S1 resolution and SER problems: part3

Campaign V

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28 Nov 2018

Algorithm:

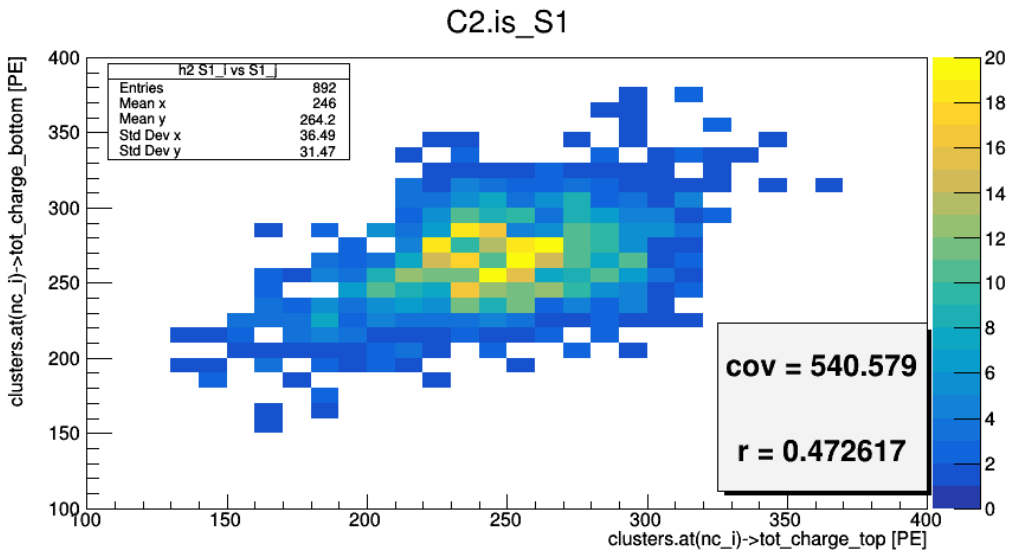
11713f949ea5bffcc2f0ceb22d1267b5f314a5af

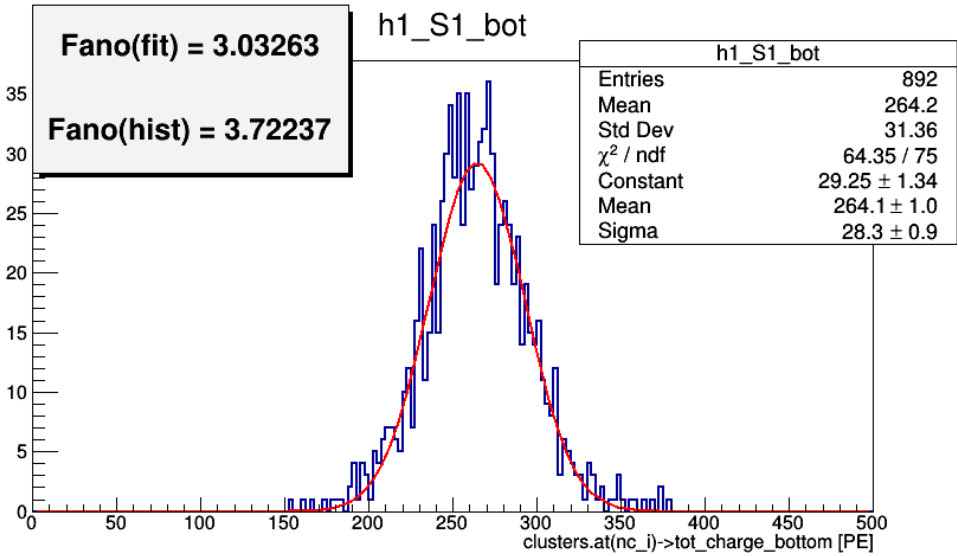
Merge branch 'barycenter' into 'master'

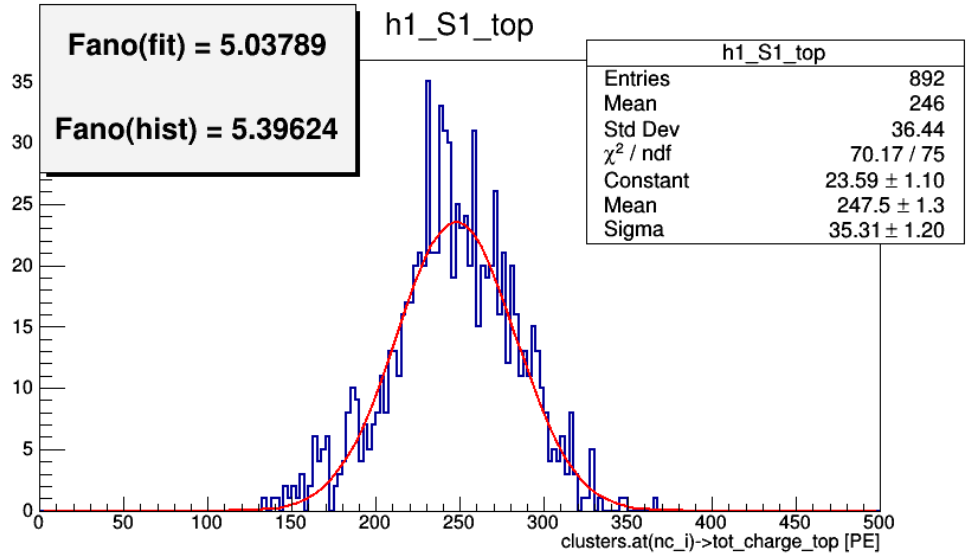
M01 == A1	M02 == A2	M03 == A3	M04 == A4
M06 == B1	M07 == B2	M05 == A5	M09 == B4
M11 == C1	M12 == C2	M08 == B3	M10 == B5
M16 == C5	M17 == D1	M15 == C4	M14 == C3
M21 == D5	M22 == E2	M20 == D4	M19 == D3
M23 == E3	M24 == E4	M18 == D2	M25 == E5

