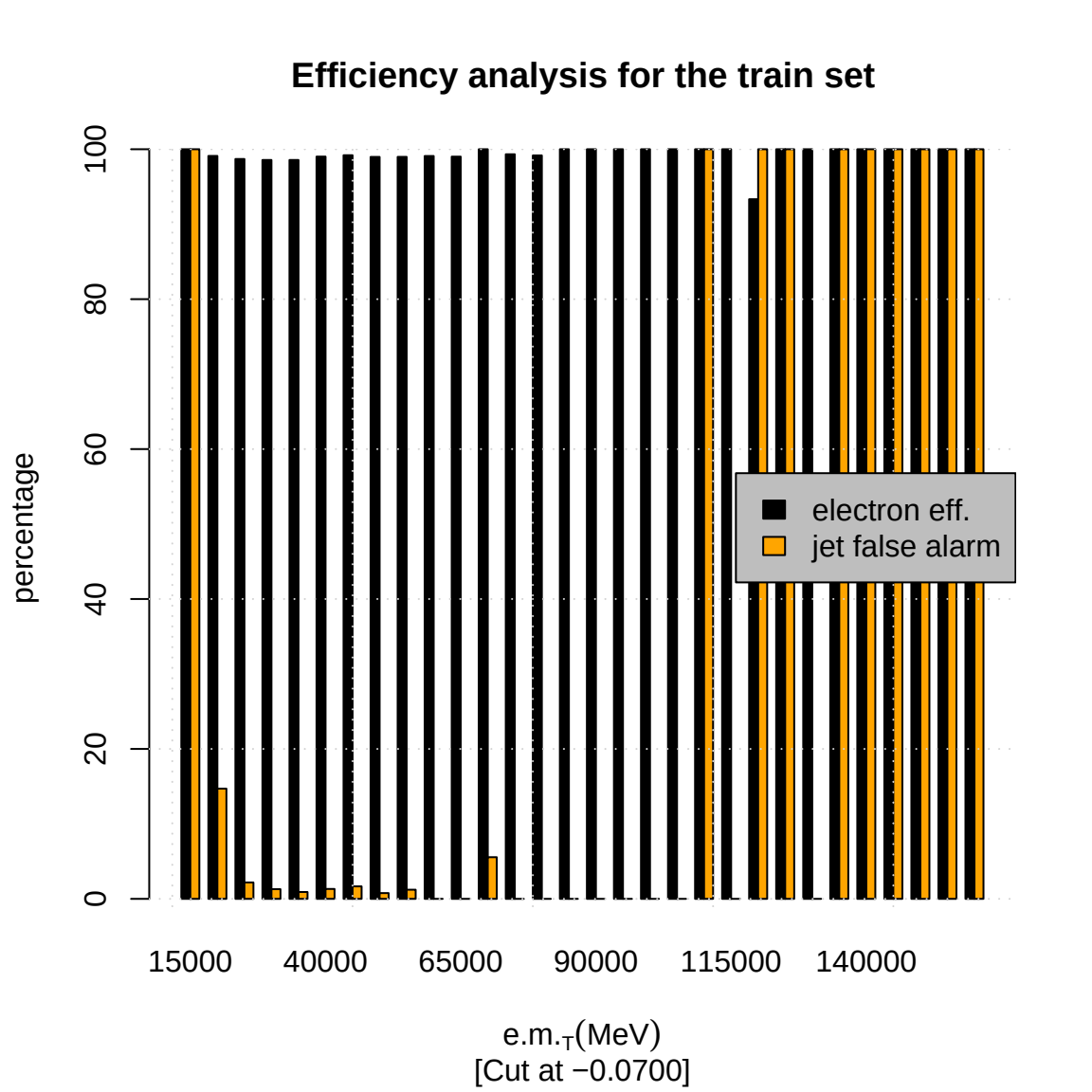
MSE values analysis for the train set
mean−square error
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
[e=109/j=94]
[e=111/j=56]
[e=241/j=105]
[e=321/j=120]
[e=337/j=139]
[e=369/j=131]
[e=239/j=104]
[e=495/j=191]
[e=581/j=177]
[e=617/j=187]
[e=625/j=150]
[e=298/j=52]
[e=664/j=127]
[e=699/j=131]
[e=609/j=174]
[e=638/j=177]
[e=321/j=88]
[e=560/j=188]
[e=506/j=201]
[e=404/j=129]
[e=392/j=113]
[e=159/j=74]
[e=265/j=125]
[e=196/j=102]
[e=121/j=113]
−2.45
−1.65
−0.85
0.15
0.75
1.35
1.95
eta
[Cut at −0.0700]

