Kaon L,T, LT, TT Model Optimization
- Towards Data/SIMC ~ 1 -

Abdennacer Hamdi

KaonLT Meeting
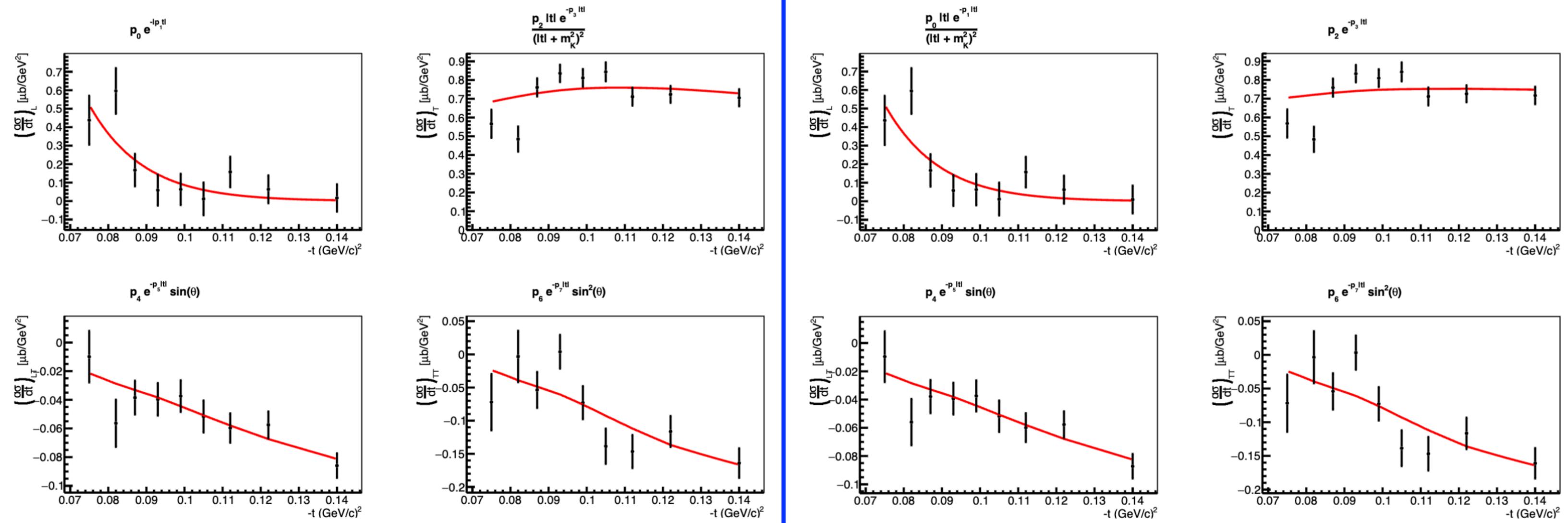
2026/03/05

$$p(e, e'K^+)\Lambda$$

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$p(e, e'K^+)\Lambda$

Pole term in σ_T

Pole term in σ_L

L, T, LT, TT Cross Sections

$p(e, e'K^+)\Lambda$

Pole term in σ_T

```
 3366.136    6756.728   1
  -74.017      24.401   2
   30.954       3.982   3
    3.825       1.197   4
   -7.763       3.581   5
   -0.257       3.773   6
 -266.500     156.887   7
    9.648       4.765   8
```