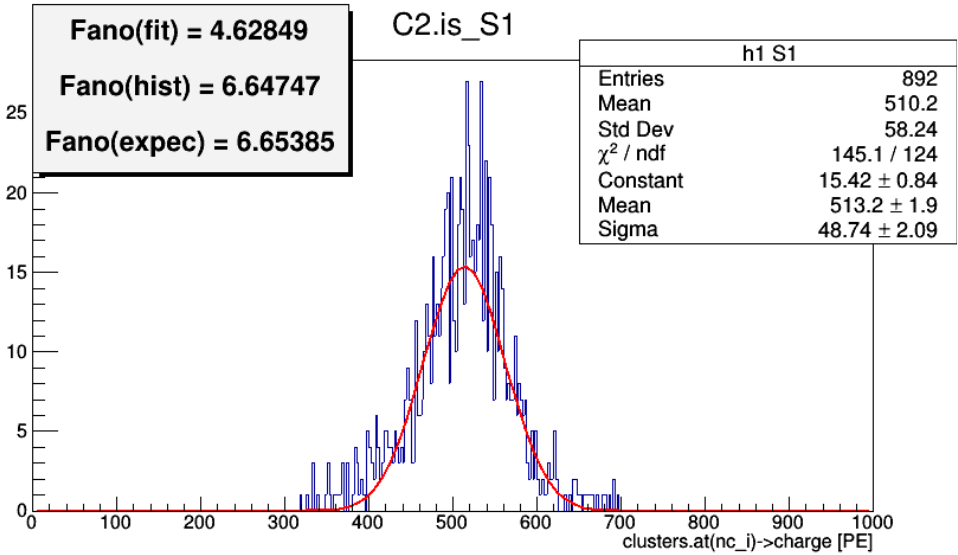
Ph2, Am241, run 537

F2	F3
F5	F4



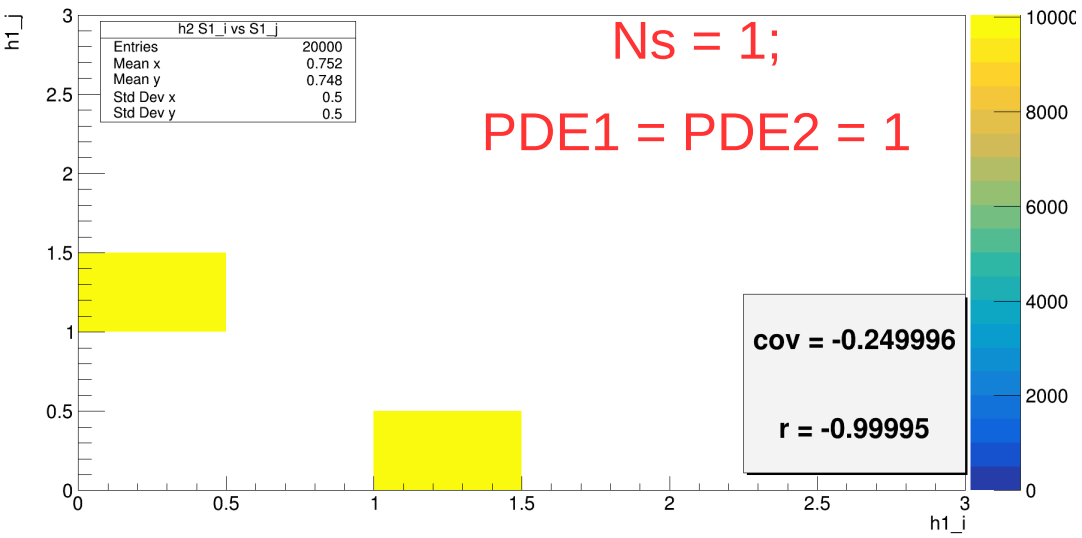


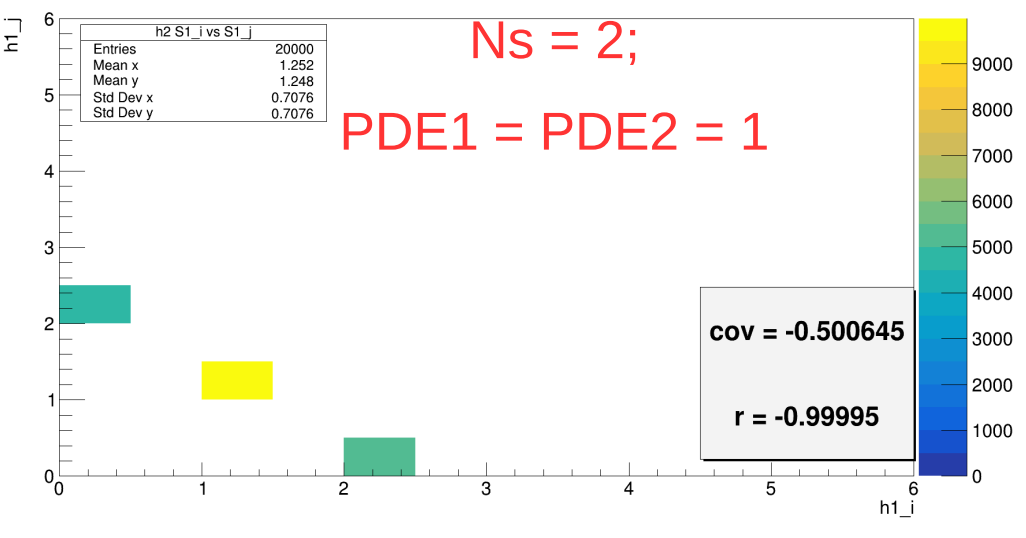


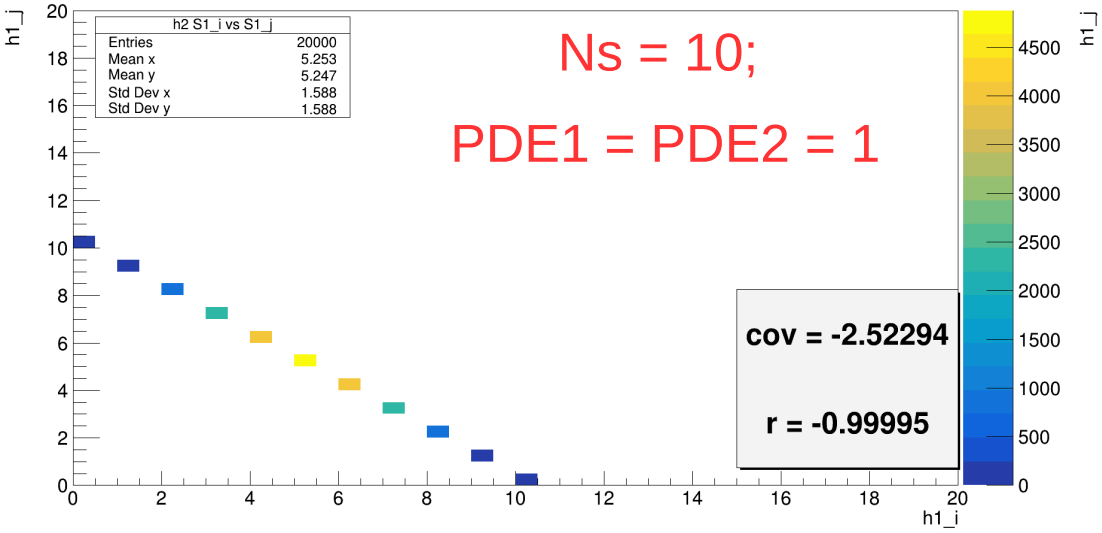


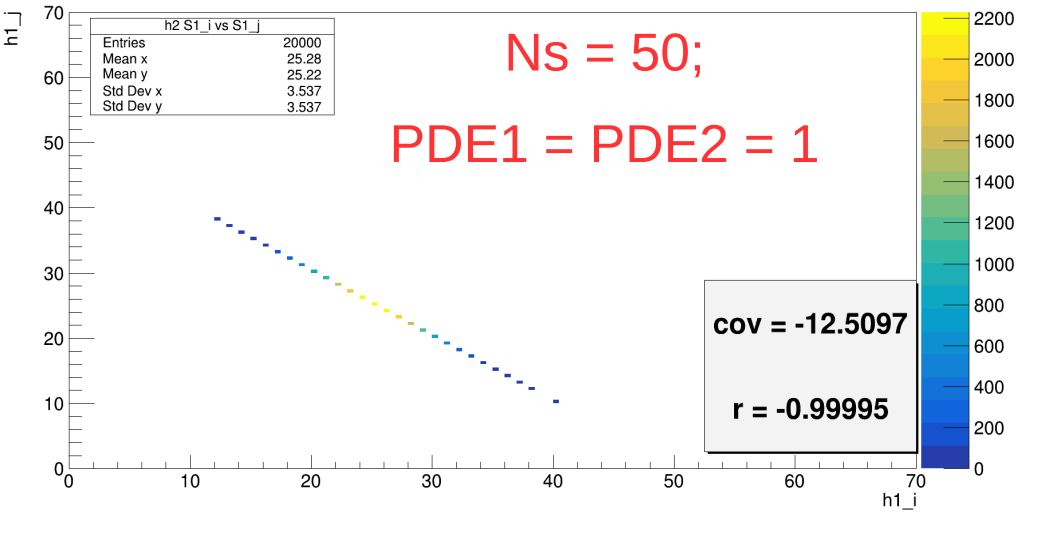

```
fano_expec = (pow(rms_i, 2.0) + pow(rms_j, 2.0) + 2*cov_r[0])/(mean_i + mean_j);
```

```
double solid_angle_part = 0.5;
 double PDE1 = 1;
 double PDE2 = 1;

 int Ns = 1;//sourse intensity and distribution
 //int Ns = rndm3.Binomial(1, 0.5);
 //int Ns = rndm3.Poisson(30);

 double Ni0 = rndm3.Binomial(Ns, solid_angle_part);//num of photons emitted in the left part
 double Nj0 = Ns - Ni0;//num of photons emitted in the right part

 double Ni = rndm3.Binomial(Ni0, PDE1);//num of photons detected by the left part
 double Nj = rndm3.Binomial(Nj0, PDE2);//num of photons detected by the right part
```







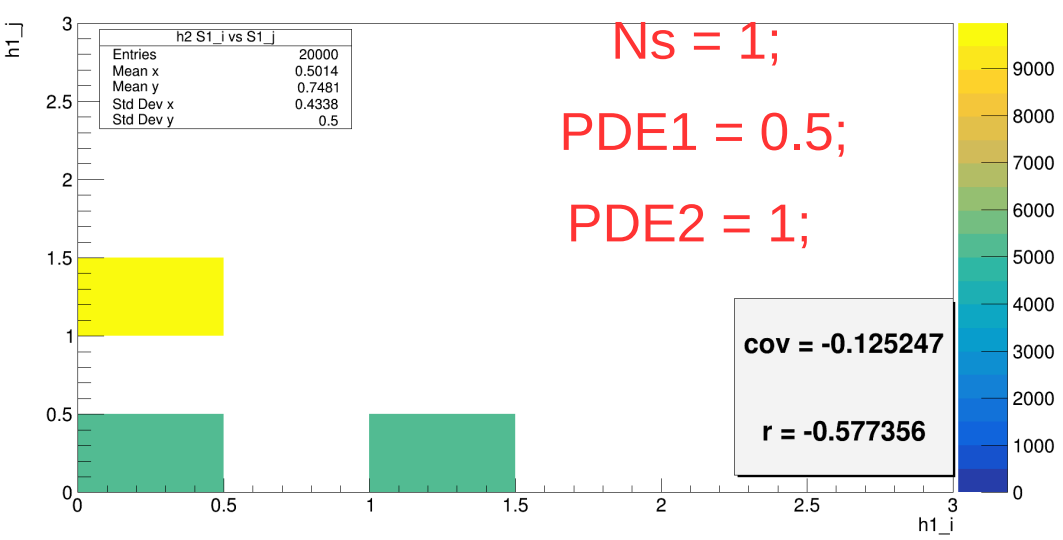


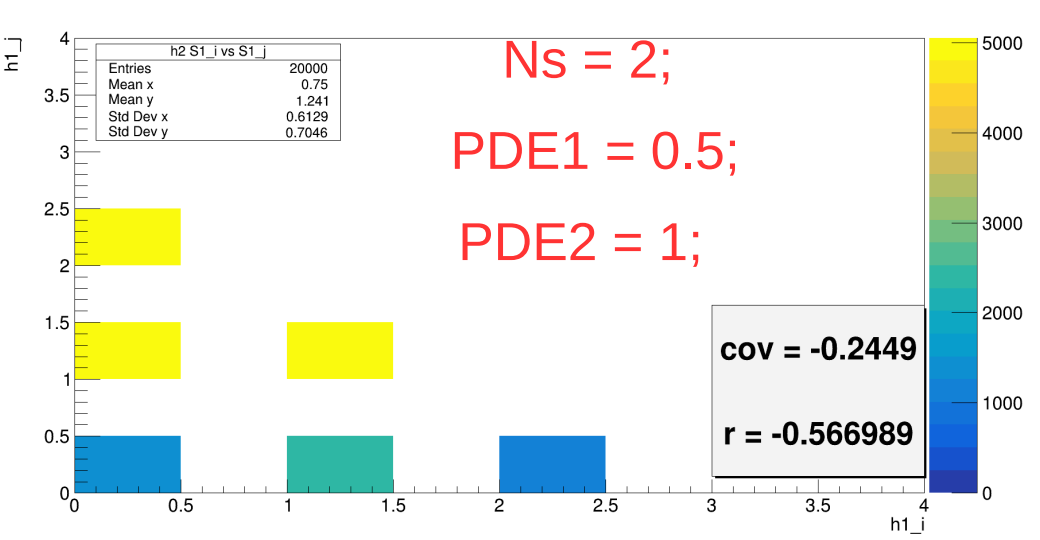
Ns = Ni + Nj; eff1 = PDE1 * solid_angle_part;