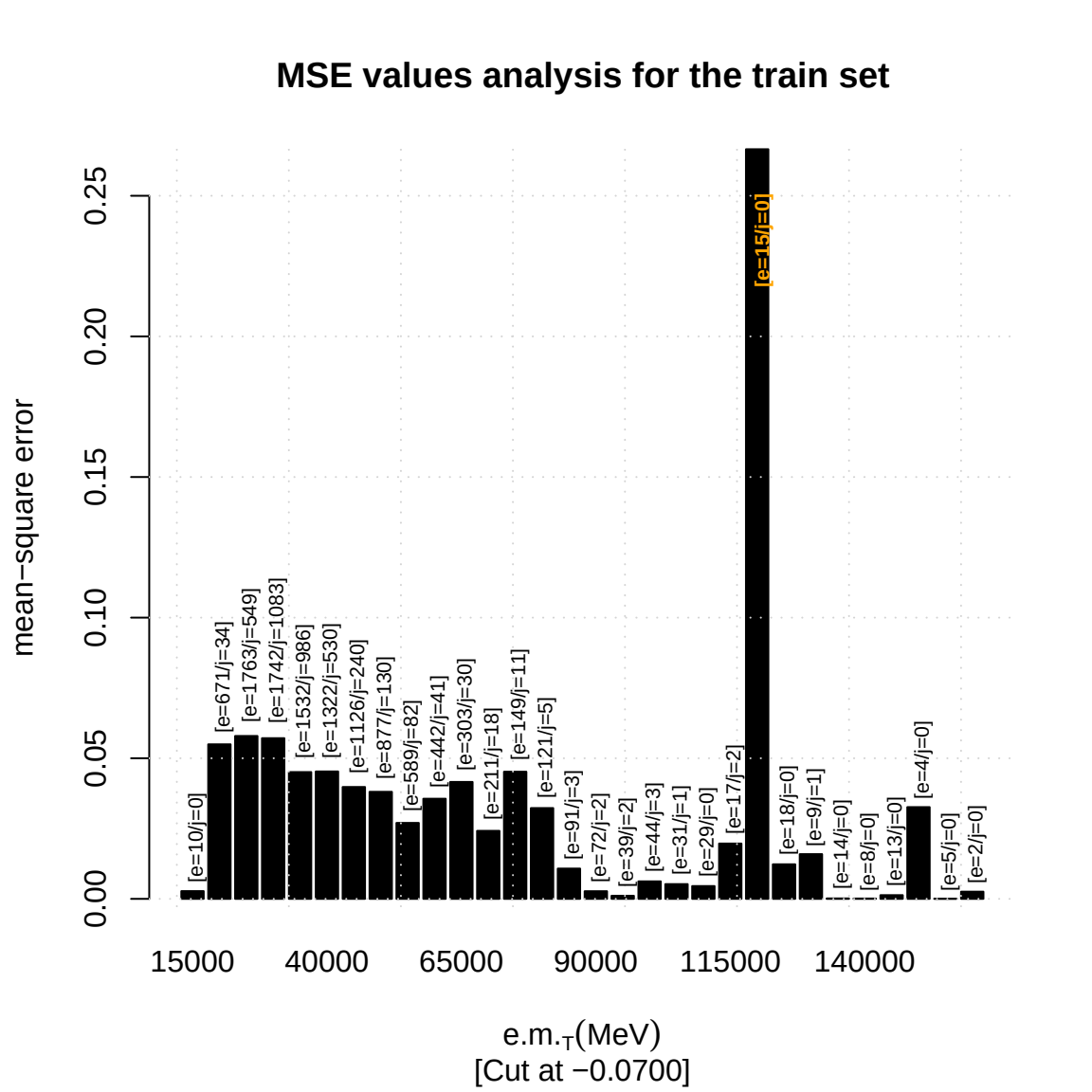

SP product analysis for the train set
[e=361/i=112]
[e=359/i=120]
[e=334/i=98]
[e=316/i=110]
[e=365/i=97]
[e=325/i=115]
[e=354/i=120]
[e=373/i=135]
[e=347/i=119]
[e=330/i=109]
[e=351/i=141]
[e=367/i=107]
[e=338/i=112]
[e=363/i=131]
[e=415/i=123]
[e=340/i=121]
[e=351/i=102]
[e=341/i=126]
[e=331/i=122]
[e=356/i=129]
[e=351/i=102]
[e=369/i=113]
[e=387/i=122]
[e=360/i=130]
