Preliminary Study of hit multiplicity distribution *Extreme Energy Events*.

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TEAM EEE

RUN COORDINATION MEETING 12 Maggio 2021

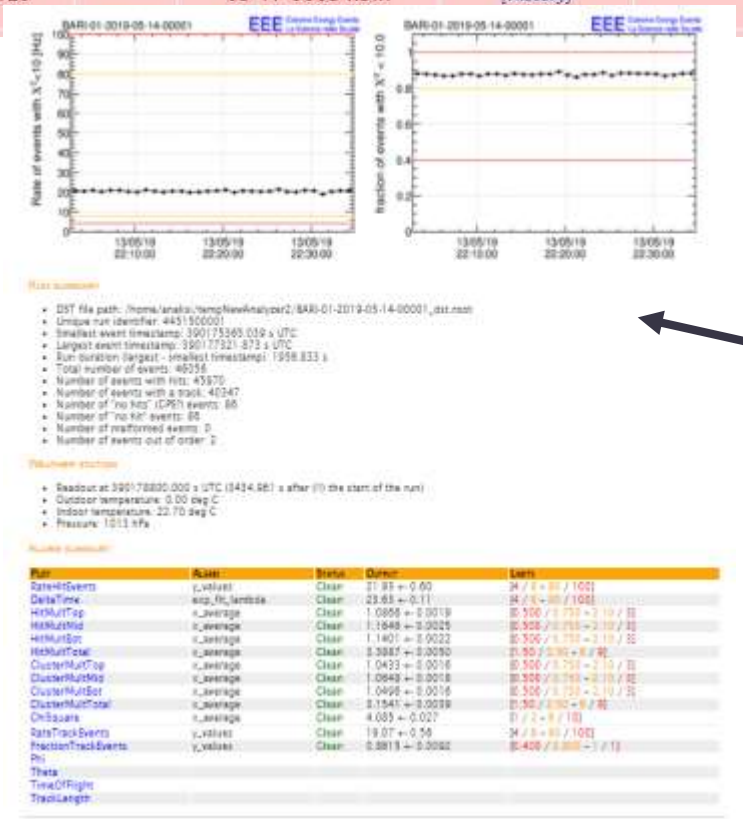
Issue

In the the last year the rate of acquisition of our telescope BARI-01 has clearly decreased (from about 20Hz to less than 10 Hz) even though the working point of the chambers hasn't changed.

We decided to perform a study on the trend of the hit multiplicity parameter over time for every chamber, comparing it to the ones of other telescopes similar to ours in live time. We have chosen as terms of comparison the telescope located in Trinitapoli (TRIN-01) and BOLO-04 telescope in Bologna.

Where to find these data:

School	Day	Time	Name of the last trasferred File	Number of Files trasferred today	Last Entry in the e-logbook of the Schools	Name of the last File analyzed by DQM	DQM daily report	RATE of Triggers for the last Run	RATE of Tracks for the last Run	Link DQM
BARI-01 *[Event Display]*	mar 16 marzo	15:22	BARI-01-2021-03-16-00013.bin	0 *[History]*	*	BARI-01-2021-03-16-00012.bin	*	10.0	9.0	BARI-01
BOLO-04 *[Event Display]*	mer 05 agosto	09:46	BOLO-04-2020-08-05-00028.bin	0 *[History]*	*	BOLO-04-2020-08-05-00028.bin	*	40.0	36.0	BOLO-04
TRIN-01 *[Event Display]*	mer 17 marzo	16:24	TRIN-01-2021-03-17-00034.bin	0 *[History]*	*	TRIN-01-2021-03-17-00033.bin	*	28.0	25.0	TRIN-01



BARI-01 DQM list

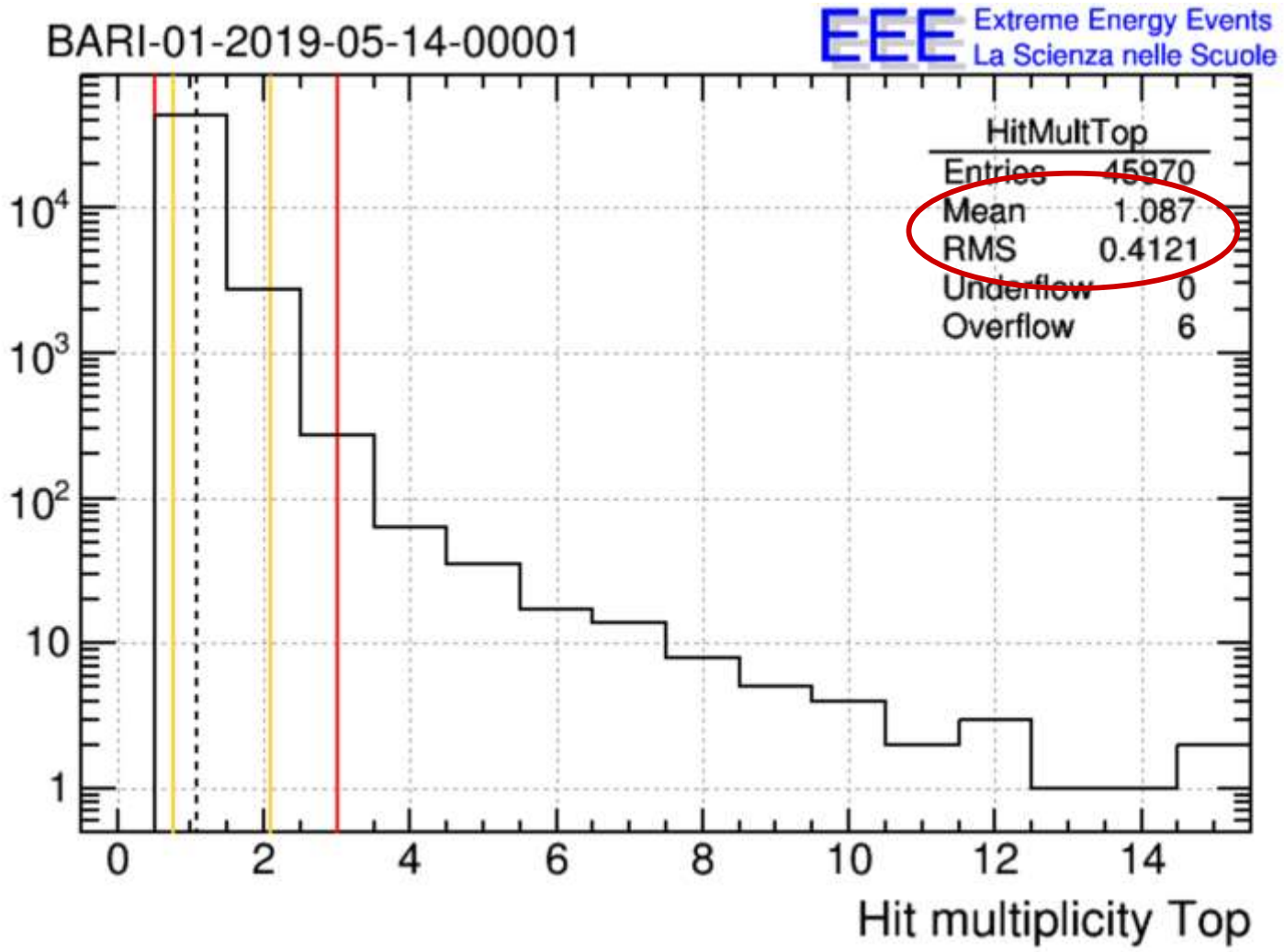
2019-06-03	2019-06-02	2019-06-01	2019-
	05-31	2019-05-30	
2019-05-29	2019-05-28	2019-05-27	2019-
	05-26	2019-05-25	
2019-05-24	2019-05-23	2019-05-22	2019-
	05-21	2019-05-20	
2019-05-19	2019-05-18	2019-05-17	2019-
	05-16	2019-05-15	
2019-05-14	2019-05-13	2019-05-12	2019-
	05-11	2019-05-10	
2019-05-09	2019-05-08	2019-05-07	2019-
	05-06	2019-05-05	
2019-05-04	2019-05-03	2019-05-02	2019-
	05-01	2019-04-30	
2019-04-29	2019-04-28	2019-04-27	2019-
	04-26	2019-04-25	
2019-04-24	2019-04-23	2019-04-22	2019-
	04-21	2019-04-20	
2019-04-19	2019-04-18	2019-04-17	2019-
	04-16	2019-04-15	
2019-04-14	2019-04-13	2019-04-12	2019-
	04-11	2019-04-10	
2019-04-09	2019-04-08	2019-04-07	2019-
	04-06	2019-04-05	
2019-04-04	2019-04-03	2019-04-02	2019-
	04-01	2019-03-31	
2019-03-30	2019-03-29	2019-03-28	2019-
	03-27	2019-03-26	
2019-03-25	2019-03-24	2019-03-23	2019-
	03-22	2019-03-21	

Where to find these data:

ALARM SUMMARY

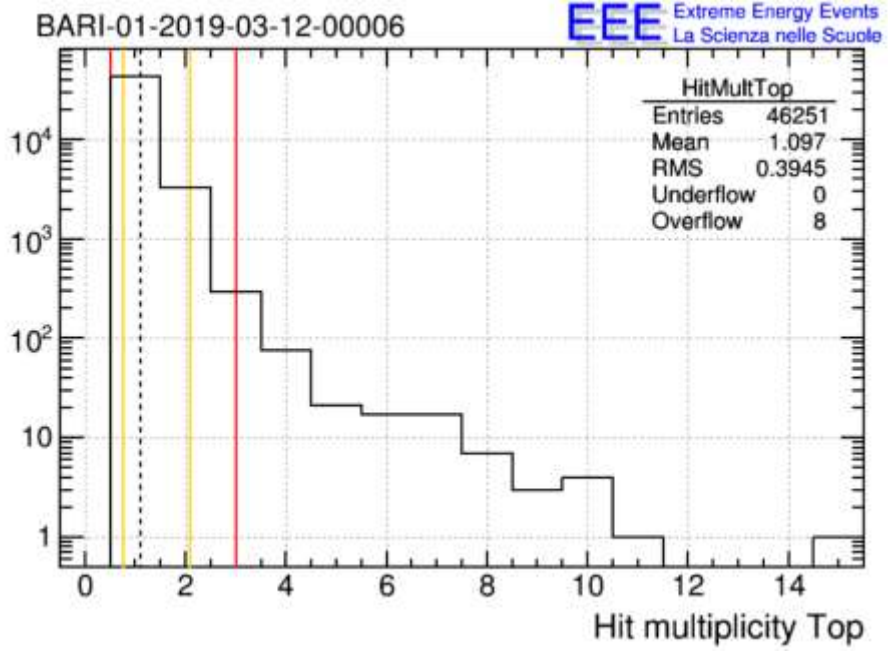
PLOT	ALARM	STATUS	OUTPUT	LIMITS
RateHitEvents	y_values	Clean	21.93 +- 0.60	[4 / 8 - 80 / 100]
DeltaTime	exp_fit_lambda	Clean	23.63 +- 0.11	[4 / 8 - 80 / 100]
HitMultTop	x_average	Clean	1.0866 +- 0.0019	[0.500 / 0.750 - 2.10 / 3]
HitMultMid	x_average	Clean	1.1646 +- 0.0025	[0.500 / 0.750 - 2.10 / 3]
HitMultBot	x_average	Clean	1.1401 +- 0.0022	[0.500 / 0.750 - 2.10 / 3]
HitMultTotal	x_average	Clean	3.3887 +- 0.0050	[1.50 / 2.50 - 6 / 9]
ClusterMultTop	x_average	Clean	1.0433 +- 0.0016	[0.500 / 0.750 - 2.10 / 3]
ClusterMultMid	x_average	Clean	1.0648 +- 0.0018	[0.500 / 0.750 - 2.10 / 3]
ClusterMultBot	x_average	Clean	1.0496 +- 0.0016	[0.500 / 0.750 - 2.10 / 3]
ClusterMultTotal	x_average	Clean	3.1541 +- 0.0039	[1.50 / 2.50 - 6 / 9]
ChiSquare	x_average	Clean	4.085 +- 0.027	[1 / 2 - 6 / 10]
RateTrackEvents	y_values	Clean	19.07 +- 0.56	[4 / 8 - 80 / 100]
FractionTrackEvents	y_values	Clean	0.8615 +- 0.0092	[0.400 / 0.800 - 1 / 1]
Phi				
Theta				
TimeOfFlight				
TrackLength				

What to look for in the graph:

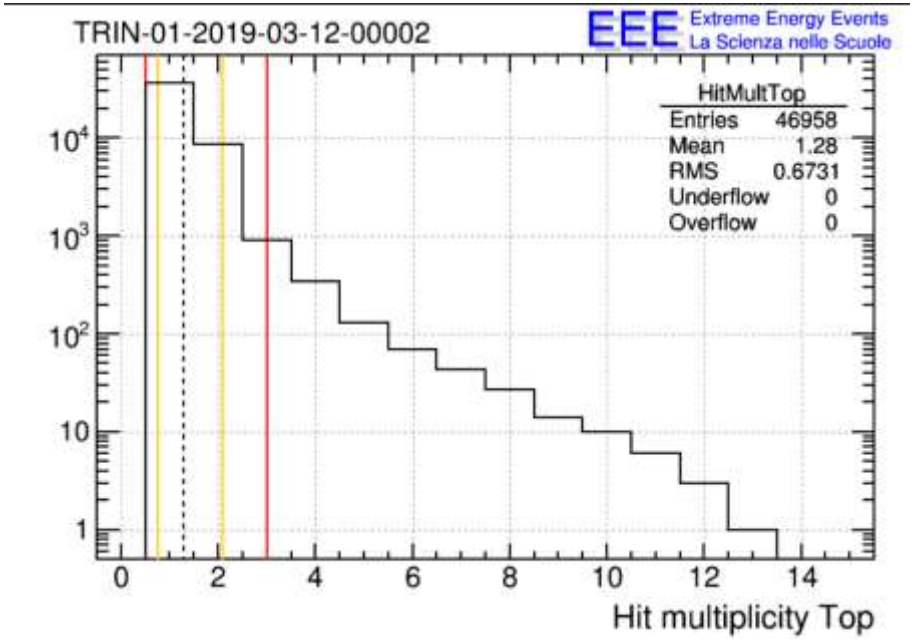


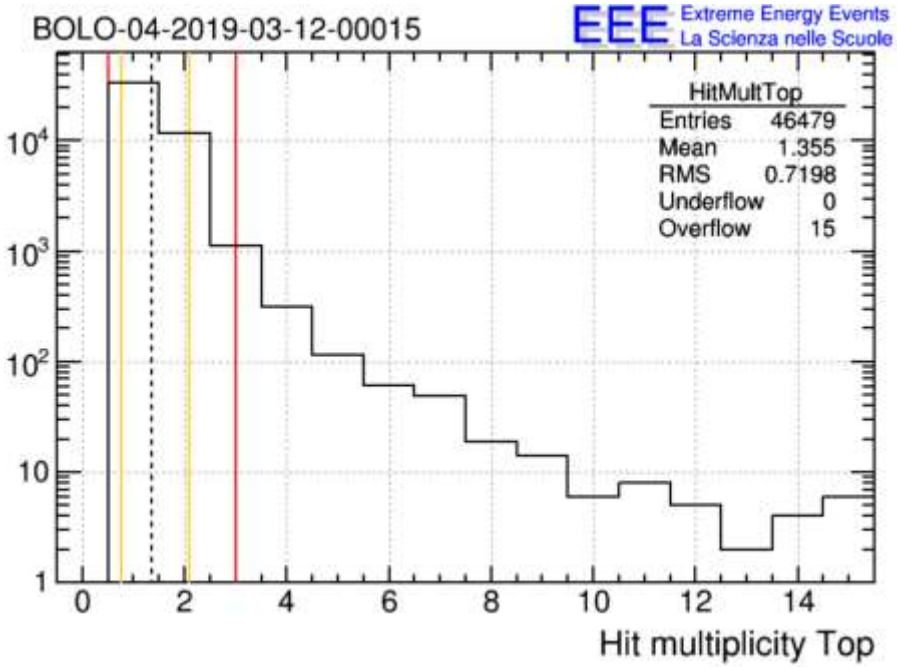
Hereafter follow some selected graphs of the hit multiplicity of the telescopes BARI-01, TRIN-01 and BOLO-04 divided by year and chamber. (Notice that we have no data in 2021 for BOLO-04 telescope).


TOP CHAMBER

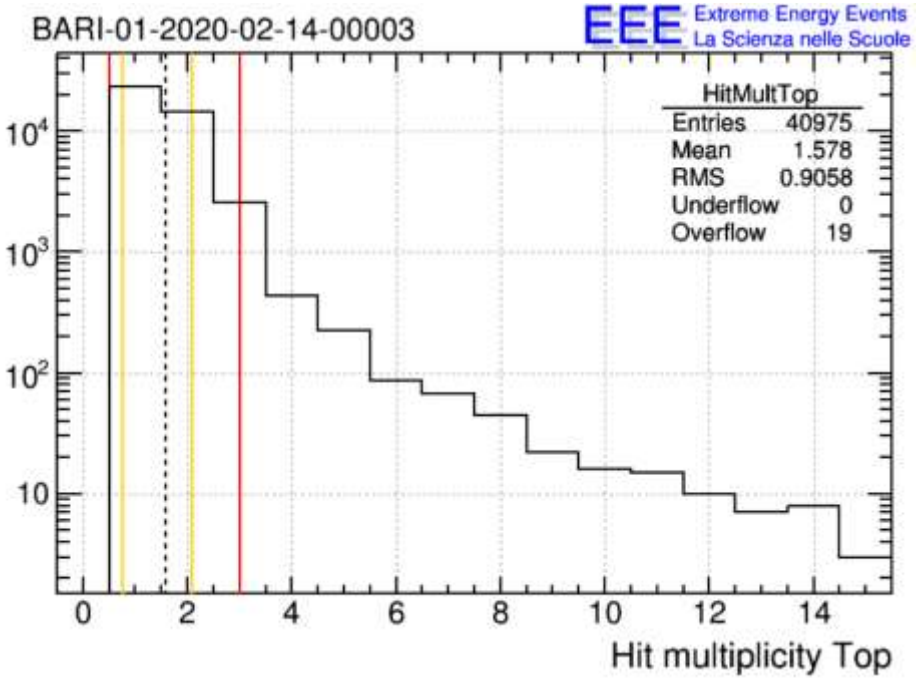

BARI-01-2019-03-12-00006
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultTop
Entries 46251
Mean 1.097
RMS 0.3945
Underflow 0
Overflow 8
Hit multiplicity Top

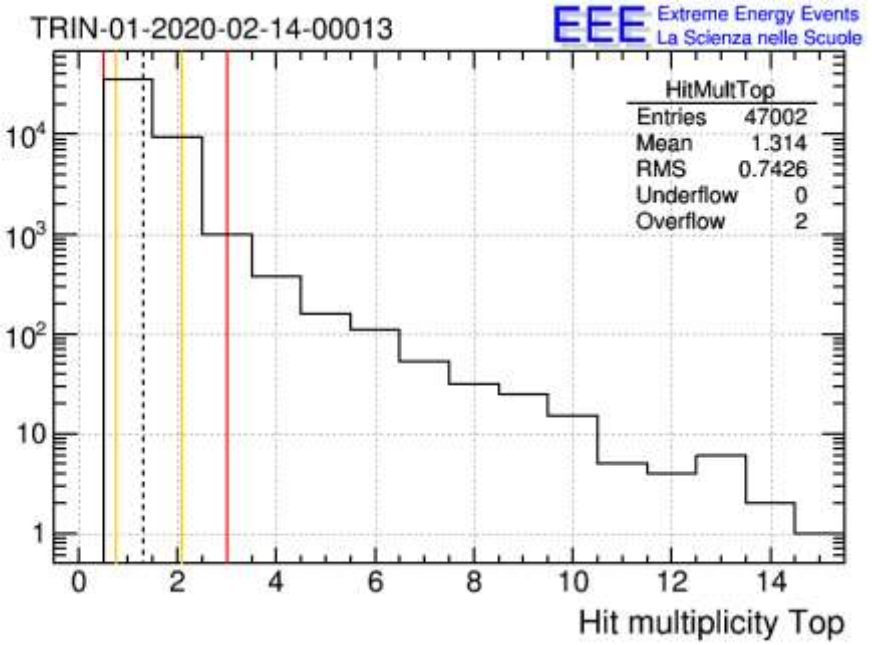
2019

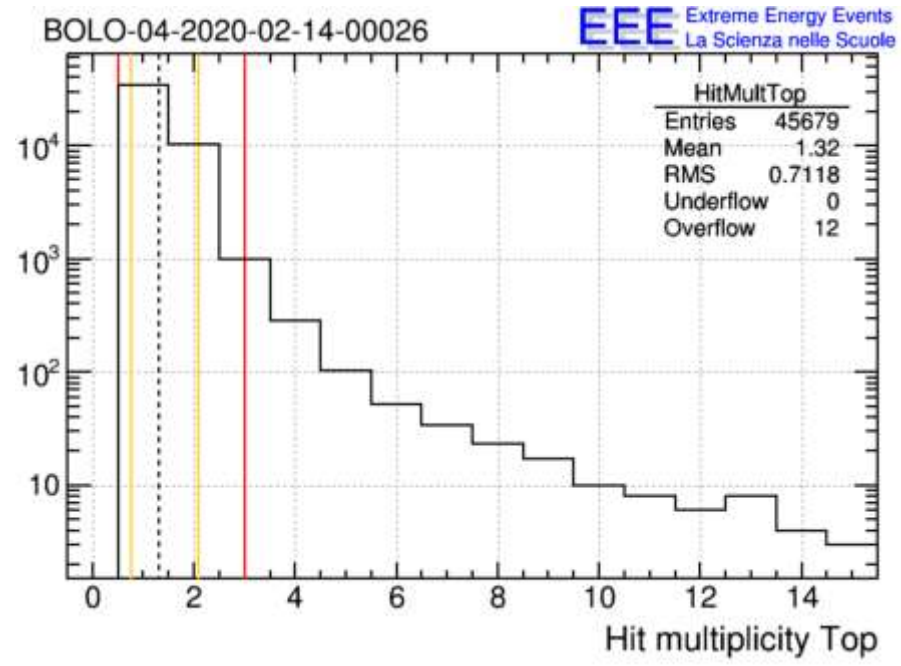

TRIN-01-2019-03-12-00002
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultTop
Entries 46958
Mean 1.28
RMS 0.6731
Underflow 0
Overflow 0
Hit multiplicity Top


BOLO-04-2019-03-12-00015
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultTop
Entries 46479
Mean 1.355
RMS 0.7198
Underflow 0
Overflow 15
Hit multiplicity Top

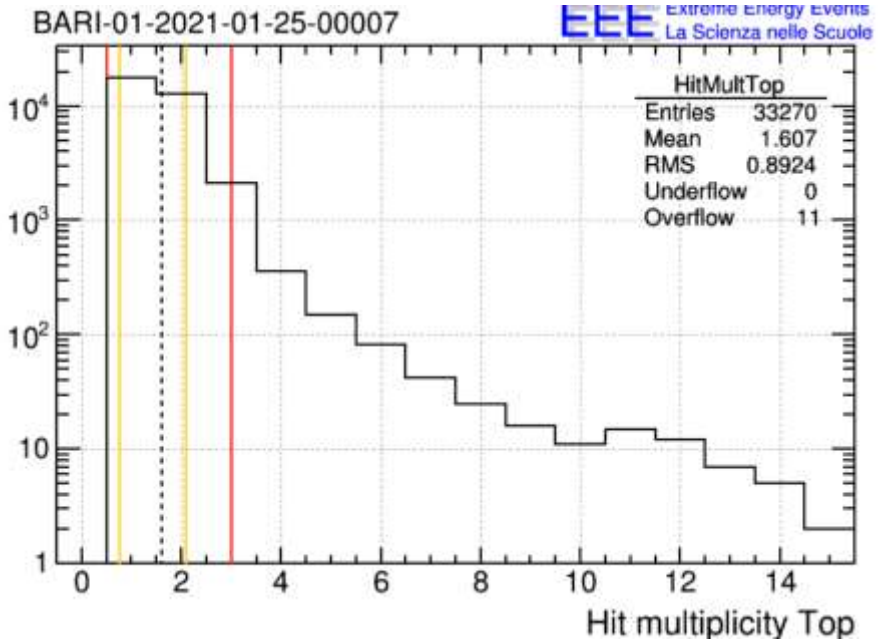
2020

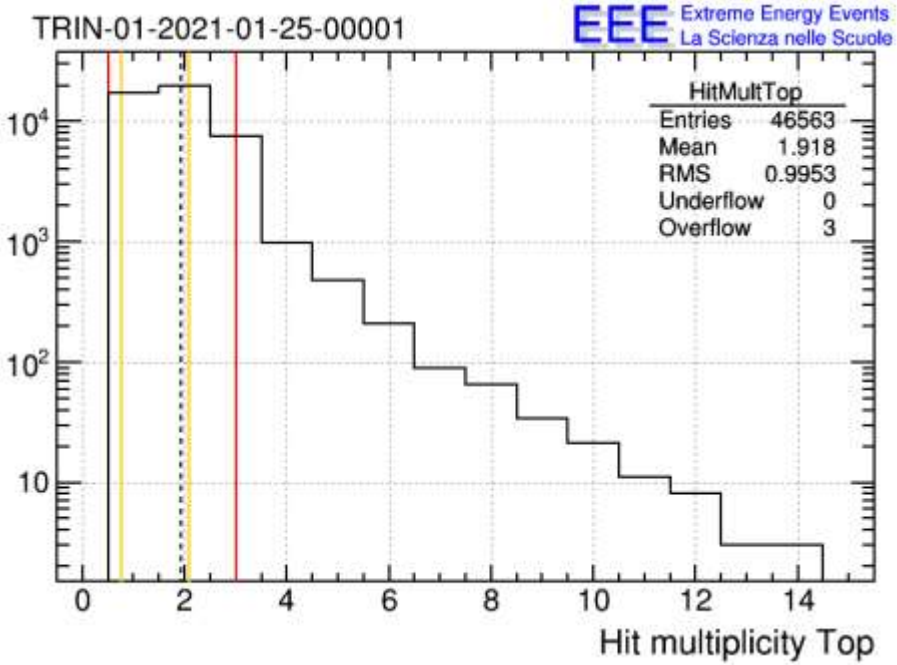

BARI-01-2020-02-14-00003
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultTop
Entries 40975
Mean 1.578
RMS 0.9058
Underflow 0
Overflow 19
Hit multiplicity Top