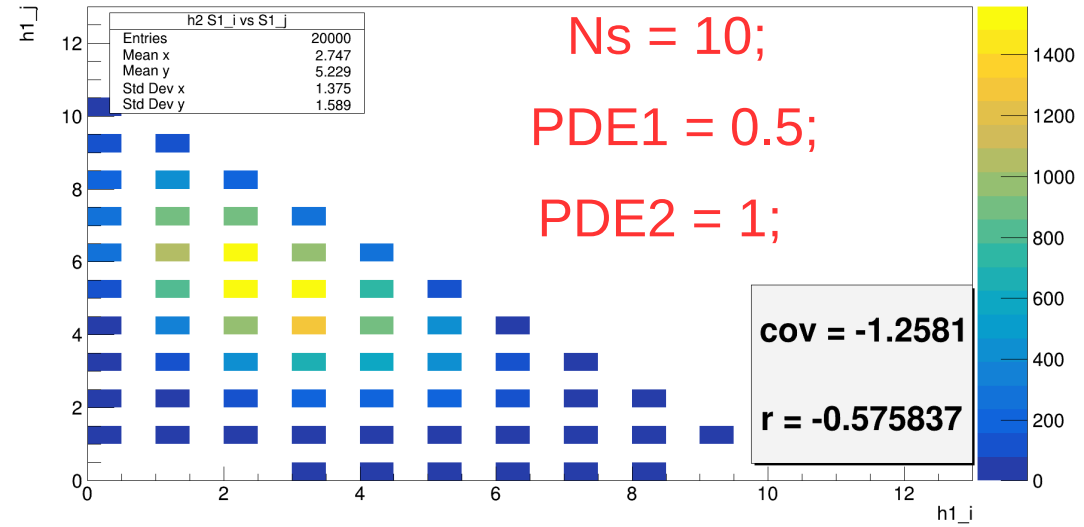
r(i, j) = - sqrt(eff1 * eff2) / sqrt((1 – eff1) * (1 – eff2))

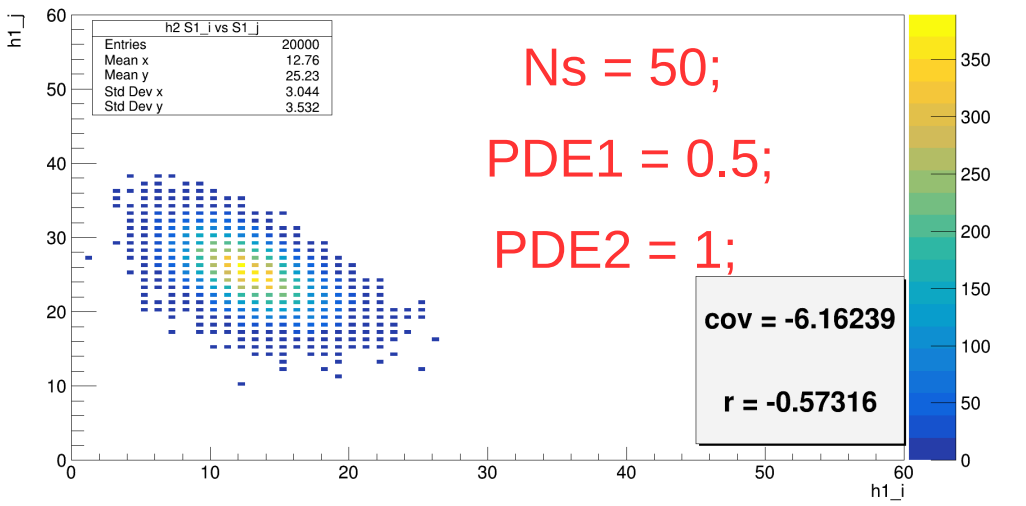
If eff1 = eff2 = 0.5, then

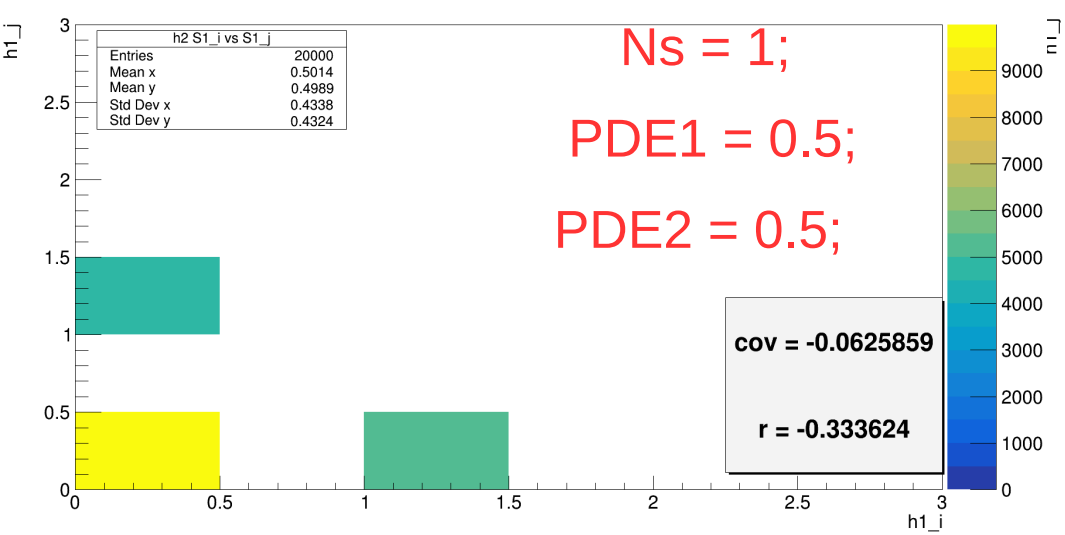
r(i, j) = -1

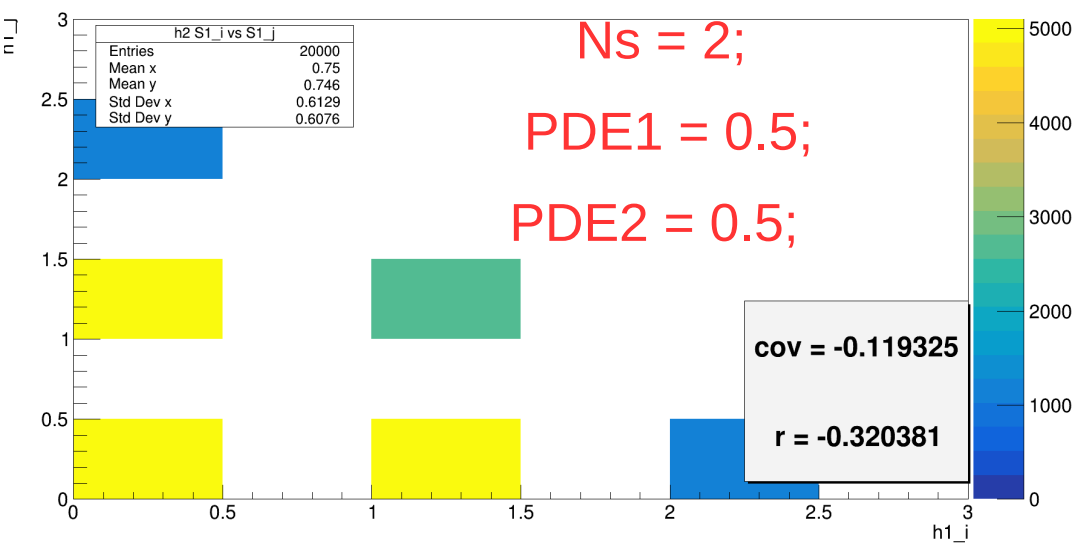

h2 S1_i vs S1_j
Entries 20000
Mean x 0.5014
Mean y 0.7481
Std Dev x 0.4338
Std Dev y 0.5
Ns = 1;
PDE1 = 0.5;
PDE2 = 1;
cov = -0.125247
r = -0.577356
h1_i
h1_j

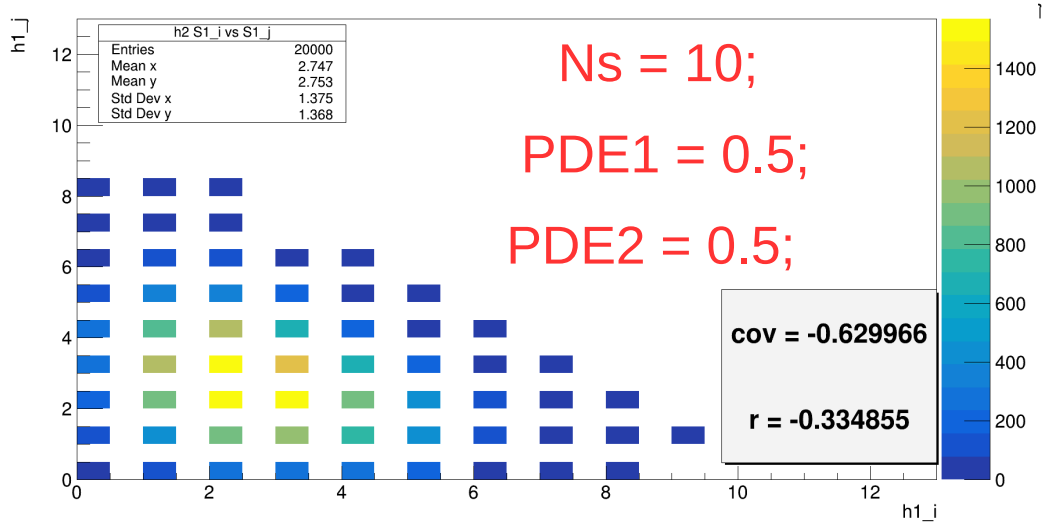

h2 S1_i vs S1_j
Entries 20000
Mean x 0.75
Mean y 1.241
Std Dev x 0.6129
Std Dev y 0.7046
Ns = 2;
PDE1 = 0.5;
PDE2 = 1;
cov = -0.2449
r = -0.566989
h1_i
h1_j