[e=314/i=116]
[e=379/i=115]
[e=345/i=120]
[e=519/i=193]
[e=327/i=107]
[e=370/i=108]
[e=387/i=121]
SP product
0.0
0.5
1.0
1.5
0.0490874
1.4490874
2.8490874
4.2490874
5.6490874
phi
[Cut at −0.0700]

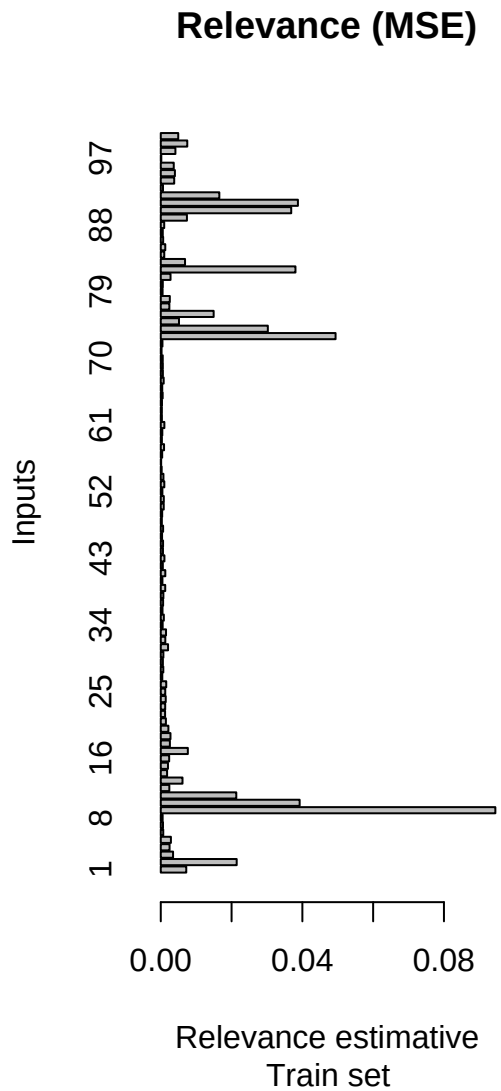

Efficiency analysis for the train set
percentage
0
20
40
60
80
100
electron eff.
jet false alarm
0.0490874
1.4490874
2.8490874
4.2490874
5.6490874
phi
[Cut at −0.0700]