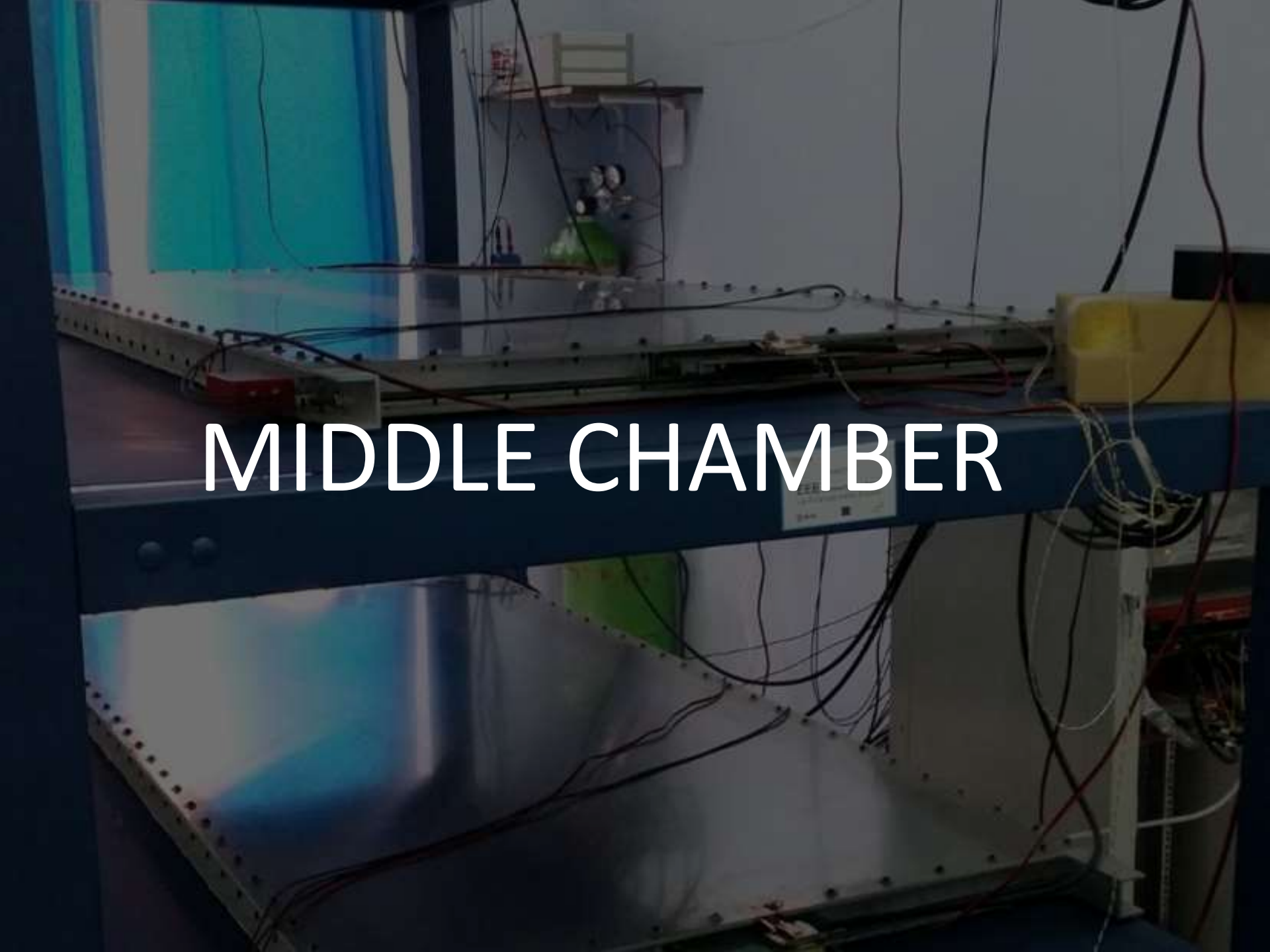

TRIN-01-2020-02-14-00013
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultTop
Entries 47002
Mean 1.314
RMS 0.7426
Underflow 0
Overflow 2
Hit multiplicity Top


BOLO-04-2020-02-14-00026
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultTop
Entries 45679
Mean 1.32
RMS 0.7118
Underflow 0
Overflow 12
Hit multiplicity Top

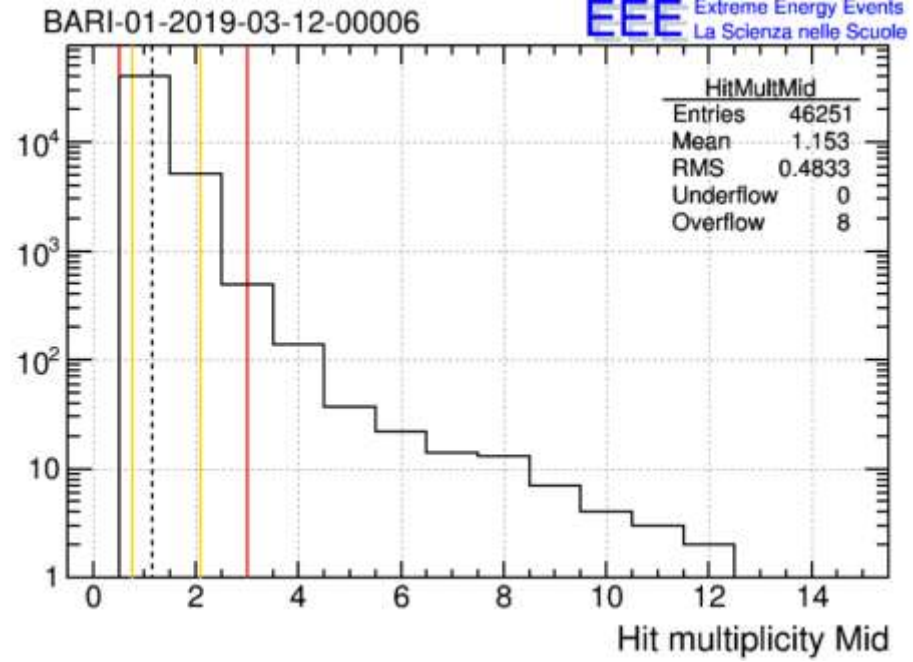
2021

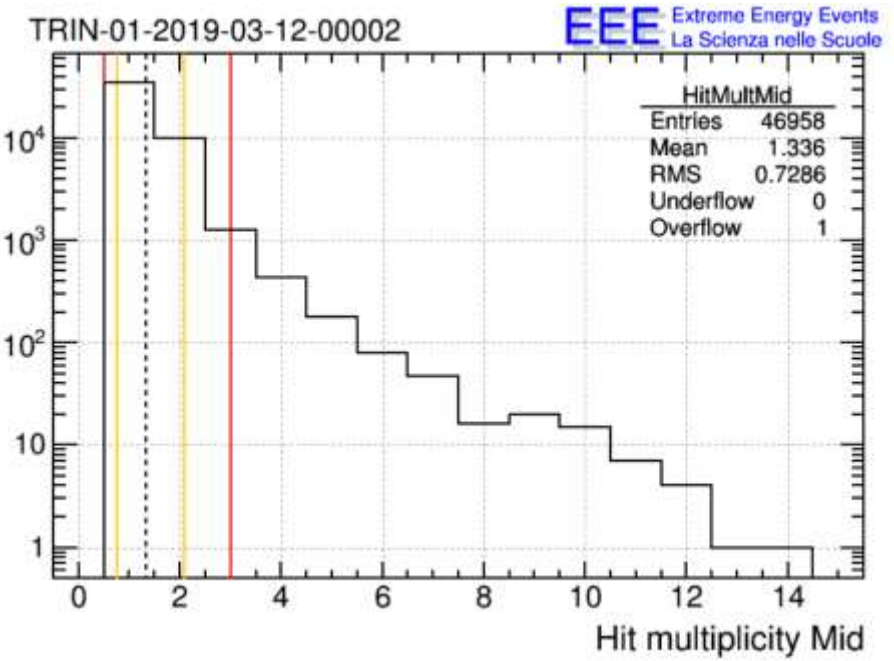

BARI-01-2021-01-25-00007
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultTop
Entries 33270
Mean 1.607
RMS 0.8924
Underflow 0
Overflow 11
Hit multiplicity Top

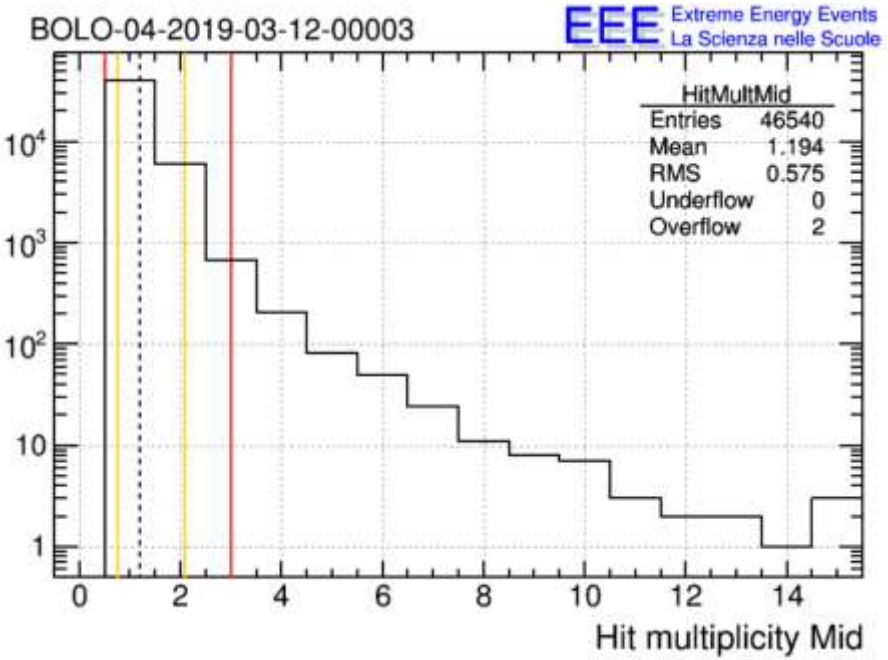

TRIN-01-2021-01-25-00001
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultTop
Entries 46563
Mean 1.918
RMS 0.9953
Underflow 0
Overflow 3
Hit multiplicity Top