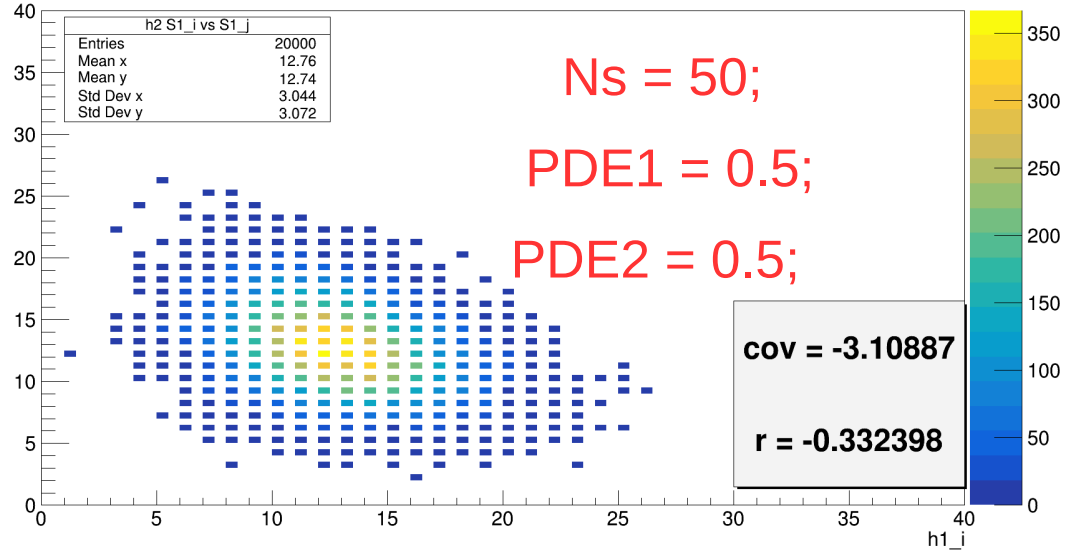

h2 S1_i vs S1_j
Entries 20000
Mean x 2.747
Mean y 5.229
Std Dev x 1.375
Std Dev y 1.589
Ns = 10;
PDE1 = 0.5;
PDE2 = 1;
cov = -1.2581
r = -0.575837
h1_i
h1_j


h2 S1_i vs S1_j
Entries 20000
Mean x 12.76
Mean y 25.23
Std Dev x 3.044
Std Dev y 3.532
Ns = 50;
PDE1 = 0.5;
PDE2 = 1;
cov = -6.16239
r = -0.57316
h1_i
h1_j

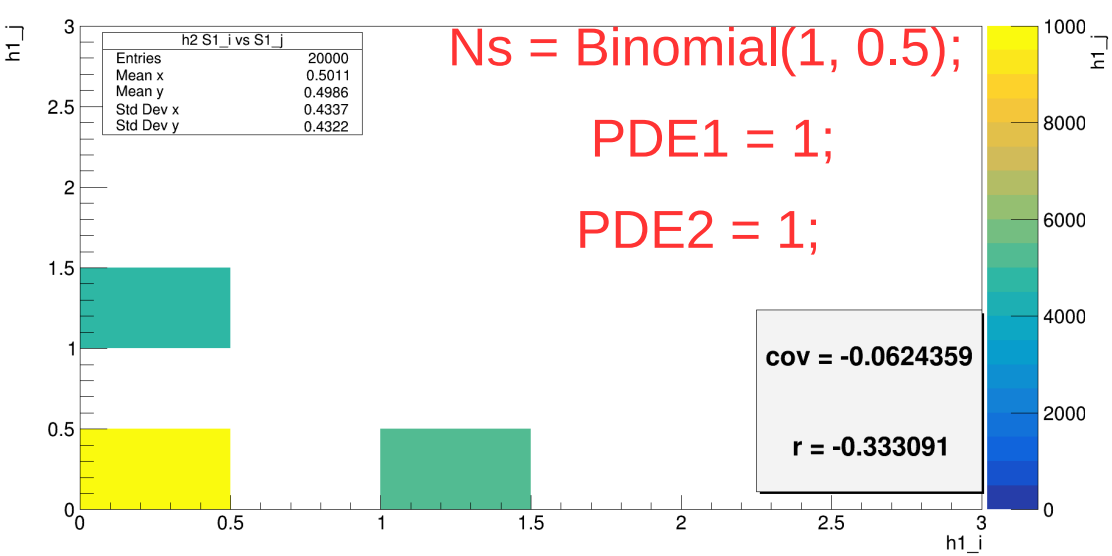

h2 S1_i vs S1_j
Entries 20000
Mean x 0.5014
Mean y 0.4989
Std Dev x 0.4338
Std Dev y 0.4324
Ns = 1;
PDE1 = 0.5;
PDE2 = 0.5;
cov = -0.0625859
r = -0.333624
h1_i
h1_j

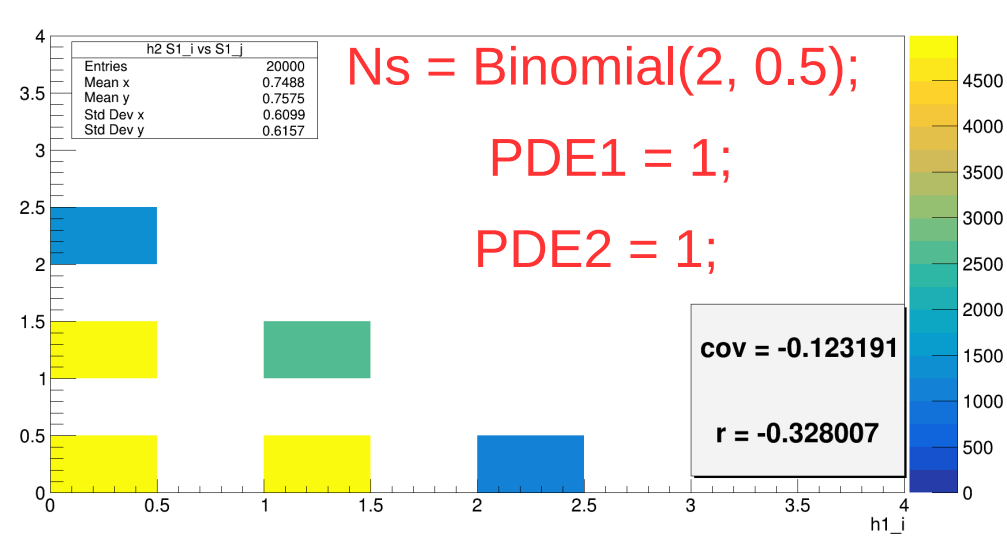

h2 S1_i vs S1_j
Entries 20000
Mean x 0.75
Mean y 0.746
Std Dev x 0.6129
Std Dev y 0.6076
Ns = 2;
PDE1 = 0.5;
PDE2 = 0.5;
cov = -0.119325
r = -0.320381
h1_i
h1_j

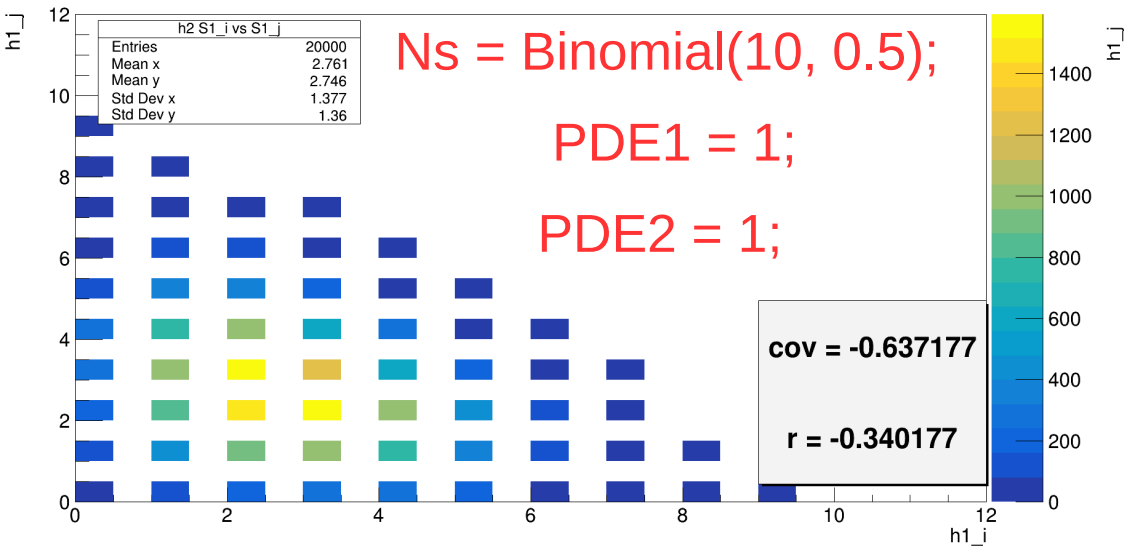

h2 S1_i vs S1_j
Entries 20000
Mean x 2.747
Mean y 2.753
Std Dev x 1.375
Std Dev y 1.368
Ns = 10;
PDE1 = 0.5;
PDE2 = 0.5;
cov = -0.629966
r = -0.334855
h1_i
h1_j


h2 S1_i vs S1_j
Entries 20000
Mean x 12.76
Mean y 12.74
Std Dev x 3.044
Std Dev y 3.072
Ns = 50;
PDE1 = 0.5;
PDE2 = 0.5;
cov = -3.10887
r = -0.332398
h1_i
h1_j