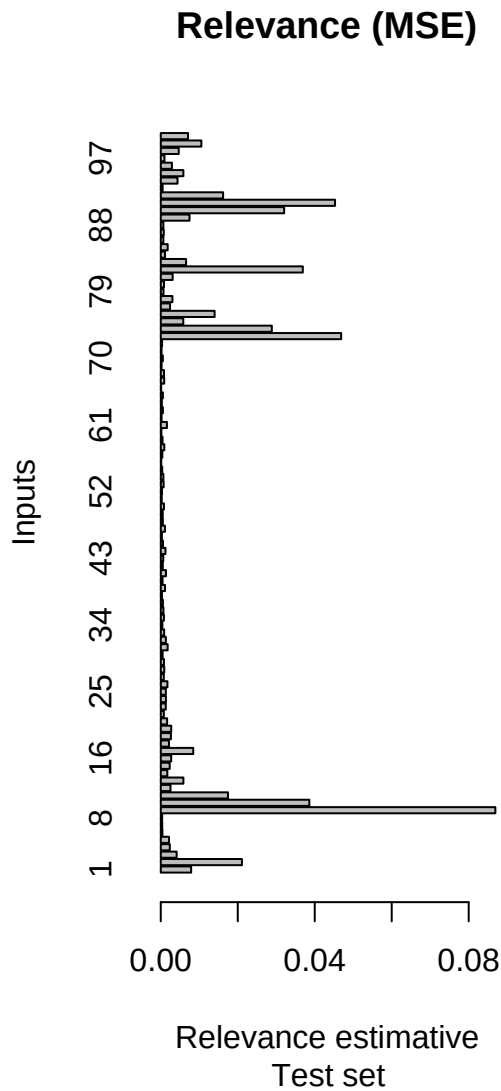

MSE values analysis for the train set
mean−square error
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
[e=361/j=112]
[e=359/j=120]
[e=334/j=98]
[e=316/j=110]
[e=365/j=97]
[e=325/j=115]
[e=354/j=120]
[e=373/j=135]
[e=347/j=119]
[e=330/j=109]
[e=351/j=141]
[e=367/j=107]
[e=338/j=112]
[e=363/j=131]
[e=415/j=123]
[e=340/j=121]
[e=351/j=102]
[e=341/j=126]
[e=331/j=122]
[e=356/j=129]
[e=351/j=102]
[e=369/j=113]
[e=387/j=122]
[e=360/j=130]
[e=314/j=116]
[e=379/j=115]
[e=345/j=120]
[e=519/j=193]
[e=327/j=107]
[e=370/j=108]
[e=387/j=121]
0.0490874
1.4490874
2.8490874
4.2490874
5.6490874
phi
[Cut at −0.0700]