Pole term in σ_L

```
 7487.716   13724.323   1
   80.636      22.312   2
   17.685       0.403   3
   -0.000       0.026   4
   -7.349       3.399   5
   -0.757       3.780   6
 -280.205     164.939   7
   10.103       4.780   8
```

```
tc   , L                    , T                       ,
0.075, 0.437695475016442    , 0.566483442252913    ,
0.082, 0.596028702589258    , 0.484802329859732,
0.087, 0.167726368929057   , 0.760760847653837,
0.093, 0.058798940449810187 , 0.835486175951066,
0.099, 0.0631166275346792   , 0.811299878214705,
0.105, 0.0118237831401705   , 0.843709092116485,
0.112, 0.157426100994476   , 0.711342134226440,
0.122, 0.0637213070510138   , 0.723280133621689,
0.14 , 0.016623788617862   , 0.705443562587995,
```

```
tc   , L                    , T                       ,
0.075, 0.435936339515533   , 0.568118984019030,
0.082, 0.594376891718253   , 0.483548206533991,
0.087, 0.166222112722895   , 0.758788698788086,
0.093, 0.057733642831983   , 0.833231165509217,
0.099, 0.062545735264520   , 0.809465679943589,
0.105, 0.0117545346159136   , 0.842564718865299,
0.112, 0.157020751322589   , 0.711659041954700,
0.122, 0.062393279426342   , 0.726011326562038,
0.14 , 0.009349778042875   , 0.717123473031554,
```
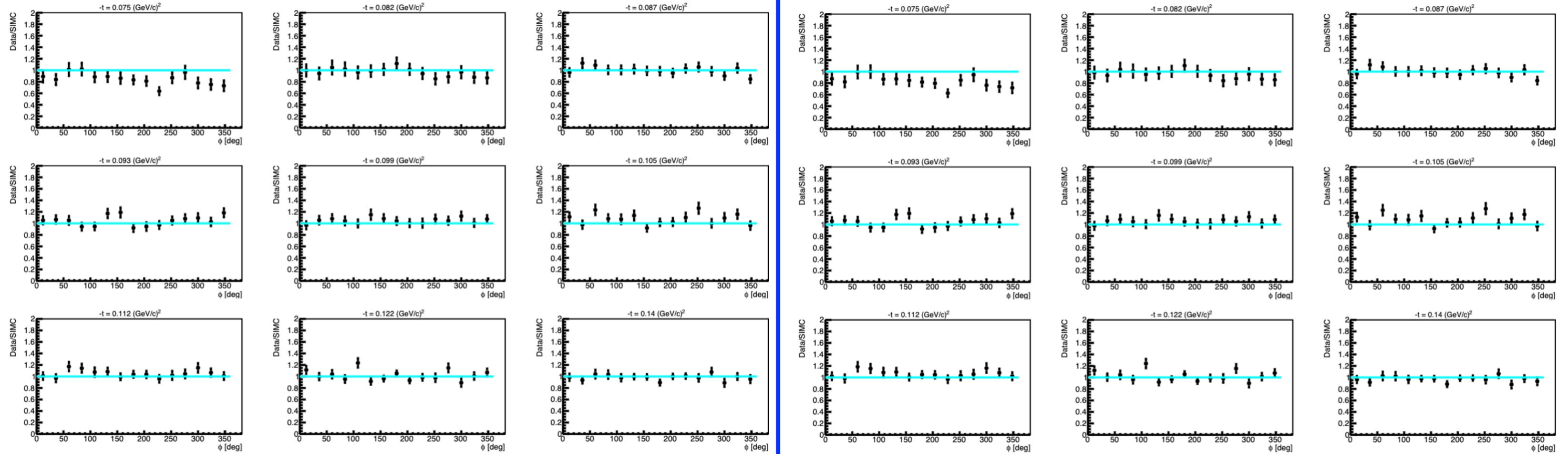
Pole term in σ_T
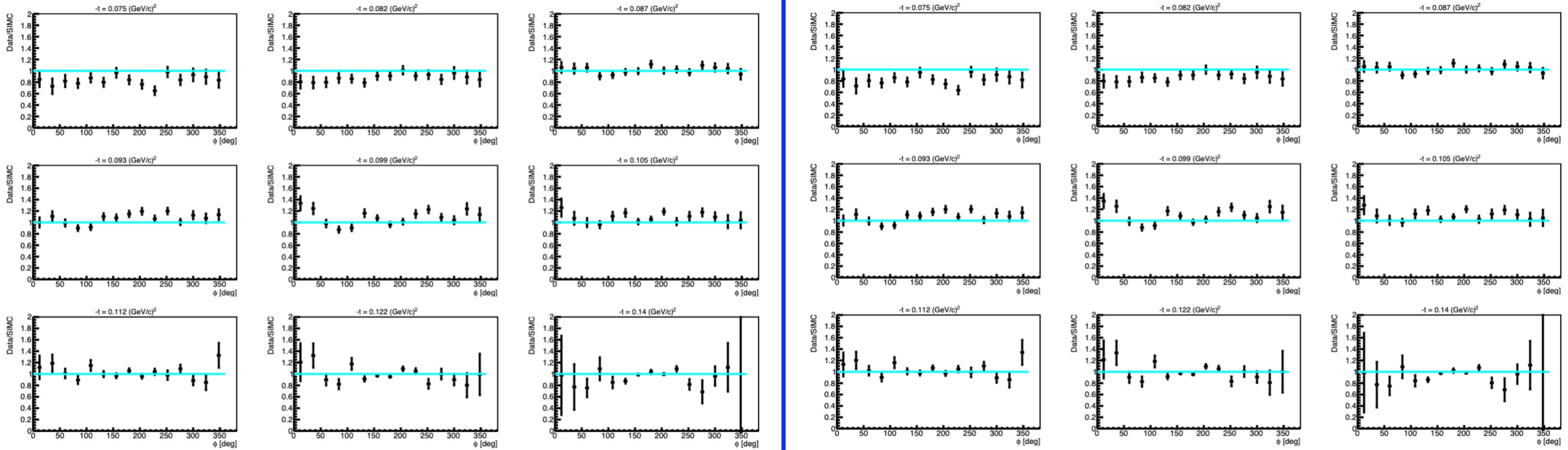
Pole term in σ_L