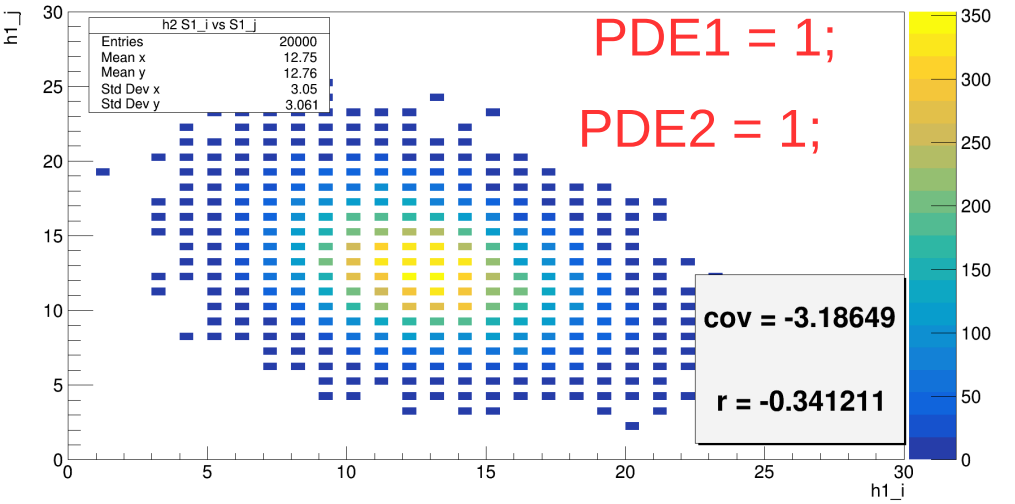
```
double solid_angle_part = 0.5;
 double PDE1 = 1;
 double PDE2 = 1;

 //int Ns = 1;//sourse intensity and distribution
 int Ns = rndm3.Binomial(1, 0.5);
 //int Ns = rndm3.Poisson(30);

 double Ni0 = rndm3.Binomial(Ns, solid_angle_part);//num of photons emitted in the left part
 double Nj0 = Ns - Ni0;//num of photons emitted in the right part

 double Ni = rndm3.Binomial(Ni0, PDE1);//num of photons detected by the left part
 double Nj = rndm3.Binomial(Nj0, PDE2);//num of photons detected by the right part
```

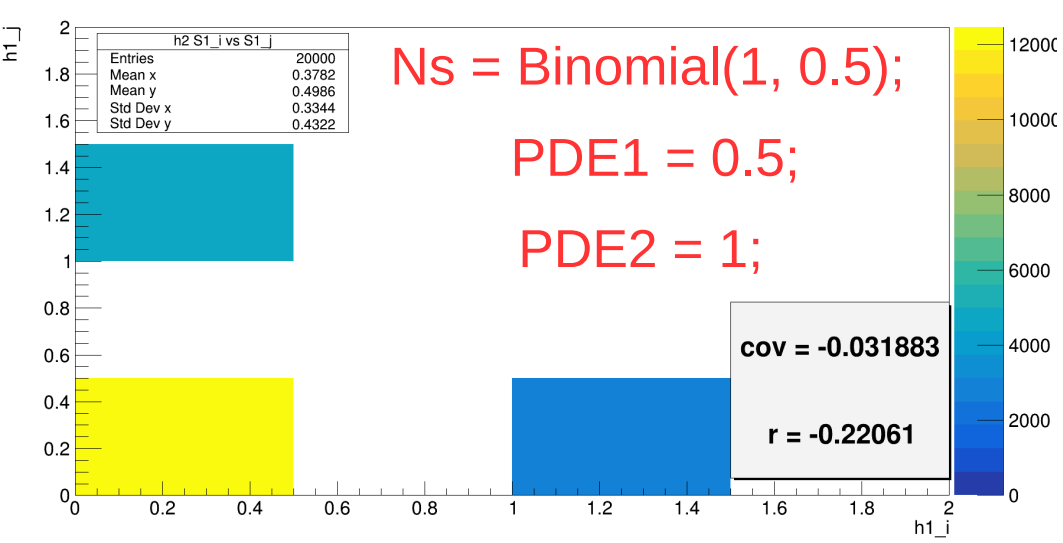


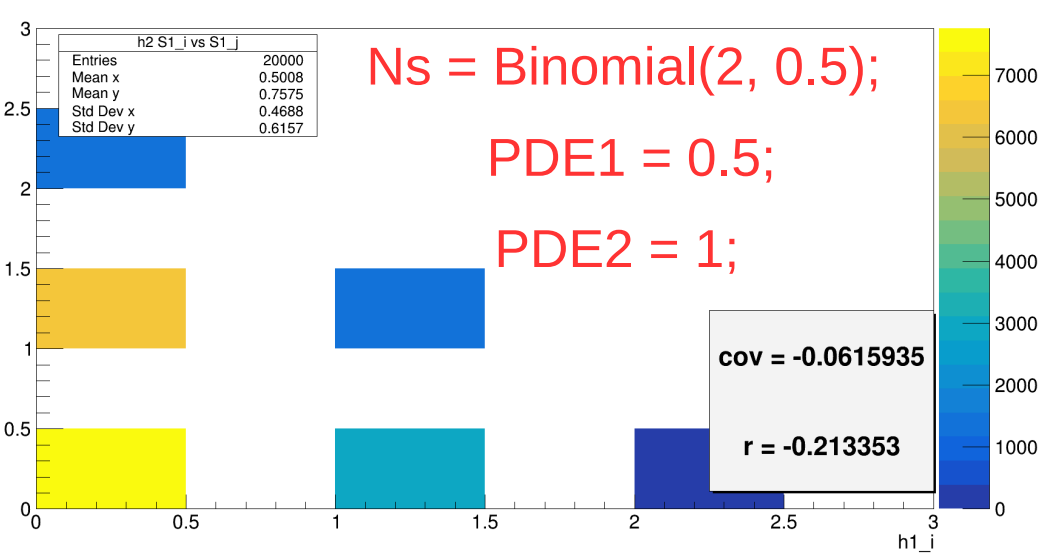


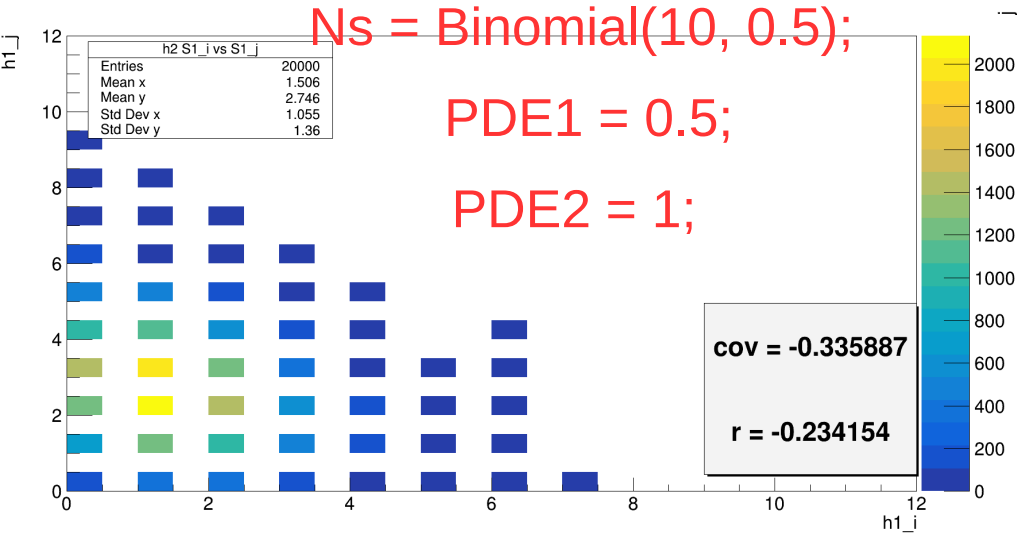


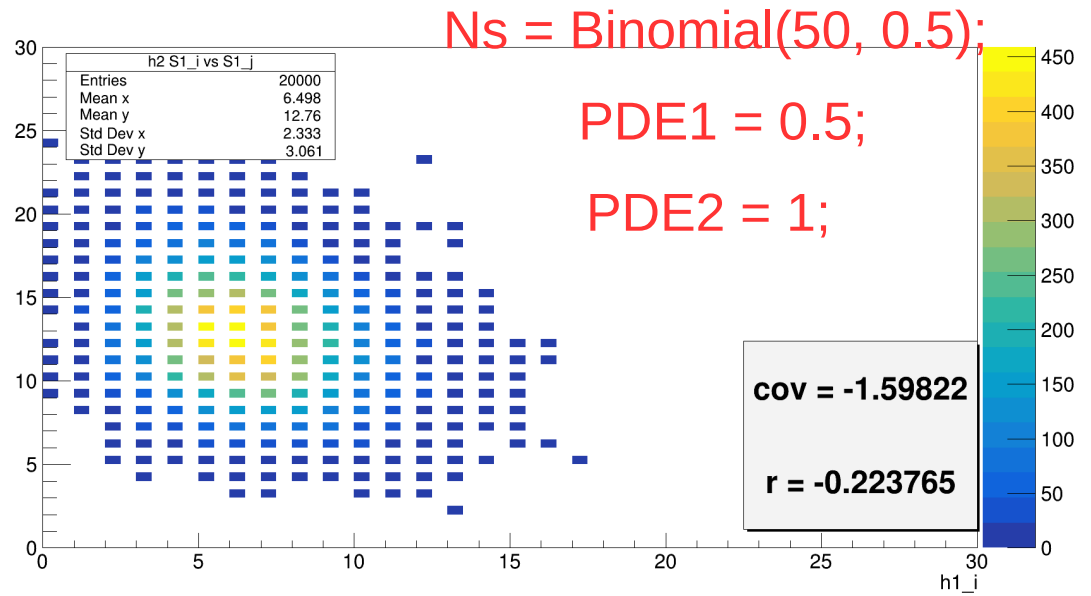
Ns = Binomial(50, 0.5);