MIDDLE CHAMBER

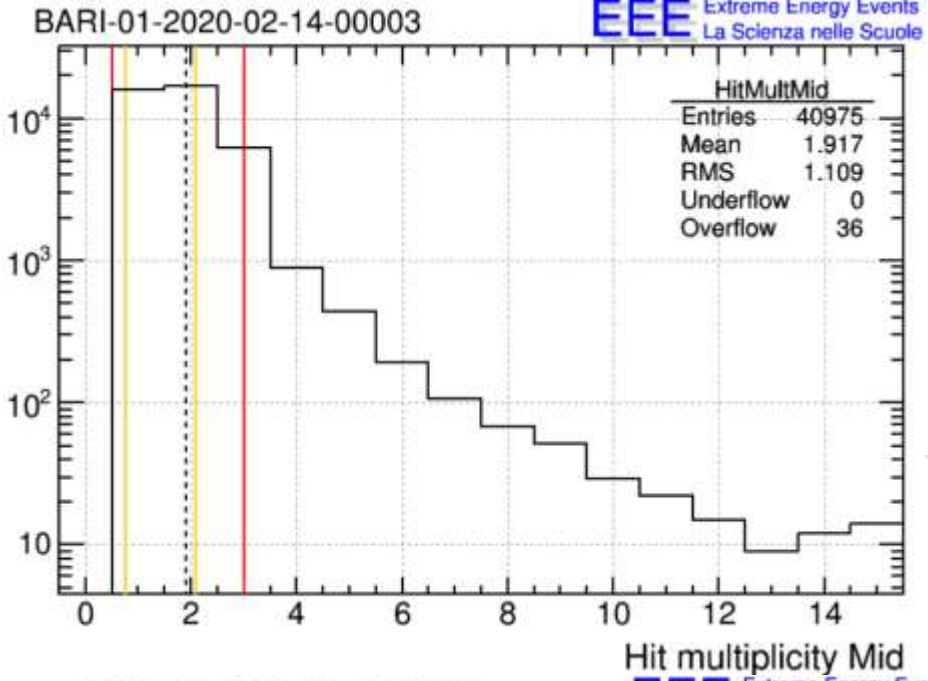
2019

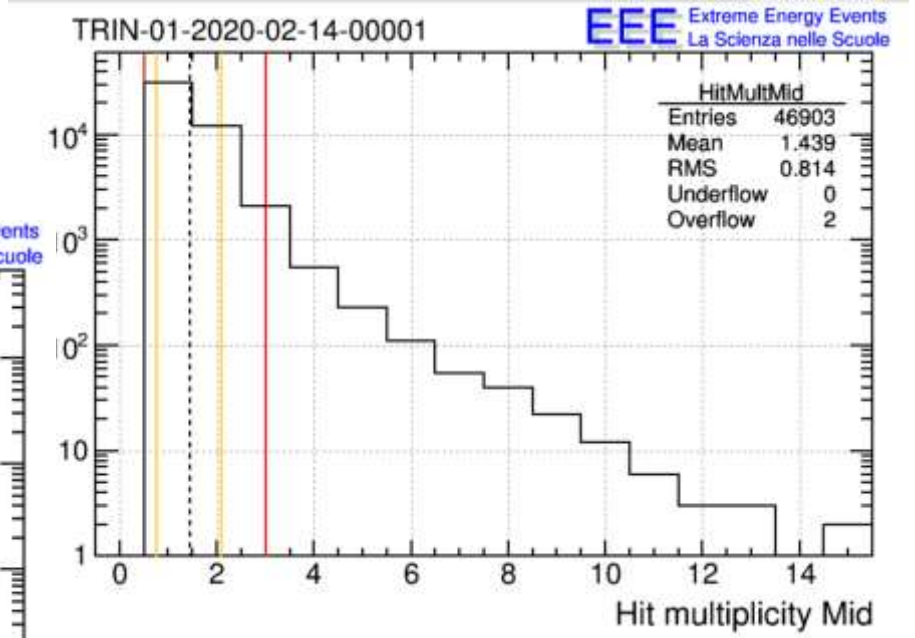

BARI-01-2019-03-12-00006
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 46251
Mean 1.153
RMS 0.4833
Underflow 0
Overflow 8
Hit multiplicity Mid

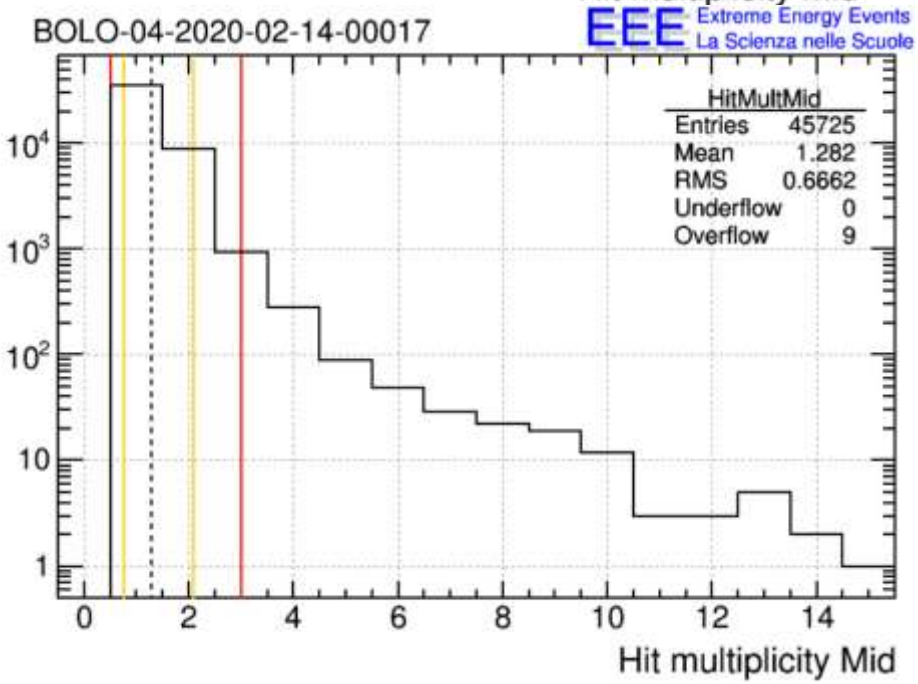

TRIN-01-2019-03-12-00002
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 46958
Mean 1.336
RMS 0.7286
Underflow 0
Overflow 1
Hit multiplicity Mid


BOLO-04-2019-03-12-00003
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 46540
Mean 1.194
RMS 0.575
Underflow 0
Overflow 2
Hit multiplicity Mid

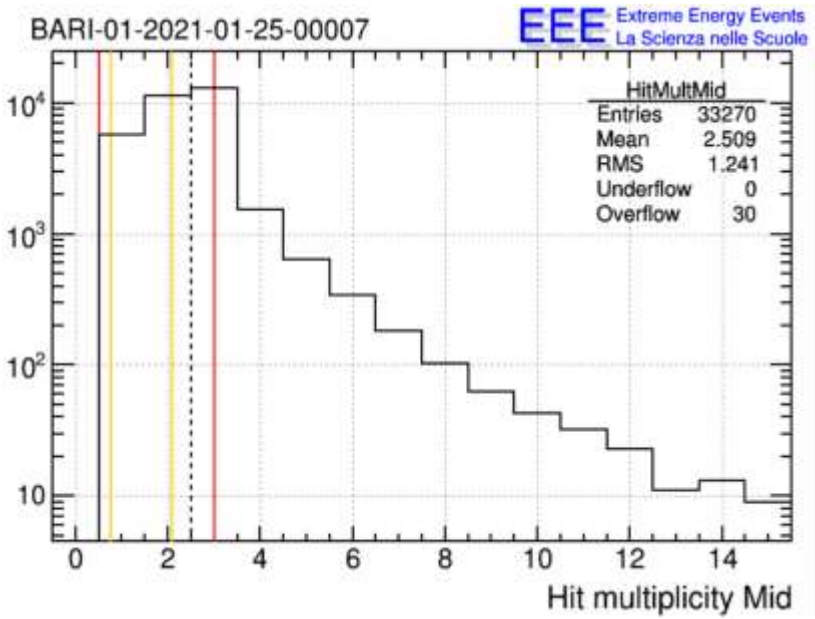
2020

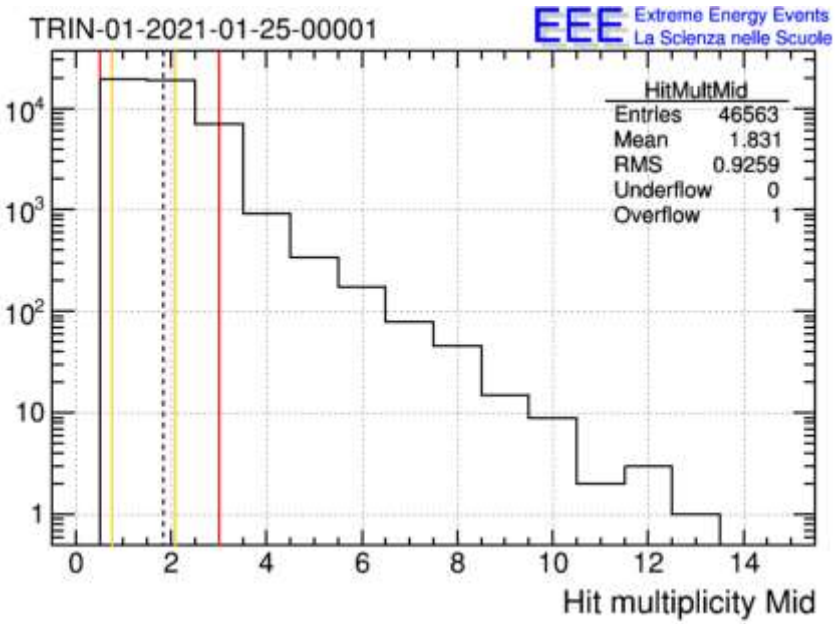

BARI-01-2020-02-14-00003
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 40975
Mean 1.917
RMS 1.109
Underflow 0
Overflow 36
Hit multiplicity Mid

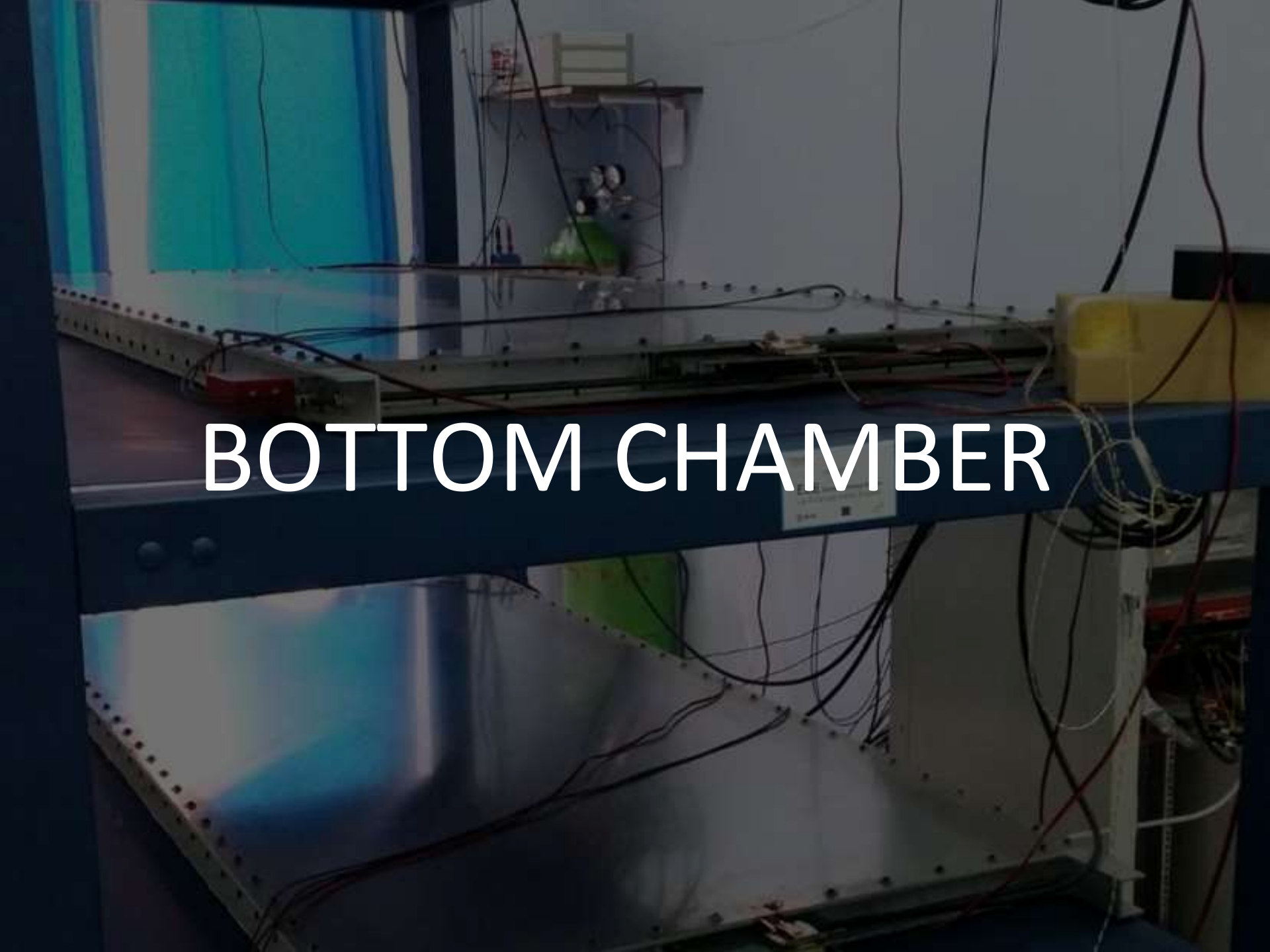

TRIN-01-2020-02-14-00001
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 46903
Mean 1.439
RMS 0.814
Underflow 0
Overflow 2
Hit multiplicity Mid