Pole term in σ_T

Pole term in σ_L

Missing Mass Shift Effect On Cross Section

$p(e, e'K^+)\Lambda$

Mass Shift

No Mass Shift

L, T, LT, TT Cross Sections

$$p(e, e'K^+)\Lambda$$
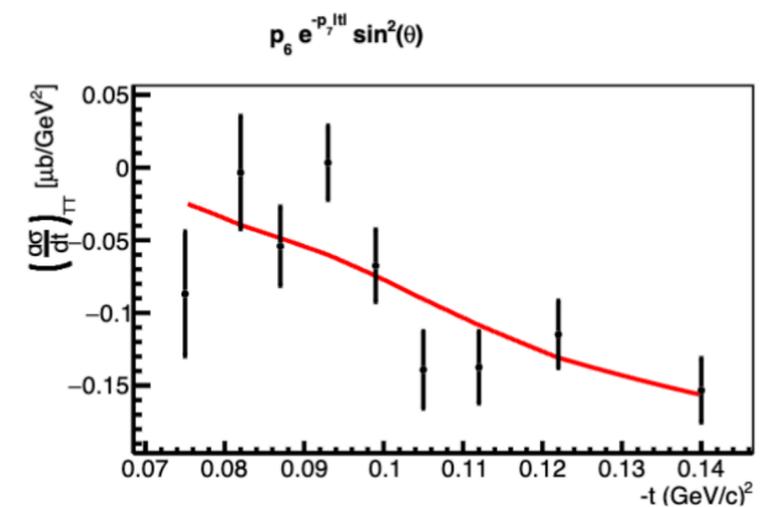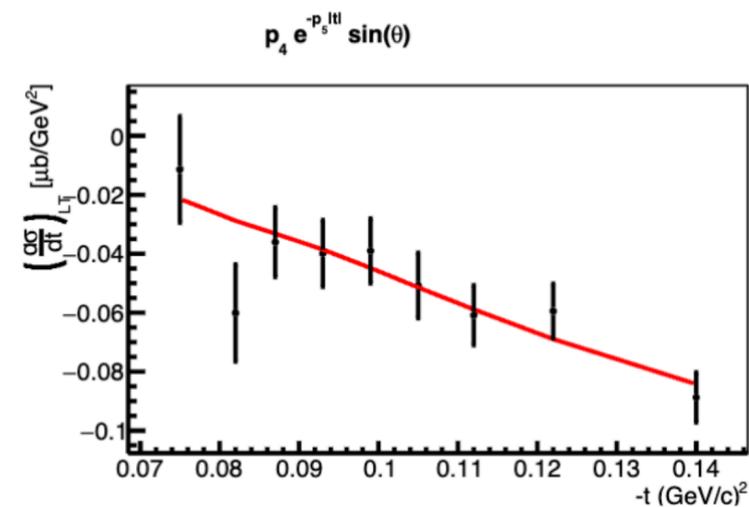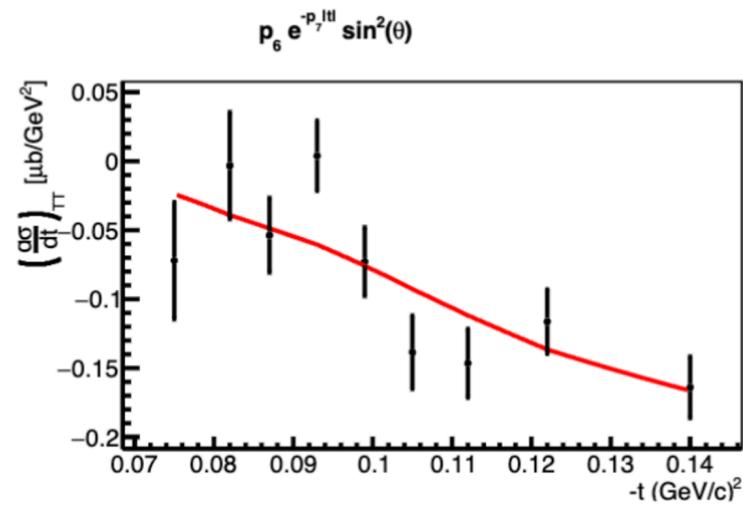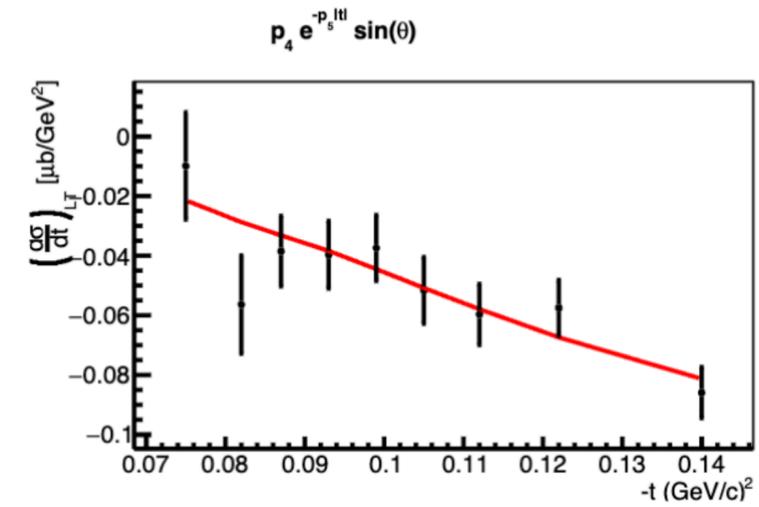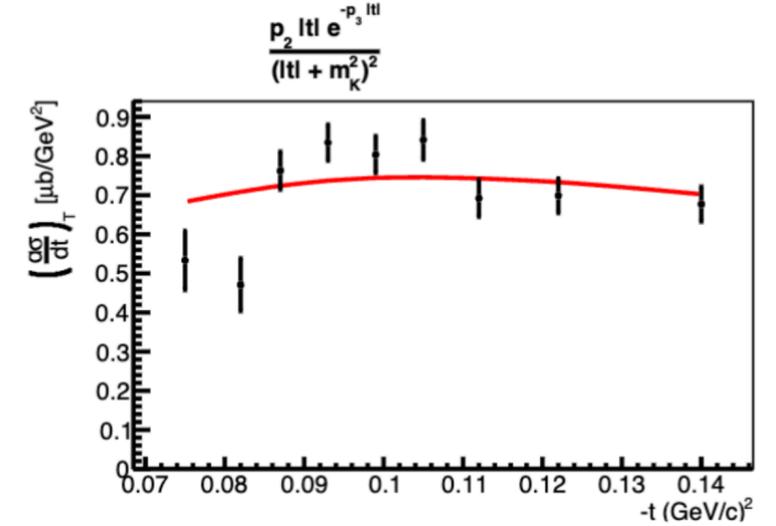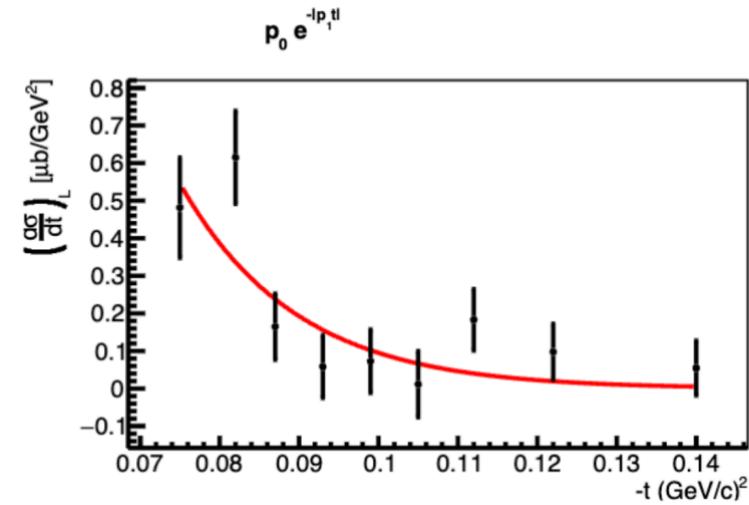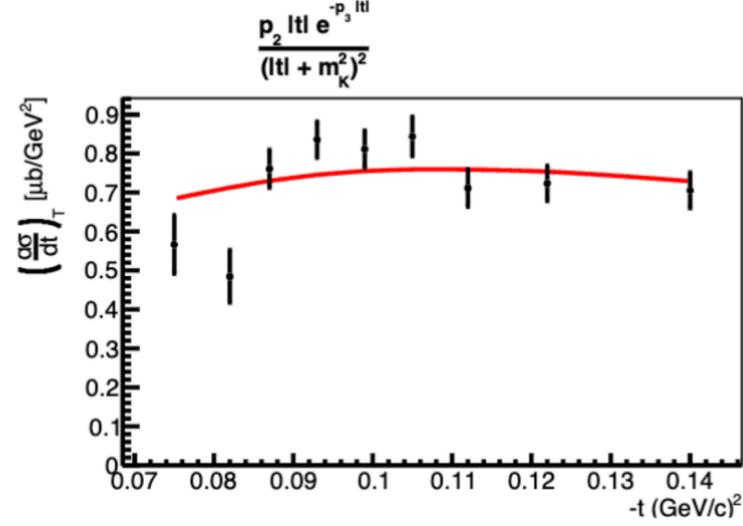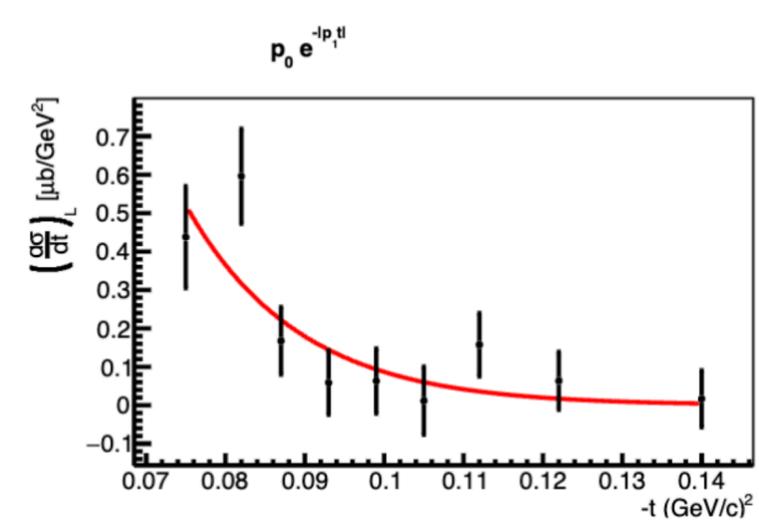
Mass Shift

```
--- iteration 01 parameters ------- iteration 02 parameters ---
3366.136    6756.728   1    3366.123    6756.431   1
 -74.017      24.401   2     -74.017      24.400   2
  30.954       3.982   3      30.954       3.982   3
   3.825       1.197   4       3.825       1.197   4
  -7.763       3.581   5      -7.763       3.581   5
  -0.257       3.773   6      -0.257       3.773   6
-266.500     156.887   7    -266.501     156.891   7
   9.648       4.765   8       9.648       4.765   8
```

```
tc  , L                  , T                 ,
0.075, 0.4376954750164042 , 0.566483442252913  ,
0.082, 0.5960287025892258 , 0.4848023298597324,
0.087, 0.16772636892905787, 0.7607608476538372,
0.093, 0.05879894044981018, 0.8354861759510661,
0.099, 0.0631166275346916 , 0.8112998782147054,
0.105, 0.0118237831401705  , 0.8437090292116485,
0.112, 0.15742610099444762, 0.7113421342264407,
0.122, 0.0637213070510138  , 0.7232801336216896,
0.14 , 0.016623783861786236, 0.7054435625879956,
```