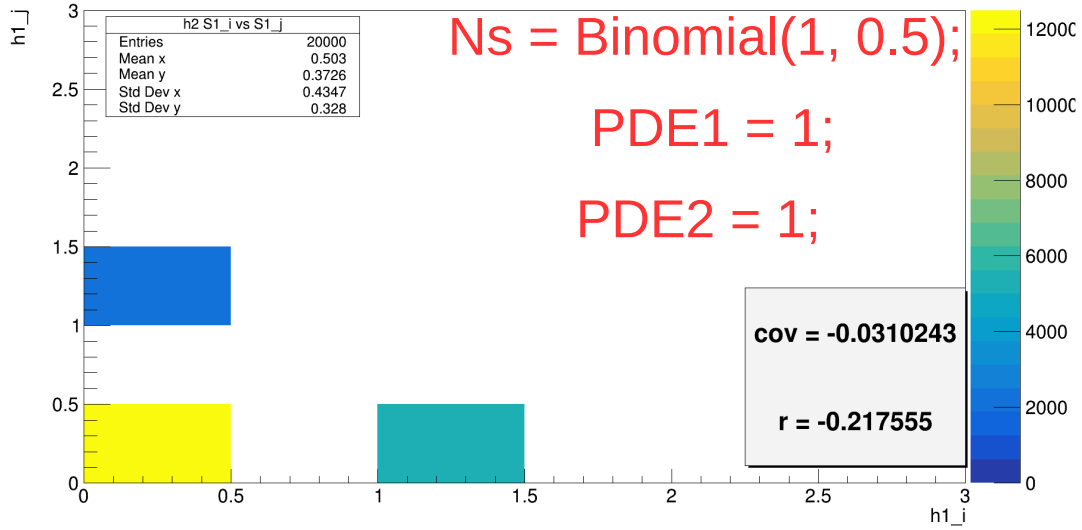

h2 S1_i vs S1_j
Entries 20000
Mean x 0.3782
Mean y 0.4986
Std Dev x 0.3344
Std Dev y 0.4322
Ns = Binomial(1, 0.5);
PDE1 = 0.5;
PDE2 = 1;
cov = -0.031883
r = -0.22061
h1_i
h1_j

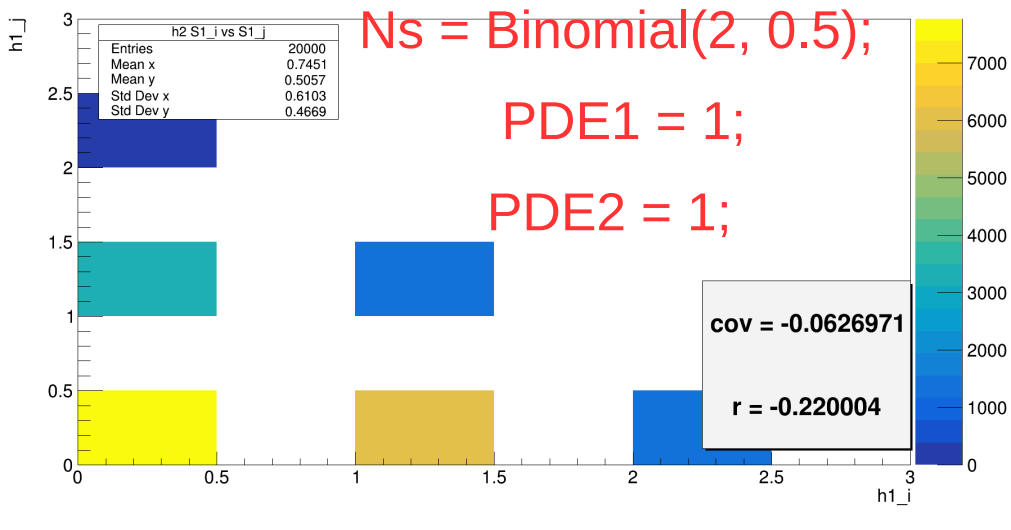

h2 S1_i vs S1_j
Entries 20000
Mean x 0.5008
Mean y 0.7575
Std Dev x 0.4688
Std Dev y 0.6157
Ns = Binomial(2, 0.5);
PDE1 = 0.5;
PDE2 = 1;
cov = -0.0615935
r = -0.213353
h1_i

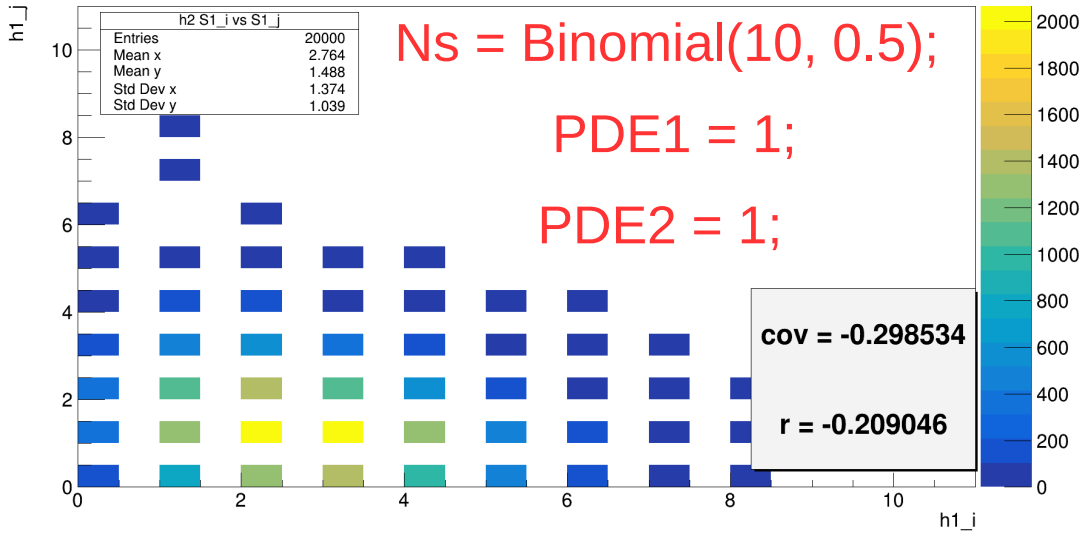

h2 S1_i vs S1_j
Entries 20000
Mean x 1.506
Mean y 2.746
Std Dev x 1.055
Std Dev y 1.36
Ns = Binomial(10, 0.5);
PDE1 = 0.5;
PDE2 = 1;
cov = -0.335887
r = -0.234154
h1_i
h1_j

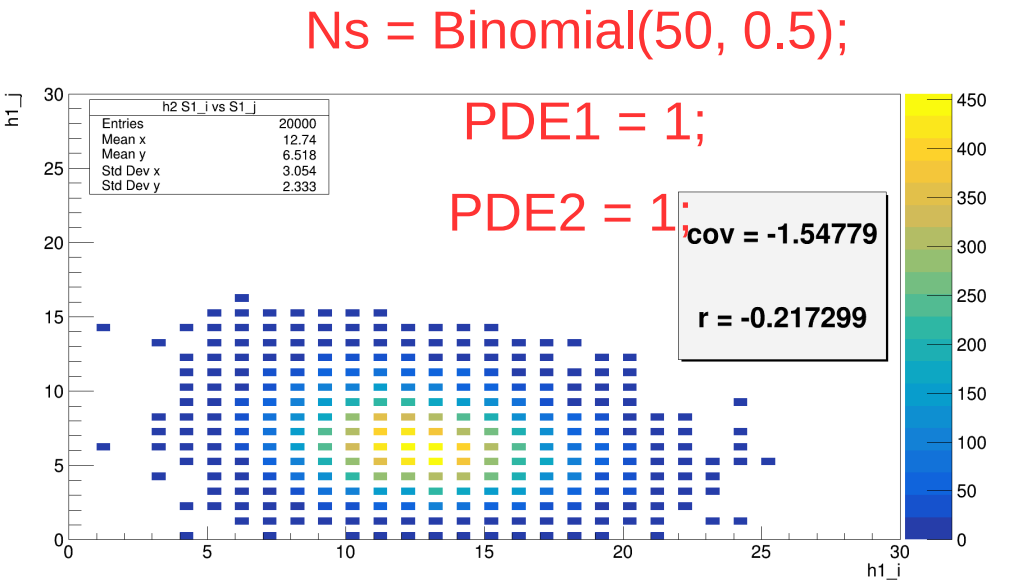

h2 S1_i vs S1_j
Entries 20000
Mean x 6.498
Mean y 12.76
Std Dev x 2.333
Std Dev y 3.061
Ns = Binomial(50, 0.5);
PDE1 = 0.5;
PDE2 = 1;
cov = -1.59822
r = -0.223765
h1_i

```
double solid_angle_part1 = 0.5;
 double solid_angle_part2 = 0.5;
 double PDE1 = 1;
 double PDE2 = 1;

 //int Ns = 60;//sourse intensity and distribution
 int Ns = rndm3.Binomial(1, 0.5);
 //int Ns = rndm3.Poisson(100);//sourse intensity and distribution

 double Ni0 = rndm3.Binomial(Ns, solid_angle_part1);//num of photons emitted in the left part
 //double Nj0 = Ns - Ni0;//num of photons emitted in the right part
 double Nj0 = rndm3.Binomial(Ns - Ni0, solid_angle_part2);

 double Ni = rndm3.Binomial(Ni0, PDE1);//num of photons detected by the left part
 double Nj = rndm3.Binomial(Nj0, PDE2);//num of photons detected by the right part
```

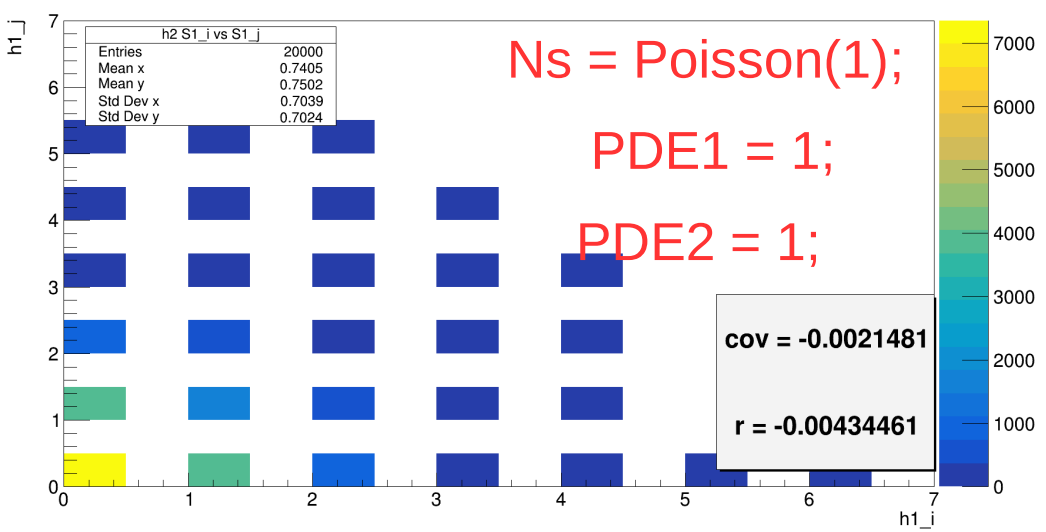

h2 S1_i vs S1_j
Entries 20000
Mean x 0.503
Mean y 0.3726
Std Dev x 0.4347
Std Dev y 0.328
Ns = Binomial(1, 0.5);
PDE1 = 1;
PDE2 = 1;
cov = -0.0310243
r = -0.217555
h1_i
h1_j