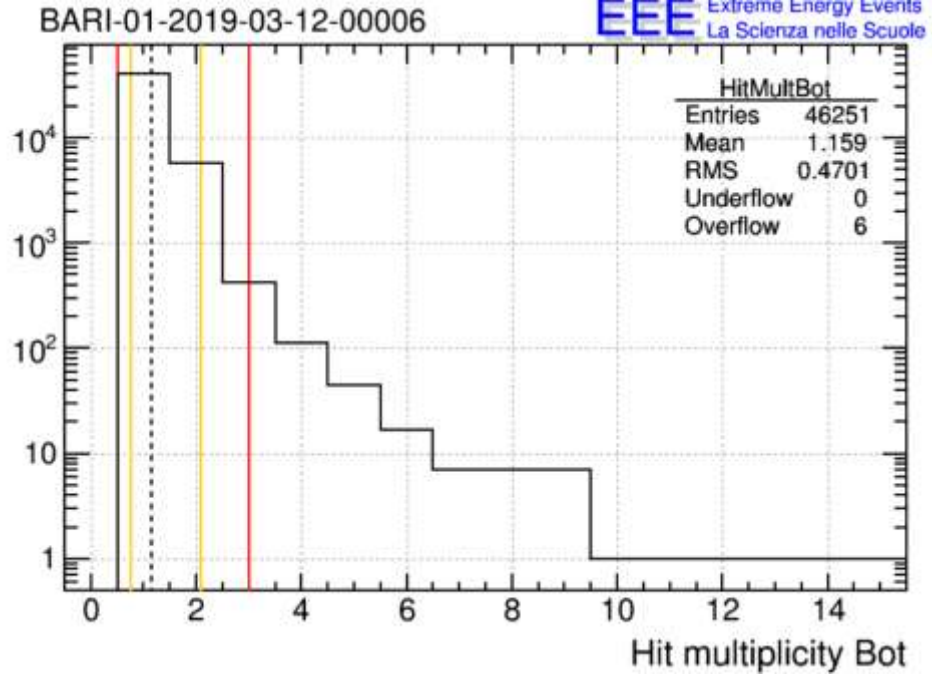

BOLO-04-2020-02-14-00017
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 45725
Mean 1.282
RMS 0.6662
Underflow 0
Overflow 9
Hit multiplicity Mid

2021

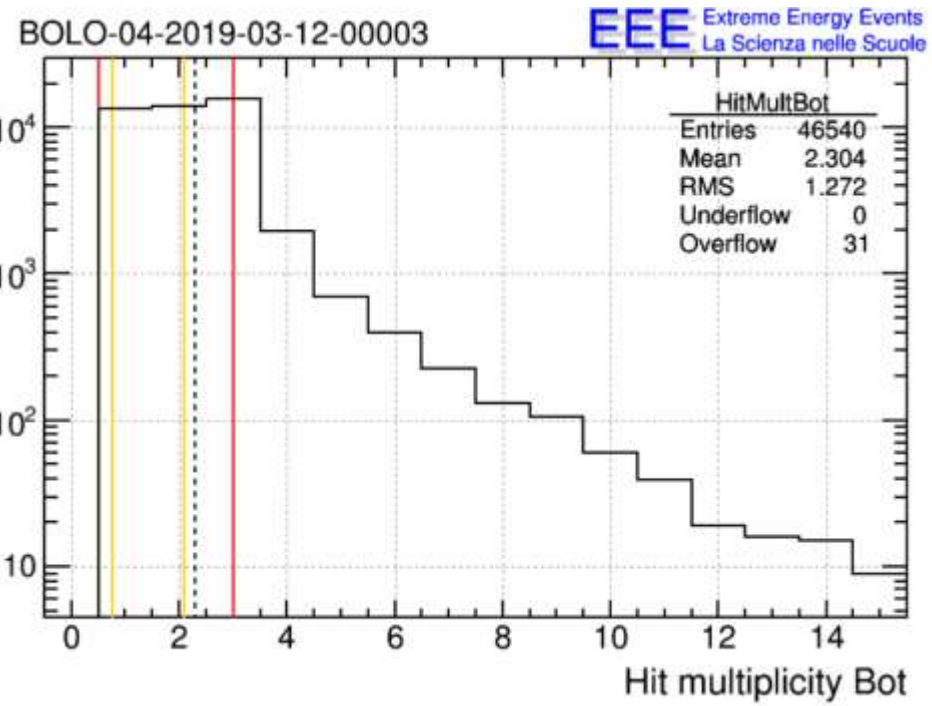

BARI-01-2021-01-25-00007
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 33270
Mean 2.509
RMS 1.241
Underflow 0
Overflow 30
Hit multiplicity Mid

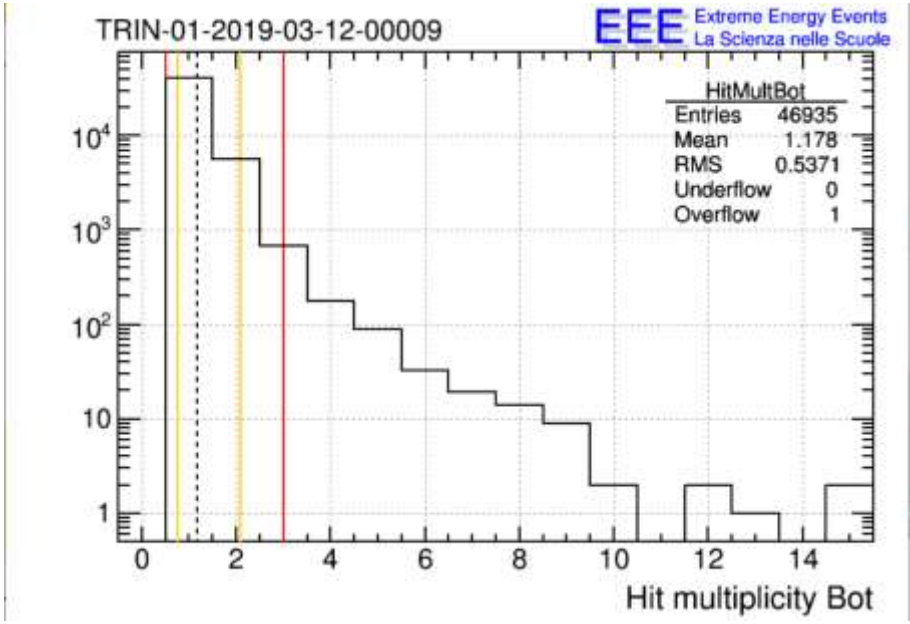

TRIN-01-2021-01-25-00001
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 46563
Mean 1.831
RMS 0.9259
Underflow 0
Overflow 1
Hit multiplicity Mid

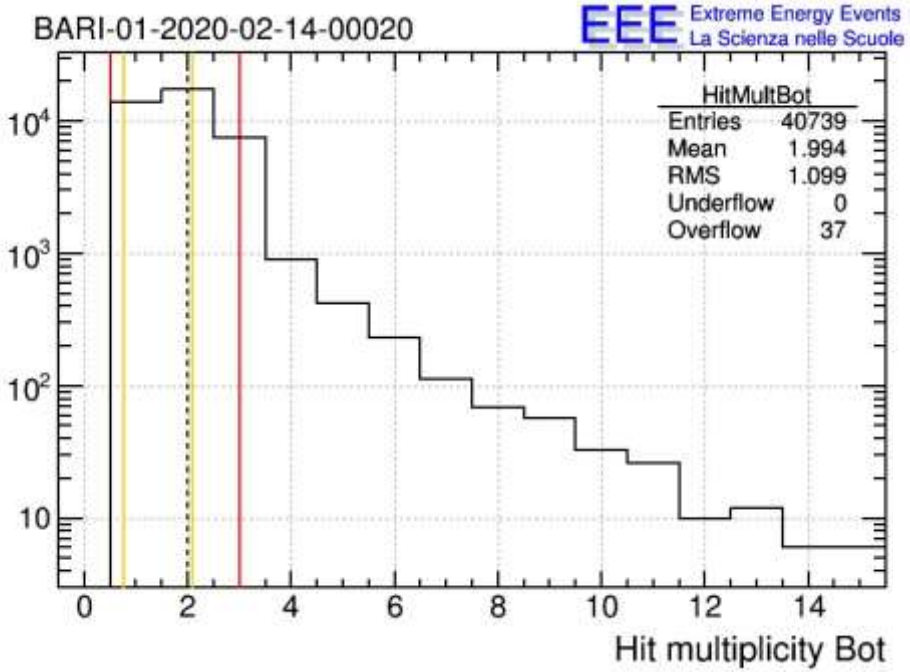

BOTTOM CHAMBER

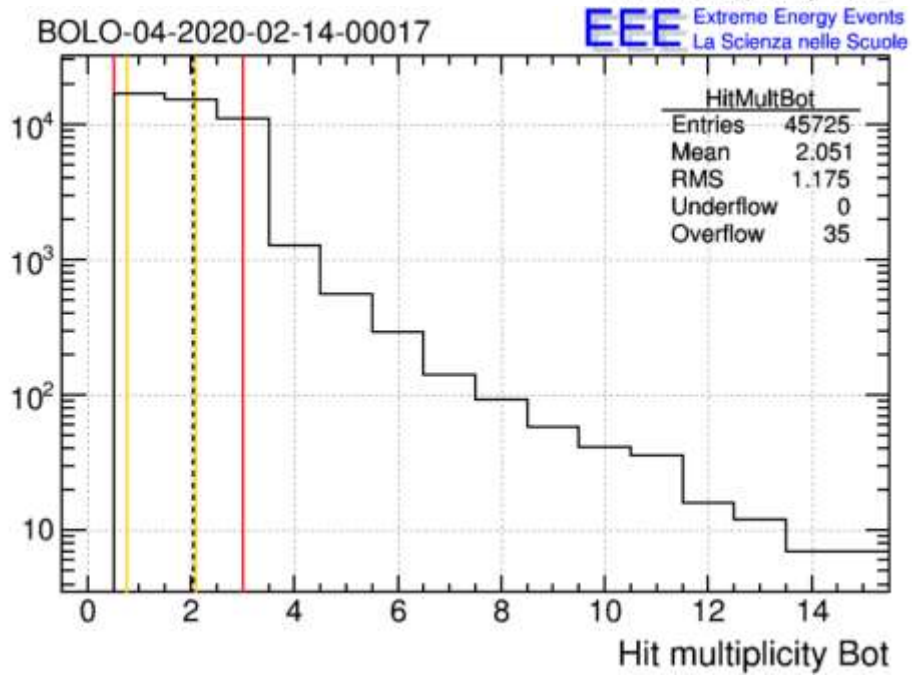

BARI-01-2019-03-12-00006
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 46251
Mean 1.159
RMS 0.4701
Underflow 0
Overflow 6
Hit multiplicity Bot

2019

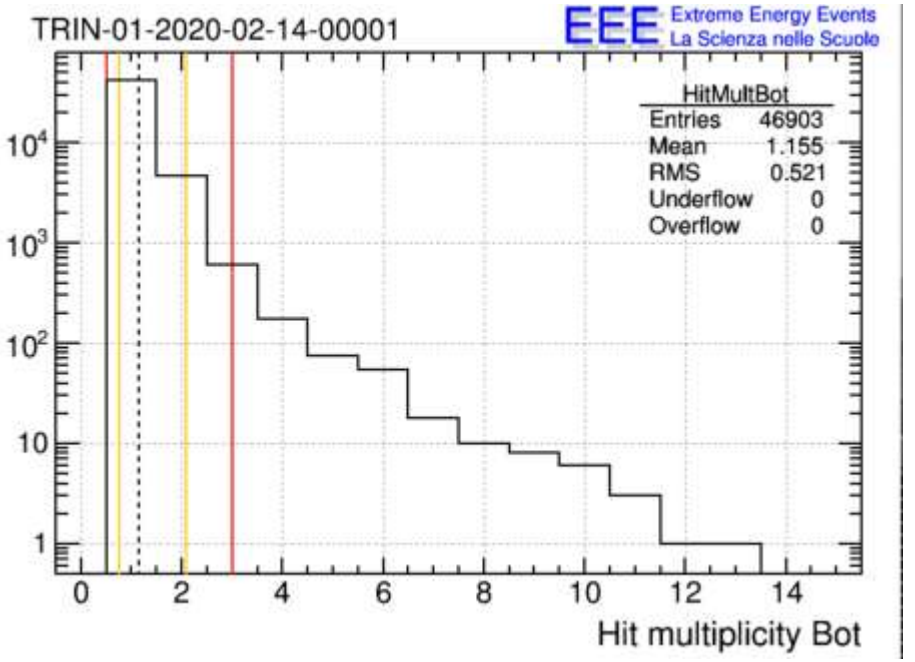

BOLO-04-2019-03-12-00003
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 46540
Mean 2.304
RMS 1.272
Underflow 0
Overflow 31
Hit multiplicity Bot