No Mass Shift

```
--- iteration 01 parameters ------- iteration 02 parameters ---
3366.136    6756.728  1  |  3105.576    6556.815  1
 -74.017      24.401  2  |   -72.311      25.591  2
  30.954       3.982  3  |    32.257       4.184  3
   3.825       1.197  4  |     4.386       1.207  4
  -7.763       3.581  5  |    -7.338       3.328  5
  -0.257       3.773  6  |    -0.915       3.696  6
-266.500     156.887  7  |  -294.990     178.140  7
   9.648       4.765  8  |    10.818       4.907  8
```

```
tc  , L                  , T                 ,
0.075, 0.4814543431522733 , 0.5333836752717132,
0.082, 0.6150297995739802 , 0.4710423112457718,
0.087, 0.16465745325383774, 0.7628460797058858,
0.093, 0.05850694060083285, 0.8343661349709233,
0.099, 0.0727260806580997 , 0.8039370428227538,
0.105, 0.01168334200939946, 0.8412713773327598,
0.112, 0.18297268048760598, 0.6920714921592023,
0.122, 0.09808392612608081, 0.6986709886285958,
0.14 , 0.05469644730881824, 0.67701912888808083,
```

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L, T, LT, TT Cross Sections

Mass Shift

```
tc    , L                    , T                    ,
0.075, 0.4376954750164042    , 0.566483442252913    ,
0.082, 0.5960287025892258    , 0.4848023298597324   ,
0.087, 0.16772636892905787   , 0.7607608476538372   ,
0.093, 0.05879894044981018   , 0.8354861759510661   ,
0.099, 0.06311662753467916   , 0.8112998782147054   ,
0.105, 0.01182378314017056   , 0.8437090292116485   ,
0.112, 0.15742610099444762   , 0.7113421342264407   ,
0.122, 0.06372130705101386   , 0.7232801336216896   ,
0.14 , 0.016623783861786236  , 0.7054435625879956   ,
```