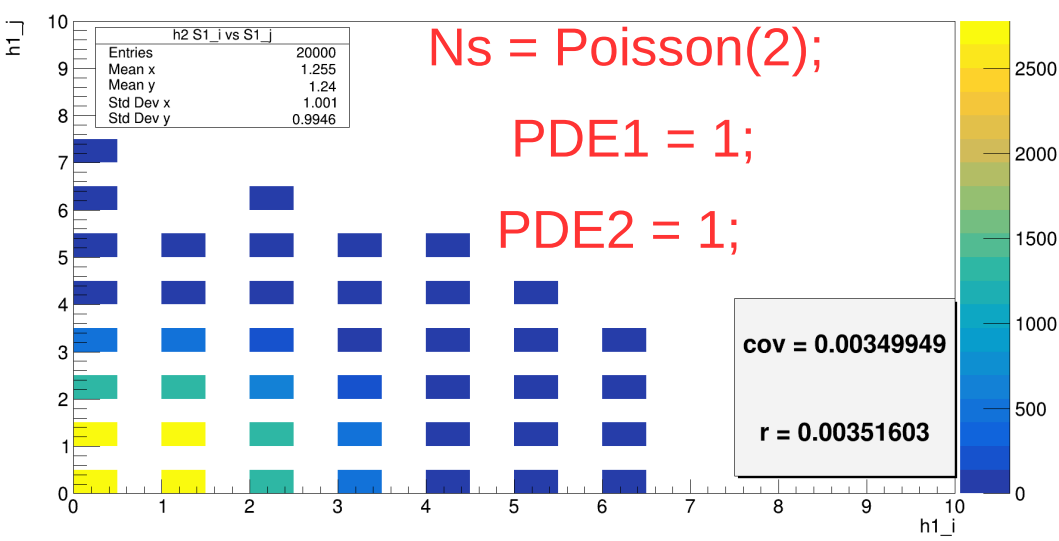

h2 S1_i vs S1_j
Entries 20000
Mean x 0.7451
Mean y 0.5057
Std Dev x 0.6103
Std Dev y 0.4669
Ns = Binomial(2, 0.5);
PDE1 = 1;
PDE2 = 1;
cov = -0.0626971
r = -0.220004
h1_i
h1_j

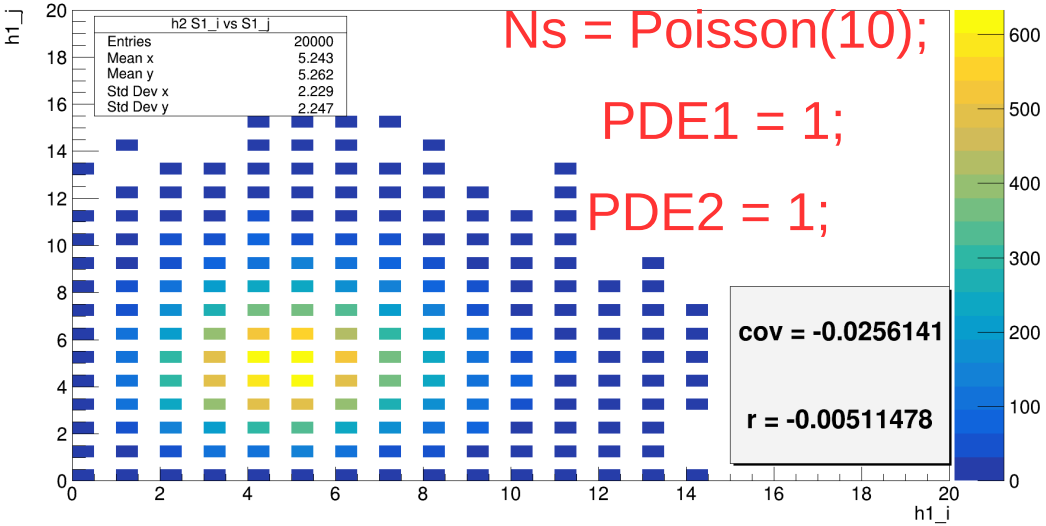

h2 S1_i vs S1_j
Entries 20000
Mean x 2.764
Mean y 1.488
Std Dev x 1.374
Std Dev y 1.039
Ns = Binomial(10, 0.5);
PDE1 = 1;
PDE2 = 1;
cov = -0.298534
r = -0.209046
h1_i
h1_j

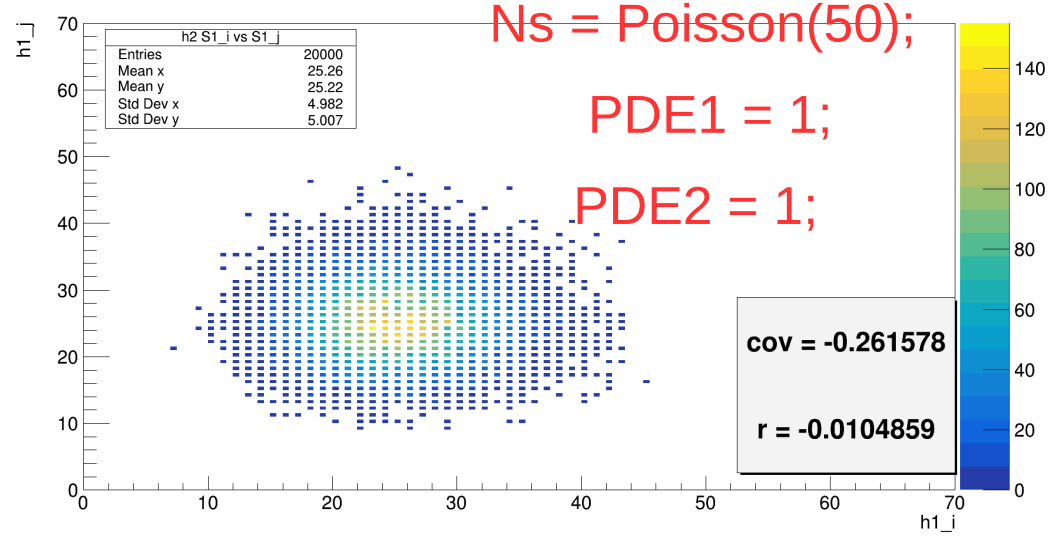

h2 S1_i vs S1_j
Entries 20000
Mean x 12.74
Mean y 6.518
Std Dev x 3.054
Std Dev y 2.333
Ns = Binomial(50, 0.5);
PDE1 = 1;
PDE2 = 1;
cov = -1.54779
r = -0.217299
h1_i
h1_j

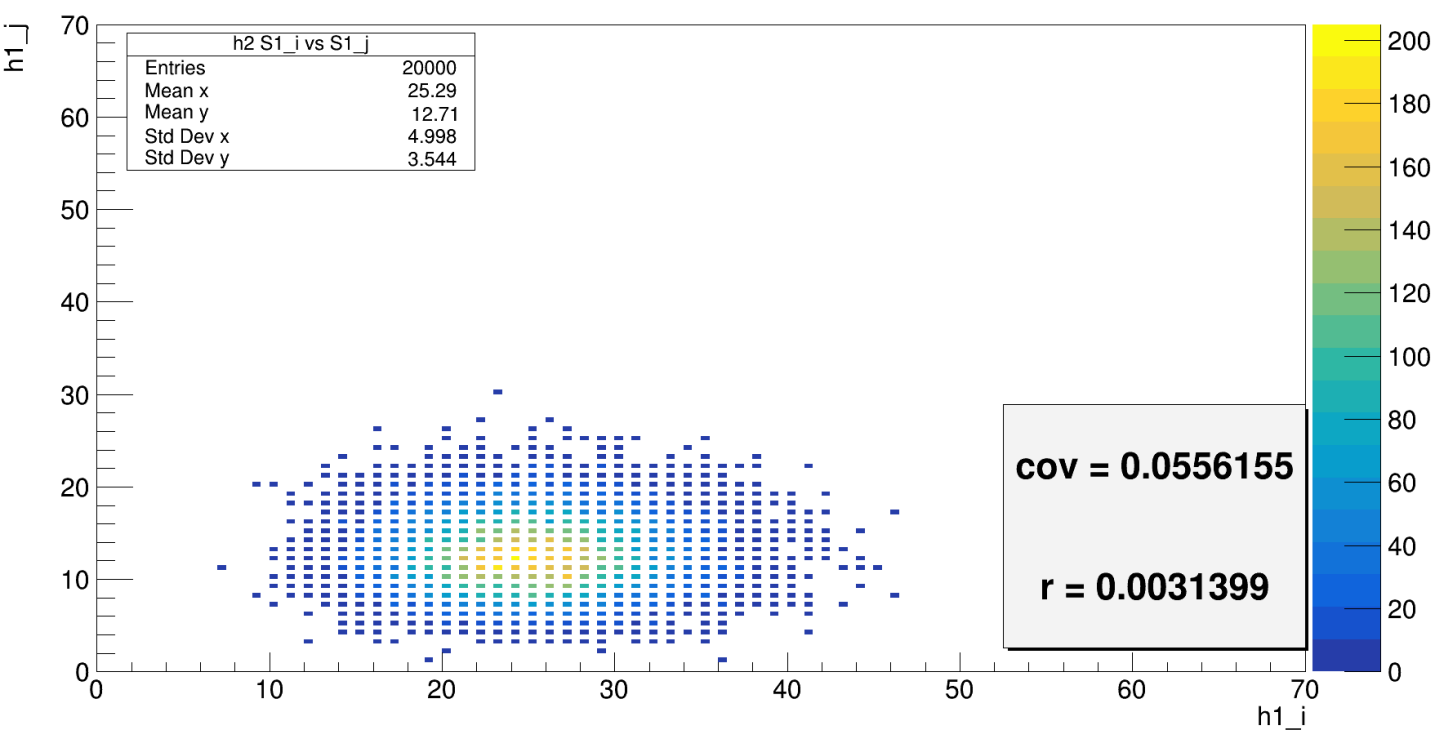
```
double solid_angle_part1 = 0.5;
 double solid_angle_part2 = 0.5;
 double PDE1 = 1;
 double PDE2 = 1;

 //int Ns = 60;//sourse intensity and distribution
 //int Ns = rndm3.Binomial(1, 0.5);
 int Ns = rndm3.Poisson(1);//sourse intensity and distribution

 double Ni0 = rndm3.Binomial(Ns, solid_angle_part1);//num of photons emitted in the left part
 double Nj0 = Ns - Ni0;//num of photons emitted in the right part
 //double Nj0 = rndm3.Binomial(Ns - Ni0, solid_angle_part2);

 double Ni = rndm3.Binomial(Ni0, PDE1);//num of photons detected by the left part
 double Nj = rndm3.Binomial(Nj0, PDE2);//num of photons detected by the right part
```