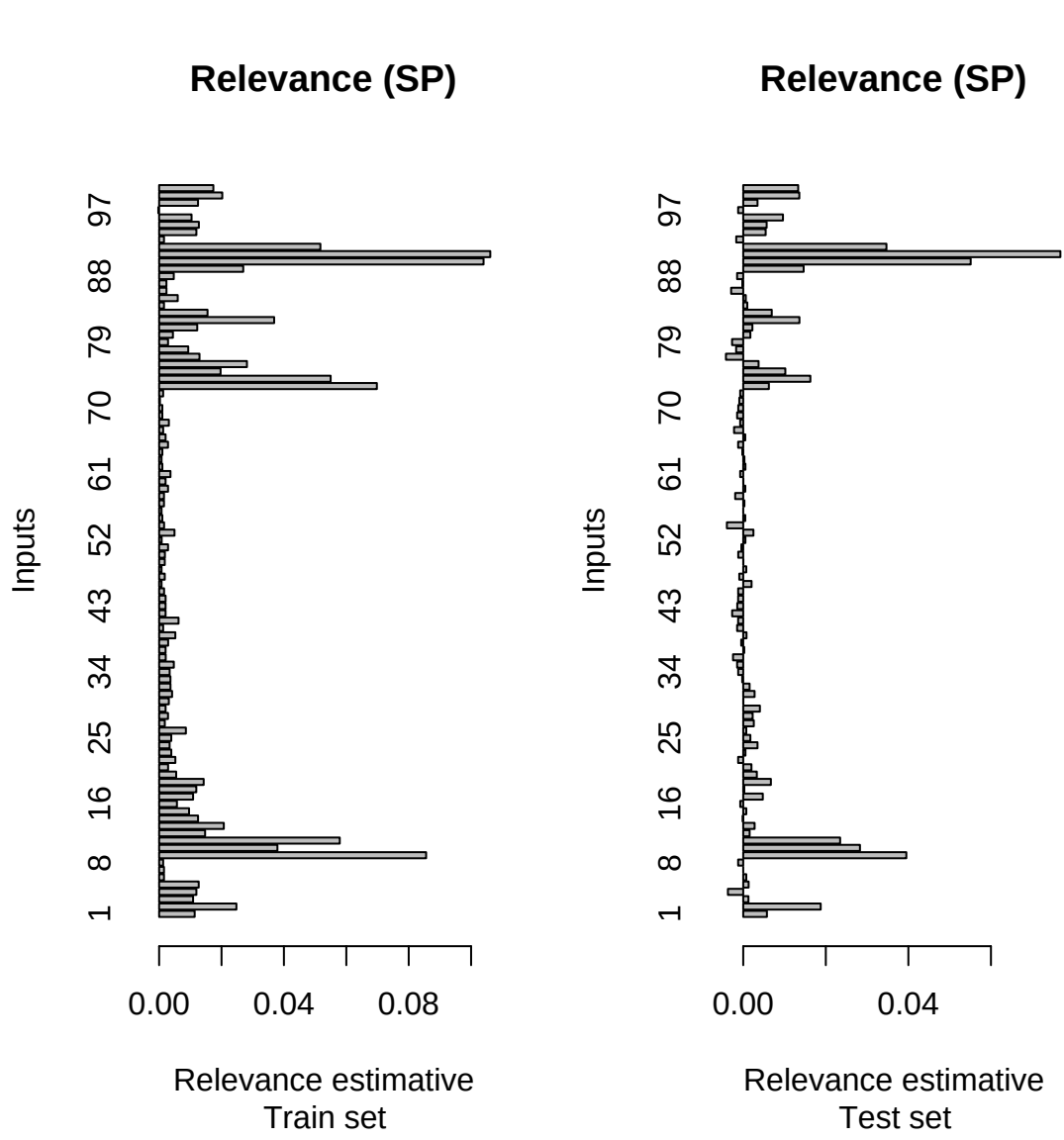

SP product analysis for the train set
SP product
0.0
0.5
1.0
1.5
2.0
15000
40000
65000
90000
115000
140000
e.m.$_T$(MeV)
[Cut at −0.0700]
[e=10/j=0]
[e=671/j=34]
[e=1763/j=549]
[e=1742/j=1083]
[e=1532/j=986]
[e=1322/j=530]
[e=1126/j=240]
[e=877/j=130]
[e=589/j=82]
[e=442/j=41]
[e=303/j=30]
[e=211/j=18]
[e=149/j=11]
[e=121/j=5]
[e=91/j=3]
[e=72/j=2]
[e=39/j=2]
[e=44/j=3]
[e=31/j=1]
[e=29/j=0]
[e=17/j=2]
[e=15/j=0]
[e=18/j=0]
[e=9/j=1]
[e=14/j=0]
[e=8/j=0]
[e=13/j=0]
[e=4/j=0]
[e=5/j=0]
[e=2/j=0]


Efficiency analysis for the train set
percentage
0
20
40
60
80
100
15000
40000
65000
90000
115000
140000
electron eff.
jet false alarm
e.m.$_T$(MeV)
[Cut at −0.0700]


MSE values analysis for the train set
mean−square error
0.00
0.05
0.10
0.15
0.20
0.25
[e=10/j=0]
[e=671/j=34]
[e=1763/j=549]
[e=1742/j=1083]
[e=1532/j=986]
[e=1322/j=530]
[e=1126/j=240]
[e=877/j=130]
[e=589/j=82]
[e=442/j=41]
[e=303/j=30]
[e=211/j=18]
[e=149/j=11]
[e=121/j=5]
[e=91/j=3]
[e=72/j=2]
[e=39/j=2]
[e=44/j=3]
[e=31/j=1]
[e=29/j=0]
[e=17/j=2]
[e=15/j=0]
[e=18/j=0]
[e=9/j=1]
[e=14/j=0]
[e=8/j=0]
[e=13/j=0]
[e=4/j=0]
[e=5/j=0]
[e=2/j=0]
15000
40000
65000
90000
115000
140000
e.m.$_T$(MeV)
[Cut at −0.0700]


Relevance (MSE)
Inputs
97
88
79
70
61
52
43
34
25
16
8
1
0.00
0.04
0.08
Relevance estimative
Train set


Relevance (MSE)
Inputs
97
88
79
70
61
52
43
34
25
16
8
1
0.00
0.04
0.08
Relevance estimative
Test set


Relevance (SP)
Inputs
1
8
16
25
34
43
52
61
70
79
88
97
0.00
0.04
0.08
Relevance estimative
Train set
Relevance (SP)
Inputs
1
8
16
25
34
43
52
61
70
79
88
97
0.00
0.04
Relevance estimative
Test set