No Mass Shift
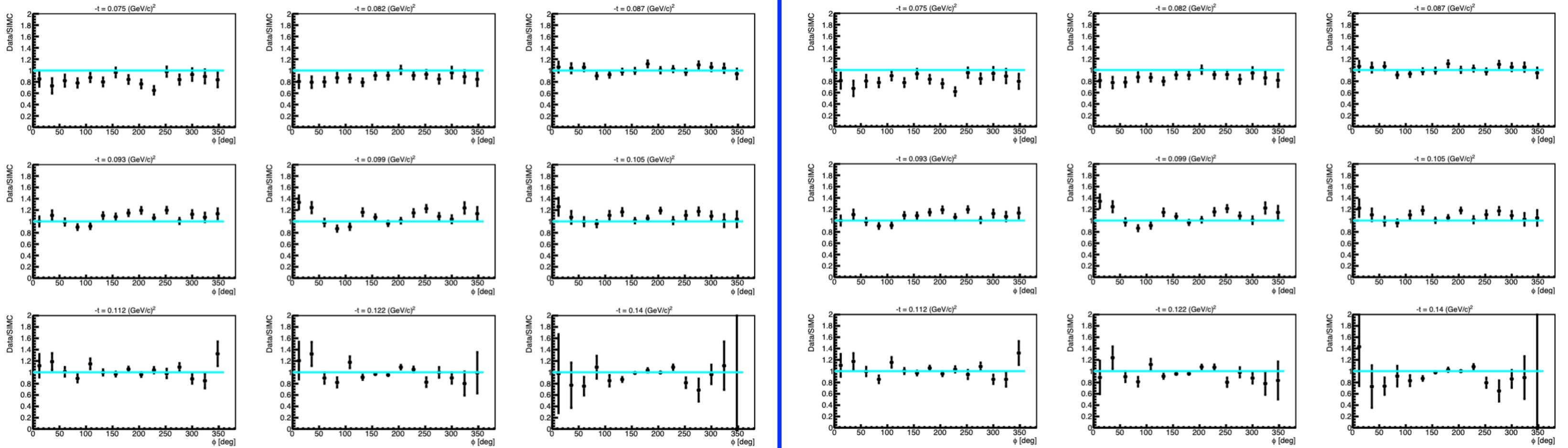
```
tc    , L                    , T                    ,
0.075, 0.4814543431522733    , 0.5333836752717132   ,
0.082, 0.6150297995739802    , 0.4710423112457718   ,
0.087, 0.16465745325383774   , 0.7628460797058858   ,
0.093, 0.05850694060083285   , 0.8343661349709233   ,
0.099, 0.07272608065809975   , 0.8039370428227538   ,
0.105, 0.011683342009399467  , 0.8412713773327598   ,
0.112, 0.18297268048760598   , 0.6920714921592023   ,
0.122, 0.09808392612608081   , 0.6986709886285958   ,
0.14 , 0.05469644730881824   , 0.677019128888083    ,
```

From Garth's theory calculation

```
Setting        , Q2 , W  , Ebeam, "MM offset", "t shift"
center_lowe  , 0.5, 2.4, 3.835,     0.00368, -0.00361
left_lowe    , 0.5, 2.4, 3.835,     0.00353, -0.00375
center_highe , 0.5, 2.4, 4.933,     0.00139, -0.00147
left_highe   , 0.5, 2.4, 4.933,     0.00054, -0.00058
right_highe  , 0.5, 2.4, 4.933,     0.0009 , -0.00096
```
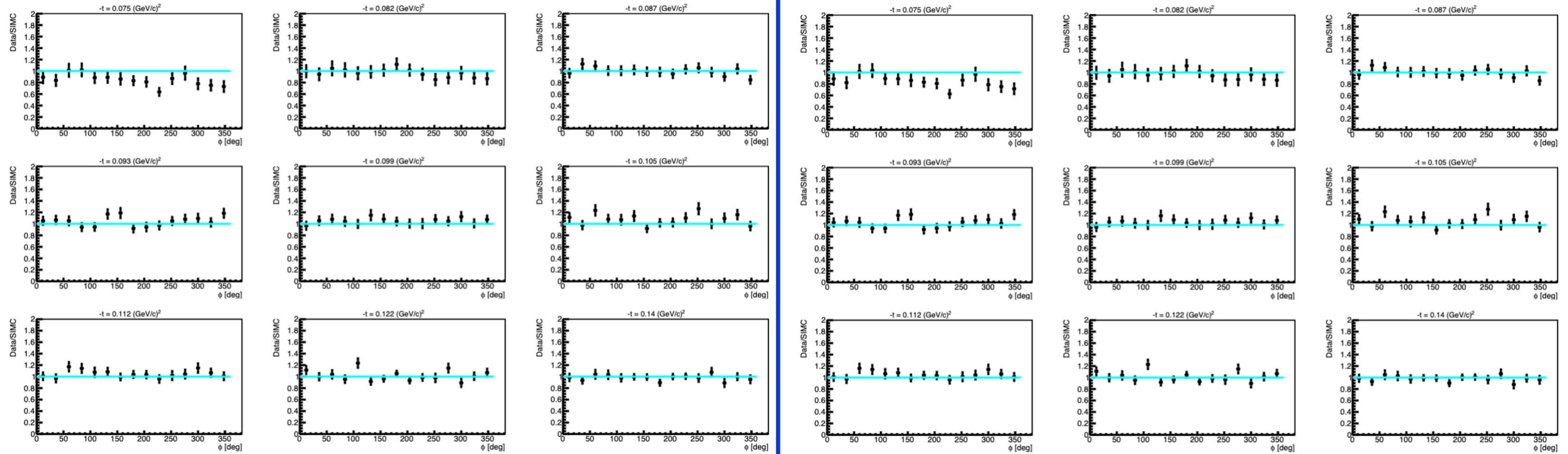
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Low ε