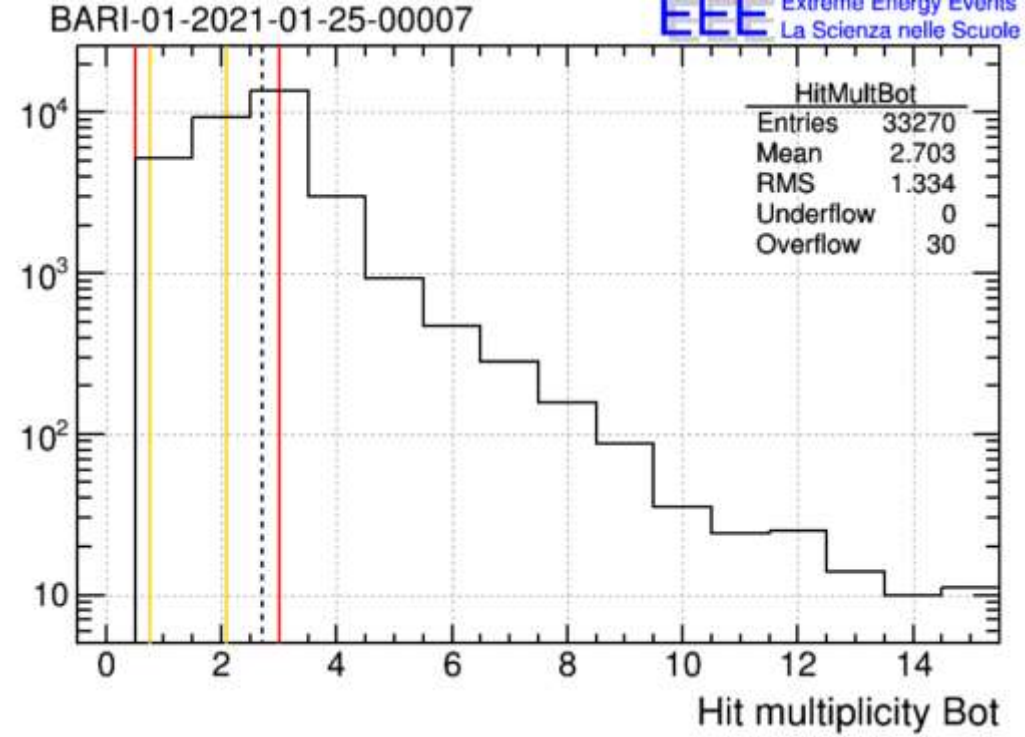

TRIN-01-2019-03-12-00009
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 46935
Mean 1.178
RMS 0.5371
Underflow 0
Overflow 1
Hit multiplicity Bot


BARI-01-2020-02-14-00020
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 40739
Mean 1.994
RMS 1.099
Underflow 0
Overflow 37
Hit multiplicity Bot

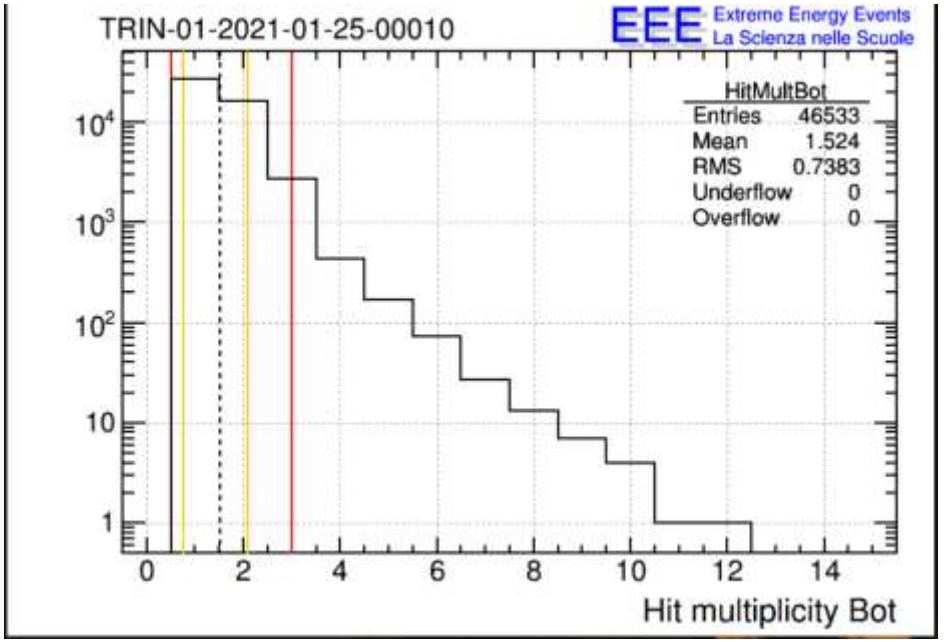

BOLO-04-2020-02-14-00017
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 45725
Mean 2.051
RMS 1.175
Underflow 0
Overflow 35
Hit multiplicity Bot

2020


TRIN-01-2020-02-14-00001
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 46903
Mean 1.155
RMS 0.521
Underflow 0
Overflow 0
Hit multiplicity Bot


BARI-01-2021-01-25-00007
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 33270
Mean 2.703
RMS 1.334
Underflow 0
Overflow 30
Hit multiplicity Bot

2021


TRIN-01-2021-01-25-00010
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 46533
Mean 1.524
RMS 0.7383
Underflow 0
Overflow 0
Hit multiplicity Bot

Consider that...

- In the autumn of 2019 there was a maintenance maneuver aimed at eliminating any gas leaks.
- Since the end of February 2020 the telescopes have been turned off because of the COVID, so it would not have been possible to ensure monitoring and any maintenance.
- In the first months of 2021 only a few telescopes remained on, including Trinitapoli and Bari, so it is worth comparing these two, because the have similar instrumental "ages".
- Here follows a table containing the previous data and additional data not shown in previous graphs for aim of brevity.

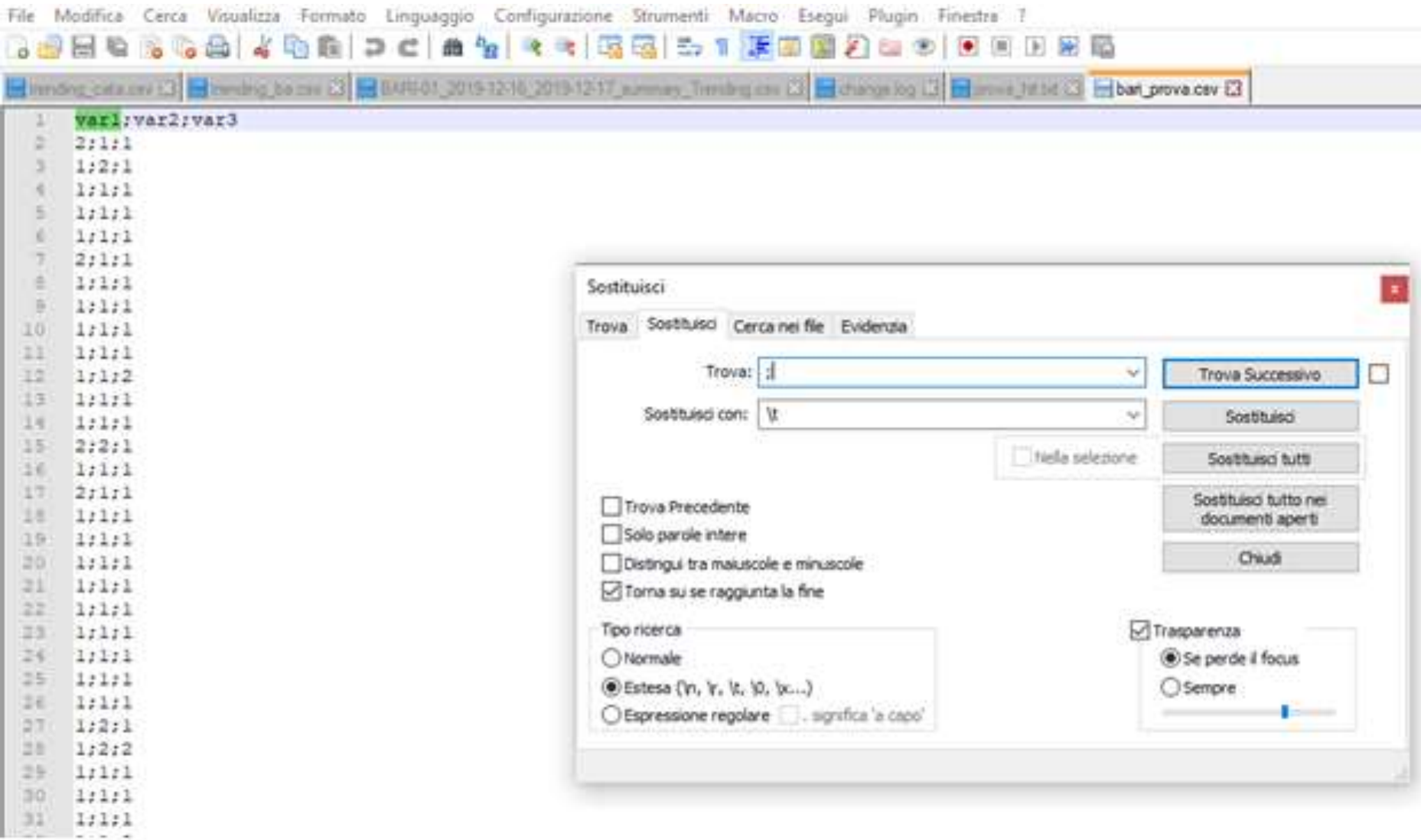
Telescope	data (AAAA/MM/GG)	top chamber		middle chamber		bottom chamber	
		mean	RMS	mean	RMS	mean	RMS
BARI-01	2019-12-03	1,097	0,3945	1,153	0,4833	1,159	0,4701
	2019-04-21	1,082	0,4029	1,158	0,5302	1,135	0,4762
	2019-12-29	1,742	0,9763	1,827	1.04	2,014	2.17
	2020-02-14	1,578	0,9058	1,917	1,109	1,994	1,099
	2020-02-29	1,538	0,8974	1,834	1,078	1,963	1,109
	2021-01-25	1,607	0,8924	2,509	1,241	2,703	1,334
	2021-02-27	2,132	1,022	2,848	1,329	3,153	1,615
	2021-03-15	2,297	1,108	2,854	1,35	3,263	1,735
TRIN-01	2019-12-03	1,28	0,6731	1,336	0,7286	1,178	0,5371
	2019-04-21	1,276	0,7343	1,336	0,7752	1,071	0,3603
	2019-12-29	1,357	0,6921	1,942	1,109	1,08	0,3762
	2020-02-14	1,314	0,7426	1,439	0,814	1,155	0,521
	2020-02-29	1,298	0,7383	1,448	0,839	1,159	0,5336
	2021-01-25	1,918	0,9953	1,831	0,9259	1,524	0,7383
	2021-02-27	1,276	0,7696	1,28	0,743	1,176	0,614
	2021-03-15	1,293	0,7867	1,285	0,7404	1,173	0,5785
BOLO-04	2019-12-03	1,355	0,7198	1,194	0,575	2,304	1,272
	2019-04-21	1,397	0,7537	1,216	0,6015	2,712	1,48
	2019-12-29	1,274	0,661	1,227	0,6079	1,783	1,019
	2020-02-14	1,32	0,7118	5.42	0,6662	1,282	0,6662
	2020-02-29	1,315	0,576	1,278	0,6616	1,966	1,127