h2 S1_i vs S1_j
Entries 20000
Mean x 0.7405
Mean y 0.7502
Std Dev x 0.7039
Std Dev y 0.7024
Ns = Poisson(1);
PDE1 = 1;
PDE2 = 1;
cov = -0.0021481
r = -0.00434461
h1_i
h1_j


h2 S1_i vs S1_j
Entries 20000
Mean x 1.255
Mean y 1.24
Std Dev x 1.001
Std Dev y 0.9946
Ns = Poisson(2);
PDE1 = 1;
PDE2 = 1;
cov = 0.00349949
r = 0.00351603
h1_i
h1_j


h2 S1_i vs S1_j
Entries 20000
Mean x 5.243
Mean y 5.262
Std Dev x 2.229
Std Dev y 2.247
Ns = Poisson(10);
PDE1 = 1;
PDE2 = 1;
cov = -0.0256141
r = -0.00511478
h1_i
h1_j


h2 S1_i vs S1_j
Entries 20000
Mean x 25.26
Mean y 25.22
Std Dev x 4.982
Std Dev y 5.007
Ns = Poisson(50);
PDE1 = 1;
PDE2 = 1;
cov = -0.261578
r = -0.0104859
h1_i
h1_j

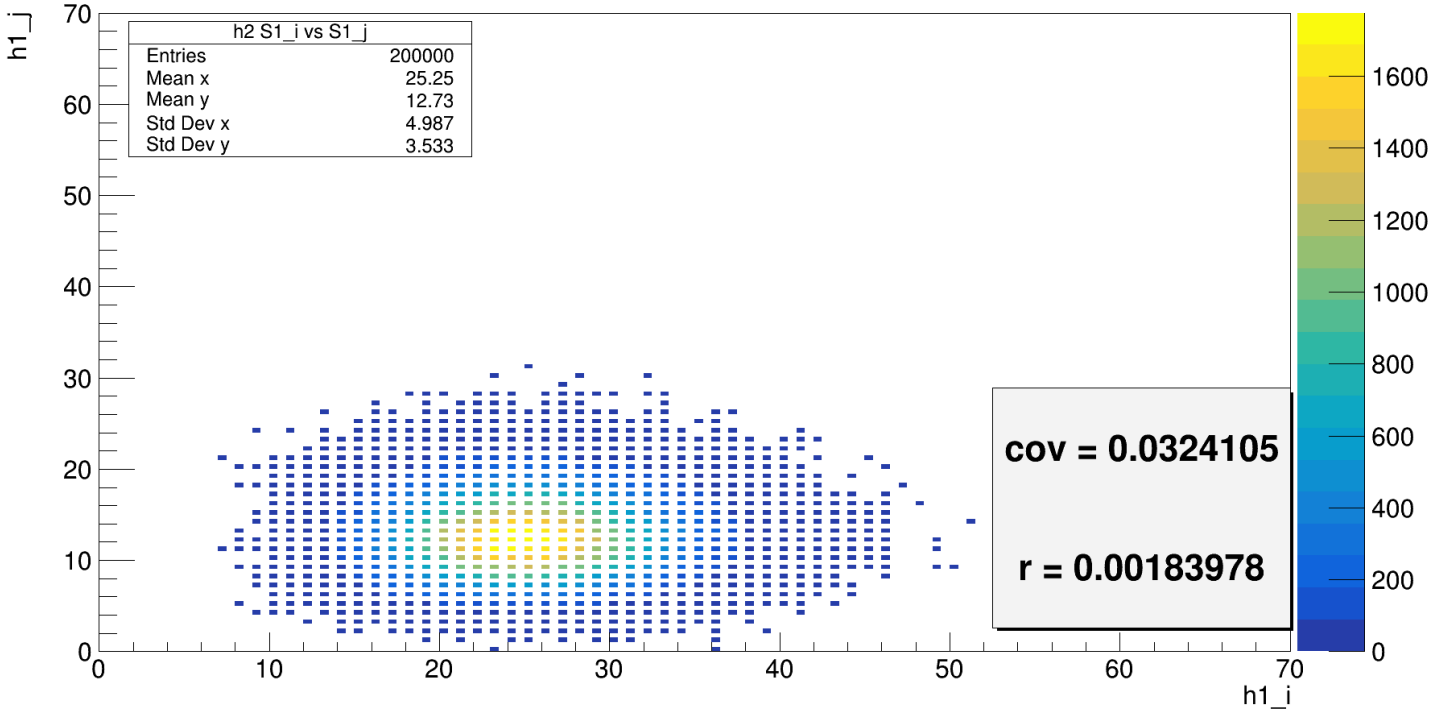


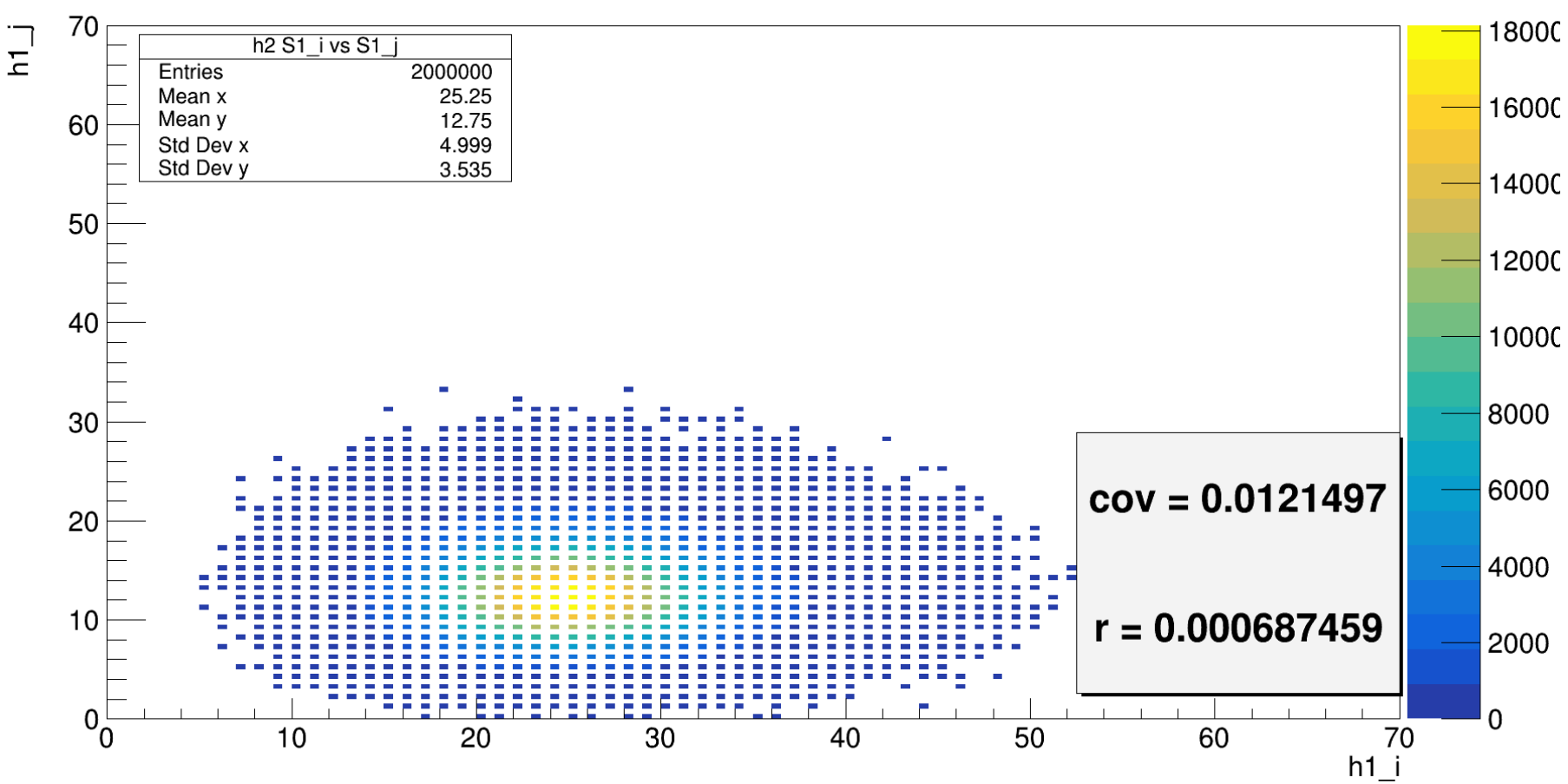
Ns = Poisson(50);

PDE1 = 1;

PDE2 = 1;

Nj0 = rndm3.Binomial(Ns - Ni0, solid_angle_part2);




h2 S1_i vs S1_j
Entries 2000000
Mean x 25.25
Mean y 12.75
Std Dev x 4.999
Std Dev y 3.535
cov = 0.0121497
r = 0.000687459
h1_j
h1_i
0
10
20
30
40
50
60
70
0
2000
4000
6000
8000
10000
12000
14000
16000
18000