$p(e, e'K^+)\Lambda$

Mass Shift

No Mass Shift

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Mass Shift

No Mass Shift

Preparation of ROOT files for CoinTime blocking

Coin Time Param File

Autumn18

Winter18

```
 6  t_coin_tdcchanperns = 0.09766
 7  ;eHadCoinTime_Offset = 0.
 8- t_coin_trig_tdcrefcut=-4500.
 9  t_coin_trig_adcrefcut=-5500.
10
11  ;NOTE: pTRIG1_ROC1, pTRIG4_ROC1, pTRIG1_ROC2, pTRIG4_R
12  ;        These varibles and their indices are used for t
13  ;        If you do change them, please make sure to modi
14
15  ; bar num:            1     2     3     4     5     6
16  t_coin_adcNames = "hASUM hBSUM hCSUM hDSUM hPSHWR hSHW
17
18  ; bar num:         1   2   3   4   5   6   7   8
19  t_coin_tdcNames = "h1X h1Y h2X h2Y h1T h2T hT1 hASUM h
20
21  t_coin_TdcTimeWindowMin =      0,    0,    0,    0,    0
22                          0,    0,    0,    0,    0,    0, 1800
23-                         0,    0,    0, 4500,    0,    0,    0
24                       4200,    0,    0,    0, 4800,    0,    0
25                          0,    0,    0,    0,    0,    0,    0
26-                         0,    0,    0,    0,    0,    0,    0
27-                         0, 5500,    0,    0, 5200,    0,    0
28                          0,    0,    0,    0,    0,    0,    0
29                          0,    0,    0,    0,    0,    0,    0
30                          0,    0,    0,    0,    0,    0,    0
```

```
 7  t_coin_tdcchanperns = 0.09766
 8  ;eHadCoinTime_Offset = 0.
 9+ t_coin_trig_tdcrefcut=-4000.
10  t_coin_trig_adcrefcut=-5500.
11
12  ;NOTE: pTRIG1_ROC1, pTRIG4_ROC1, pTRIG1_ROC2, pTRIG4_ROC2
13  ;        These varibles and their indices are used for the
14  ;        If you do change them, please make sure to modify
15
16  ; bar num:            1     2     3     4     5     6
17  t_coin_adcNames = "hASUM hBSUM hCSUM hDSUM hPSHWR hSHWR hA
18
19  ; bar num:         1   2   3   4   5   6   7   8   9
20  t_coin_tdcNames = "h1X h1Y h2X h2Y h1T h2T hT1 hASUM hBSUM
21
22  t_coin_TdcTimeWindowMin =      0,    0,    0,    0,    0,
23                          0,    0,    0,    0,    0,    0, 1800,
24+                         0,    0,    0, 5100,    0,    0,    0, 42
25                       4200,    0,    0,    0, 4800,    0,    0,
26                          0,    0,    0,    0,    0,    0,    0,
27+                         0,    0,    0,    0,    0,    0,    0,
28+                         0, 5500,    0,    0, 5500,    0,    0,
29                          0,    0,    0,    0,    0,    0,    0,
30                          0,    0,    0,    0,    0,    0,    0,
31                          0,    0,    0,    0,    0,    0,    0,
```

Coin Time Param File

```
6   t_coin_tdcchanperns = 0.09766
7   ;eHadCoinTime_Offset = 0.
8-  t_coin_trig_tdcrefcut=-4500.
9   t_coin_trig_adcrefcut=-5500.
```

```
7   t_coin_tdcchanperns = 0.09766
8   ;eHadCoinTime_Offset = 0.
9+  t_coin_trig_tdcrefcut=-4000.
10  t_coin_trig_adcrefcut=-5500.
```

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