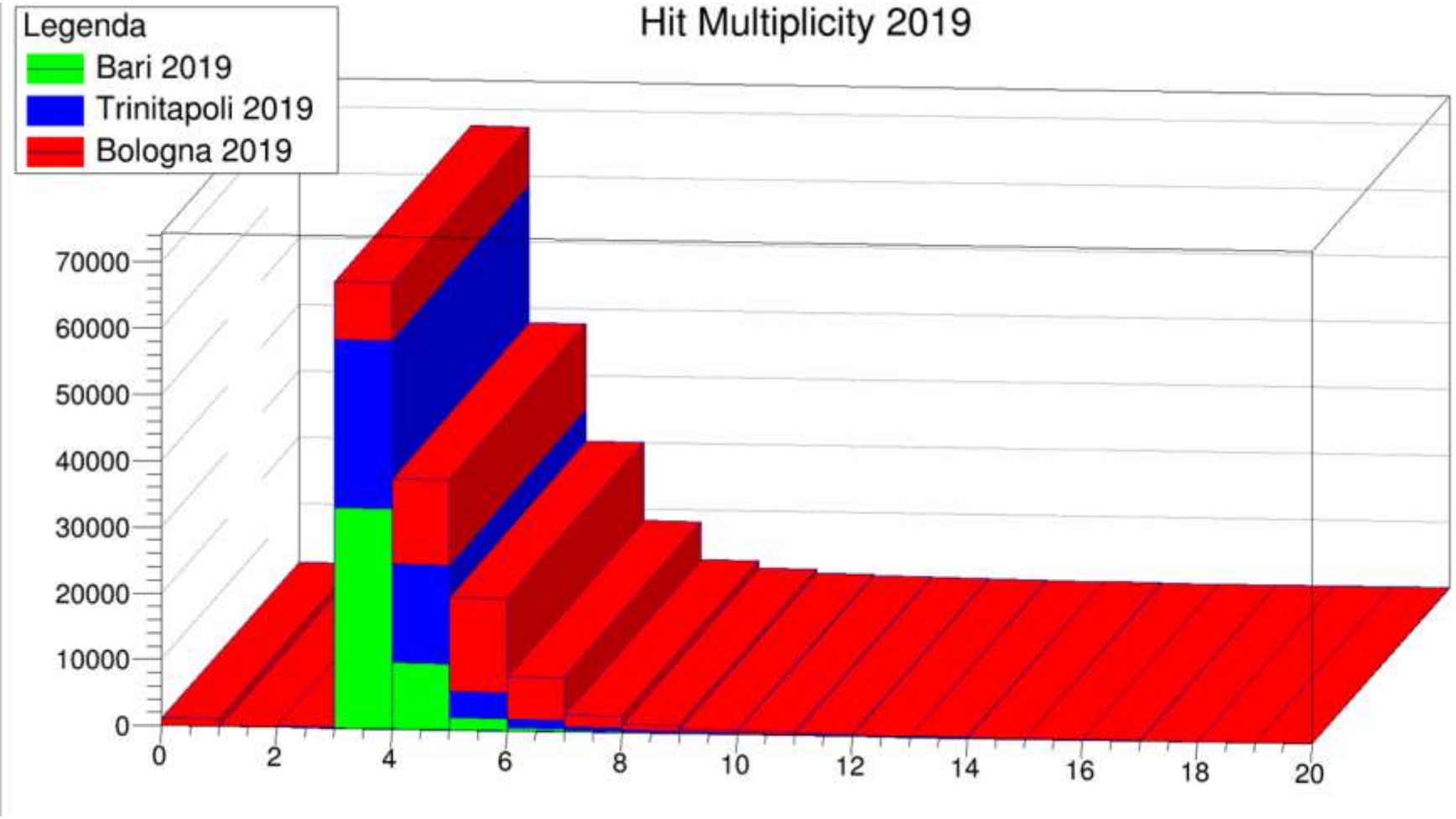

GLOBAL ANALYSIS

THE SOURCE

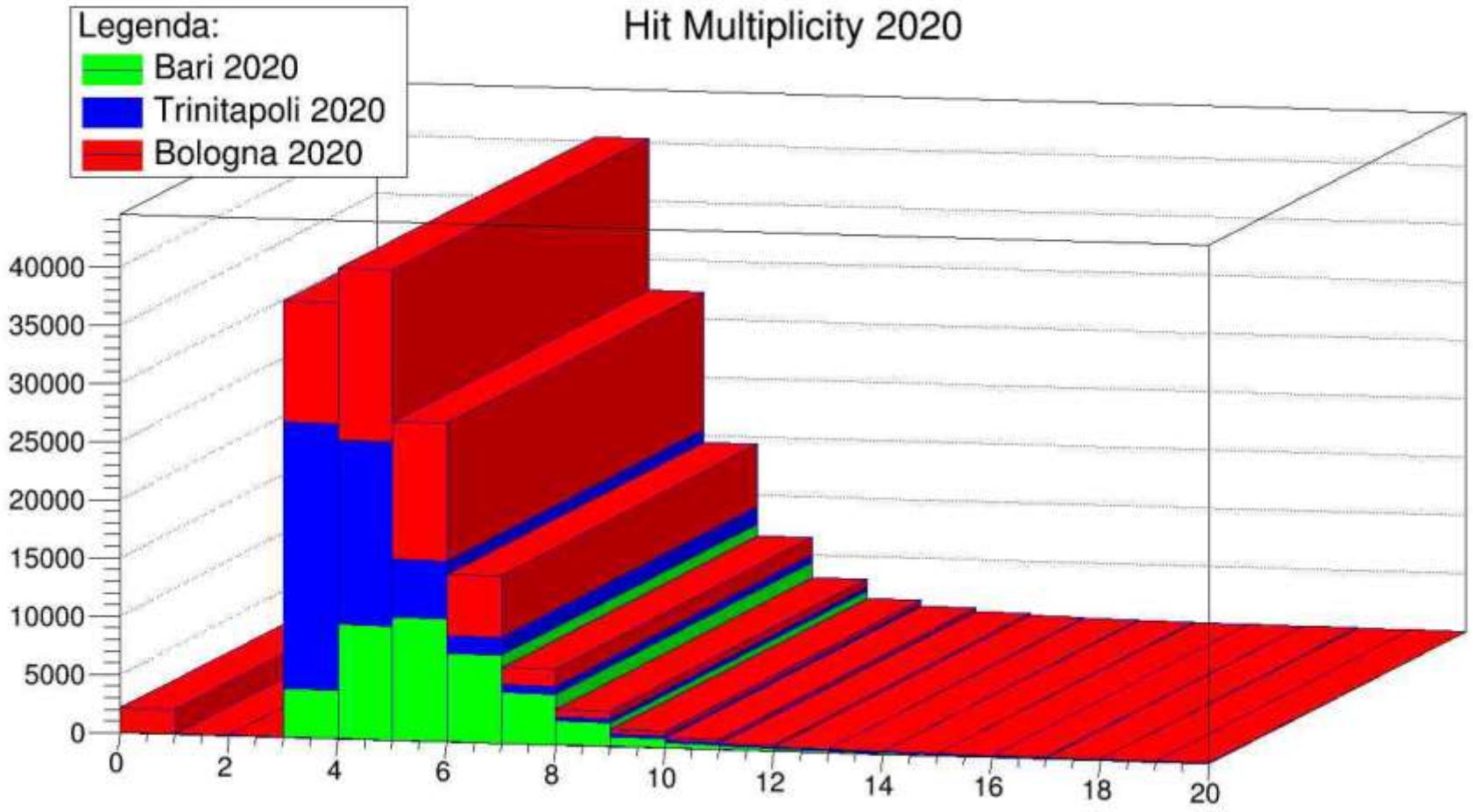
First of all we requested the data we needed from the CNAF in bologna, which sent them to us in text format files (txt format). Since we had a huge amount of superfluous data (related to other variables) we performed a job of cleaning and sorting the data.

The Use of Notepad ++ to obtain a CSV file with tabulated DATA

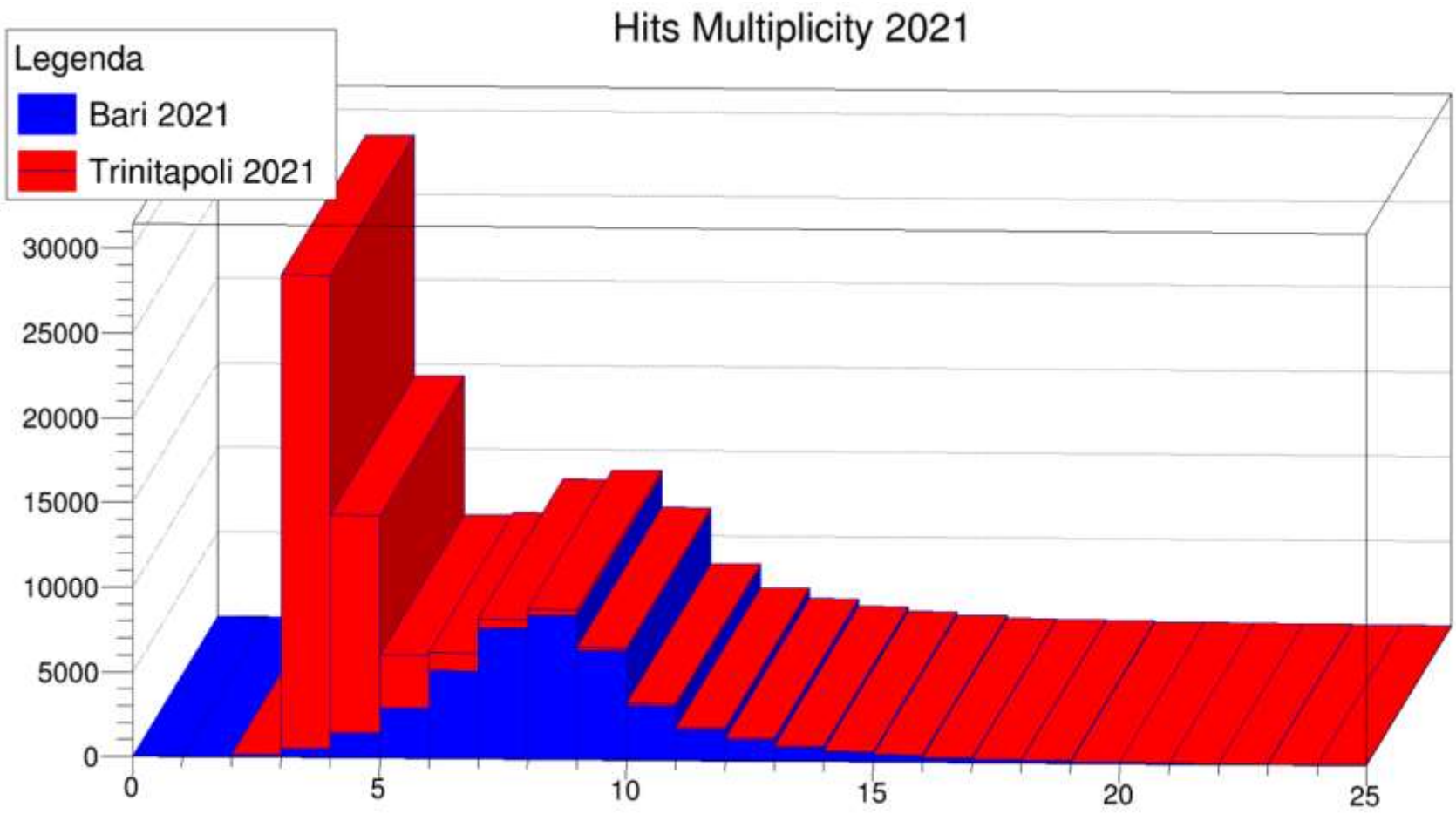




Here we took some data (2019-03-12) from the Top, Middle and Bottom Chamber from every telescope and we drew a 3D histogram. The best value for the telescopes would be a peak on the number 3 on the x axis, as it is drawn on this graphic.



This is the 2020-02-14 histogram of the three telescopes.



As you can see, we did the same work for 2021-01-25 data. Unfortunately, the telescope in Bologna was not working during this period, so we drew a histogram only with these two telescopes.

The code:

```
void HitsMultiplicity2019 ()
{
const char *nomefile1="bari2019_global.csv";
const char *nomefile2="trin2019_global.csv";
const char *nomefile3="bolo2019_global.csv";

fstream file1 (nomefile1, ios::in);
fstream file2 (nomefile2, ios::in);
fstream file3 (nomefile3, ios::in);

string variabile1, variabile2, variabile3;

file1>>variabile1>>variabile2>>variabile3;
file2>>variabile1>>variabile2>>variabile3;
file3>>variabile1>>variabile2>>variabile3;

Float_t x[100000], y[100000], z[100000], s[100000];

Int_t n, m, l;
```

Now let's focus on the first part of the code we have used to draw the histograms. This code reads the three files and for every file it adds the data about hits from the three chambers.

```
THStack *hs2 = new THStack ("hs2", "");

while (file1>>x[n]>>y[n]>>z[n]) n++;
TH1D *hist1 = new TH1D("Histogram 1", "Bari Global", 20, 0, 20);
for (Int_t i=0; i<n;i++)
{
s[i]=x[i]+y[i]+z[i];
hist1->Fill(s[i]);
}
hist1->SetFillColor(kGreen);
hs2->Add(hist1);

while (file2>>x[m]>>y[m]>>z[m]) m++;
TH1D *hist2 = new TH1D("Histogram 2 ", "Trin Global", 20, 0, 20);
for (Int_t q=0; q<m; q++)
{
s[q]=x[q]+y[q]+z[q];
hist2->Fill(s[q]);
}
hist2->SetFillColor(kBlue);
hs2->Add(hist2);

while (file3>>x[l]>>y[l]>>z[l]) l++;
TH1D *hist3 = new TH1D("Histogram 3 ", "Bolo Global", 20, 0, 20);
for (Int_t d=0; d<l; d++)
{
s[d]=x[d]+y[d]+z[d];
hist3->Fill(s[d]);
}
hist3->SetFillColor(kRed);
hs2->Add (hist3);
```

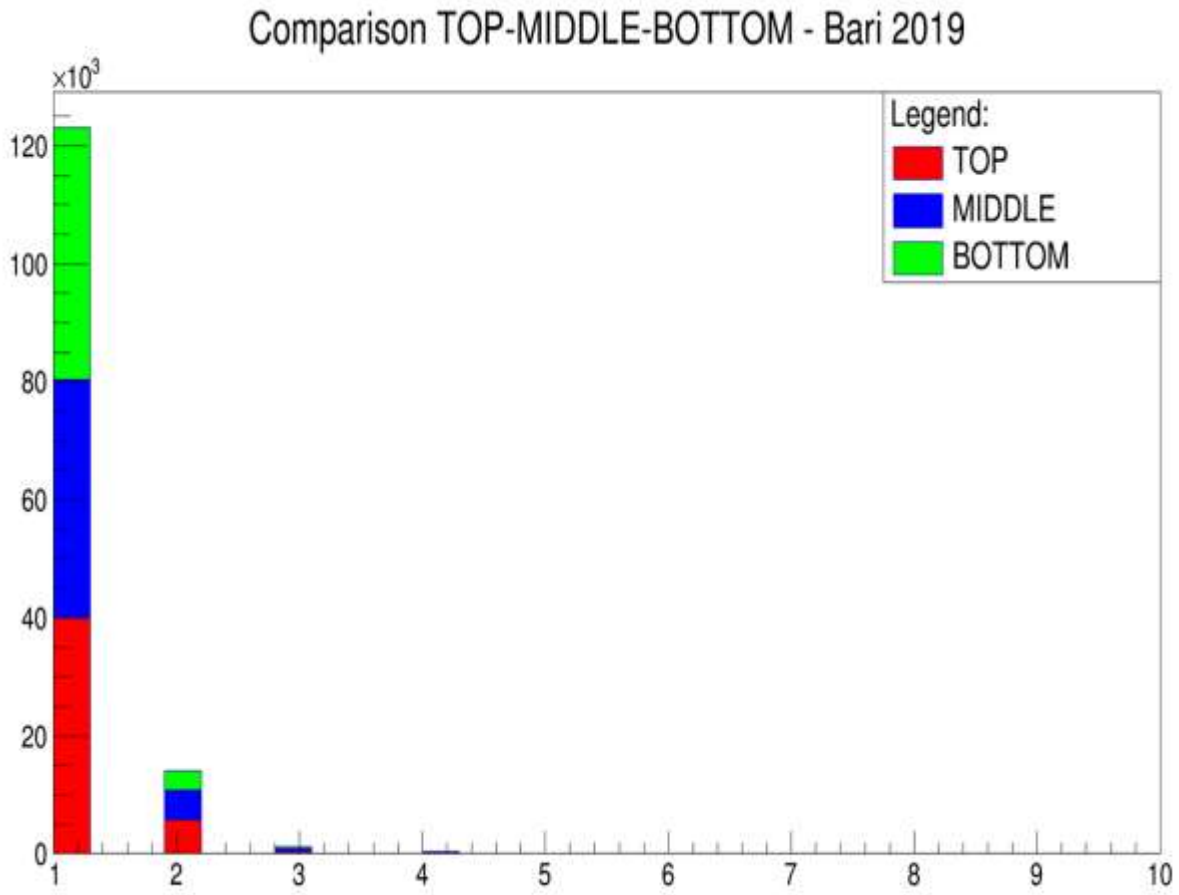
In the second part of the code, the program draws a histogram for each telescope and then it combines the three histograms into a stack.

```
auto leg= new TLegend(.1,.7,.3,.9, "Legenda");
leg->SetFillColor(0);
leg->AddEntry (hist1, "Bari 2019");
leg->AddEntry (hist2, "Trinitapoli 2019");
leg->AddEntry (hist3, "Bologna 2019");

TCanvas *cs2= new TCanvas("cs2", "cs2", 10, 10, 700, 900);
TText T; T.SetTextFont (42); T.SetTextAlign (21);
cs2->cd(1);
hs2->Draw("lego1");
leg->Draw("same");
T.DrawTextNDC(.5,.95, "Hit Multiplicity 2019");

return 0;
}
```

The third and last part of the code explains how we drew the legend for the histogram.

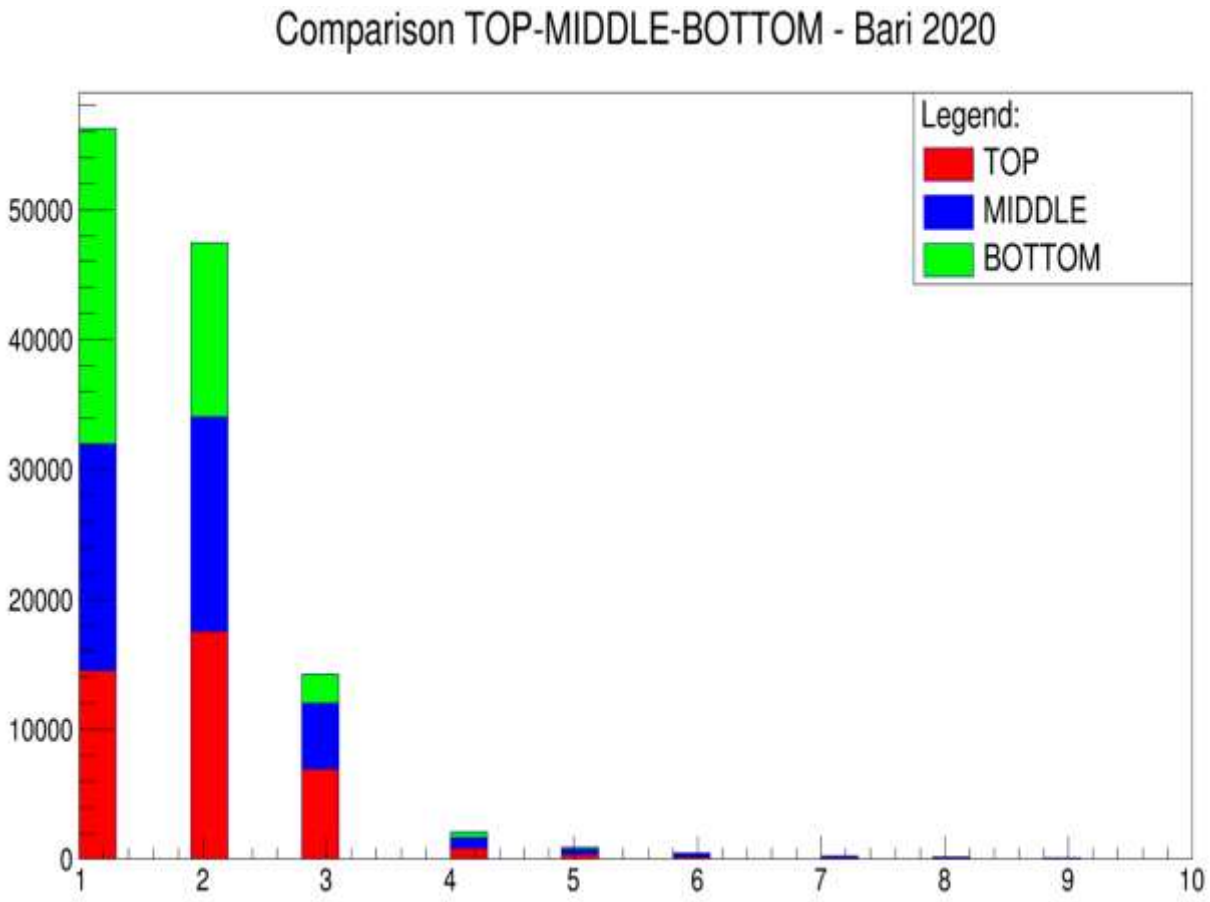
THREE CHAMBERS ANALYSIS

2019



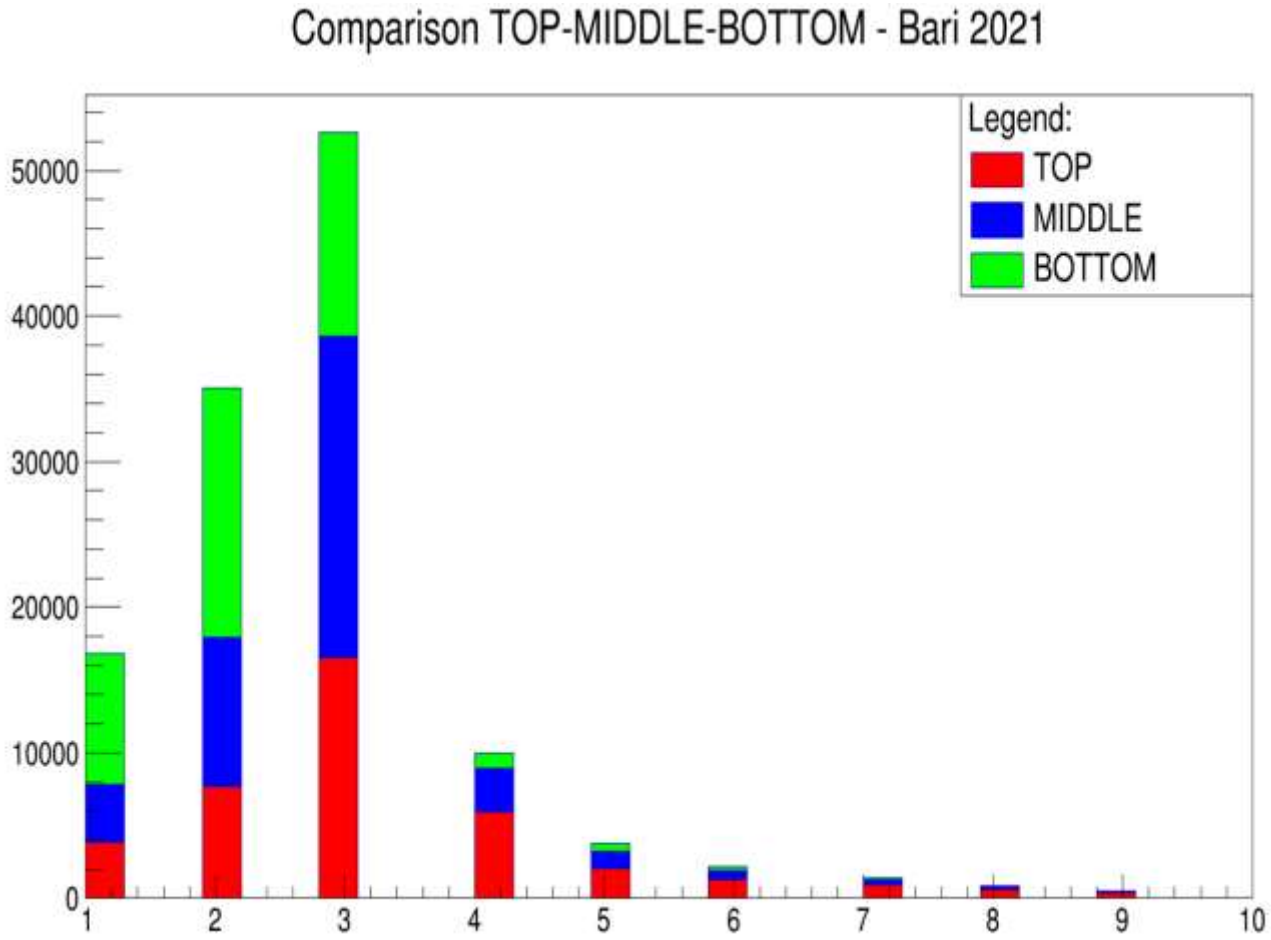
Here we took some data from the Top, Middle and Bottom Chamber from Bari-01 telescope relating to 2019-03-12 and we drew a histogram.

2020



This is the 2020-02-14 histogram of the three chambers.

2021



This is the 2021-01-25 histogram of the three chambers

```
#include "TLegend.h"

void bari2021() {
  const char *nomeFile1 = "bari2021_top.csv";
  const char *nomeFile2 = "bari2021_middle.csv";
  const char *nomeFile3 = "bari2021_bottom.csv";
  fstream file1(nomeFile1, ios::in);
  fstream file2(nomeFile2, ios::in);
  fstream file3(nomeFile3, ios::in);
  string var1;
  string var2;
  string var3;
  file1 >> var1;
  file2 >> var2;
  file3 >> var2;
  Float_t x[100000];
  Float_t y[100000];
  Float_t z[100000];
  Int_t n = 0;
  Int_t m = 0;
  Int_t r = 0;
```

At the begin of the code we drew the histograms. This code reads the three files and for every file it adds together the data from the three chambers.

```
THStack *hs = new THStack("hs","");
while(file1 >> x[n]) n++;
TH1F *hist1 = new TH1F("Histogram1", "My Title", 30, 1 , 10);
for(Int_t i=0; i<n; i++) hist1 -> Fill(x[i]);  endl;
hist1->SetFillColor(kRed);
hs->Add(hist1);
while(file2 >> y[m]) m++;
TH1F *hist2 = new TH1F("Histogram2", "My Title", 30, 1 , 10);
for(Int_t j=0; j<m; j++) hist2 -> Fill(y[j]);  endl;
hist2->SetFillColor(kBlue);
hs->Add(hist2);
while(file3 >> z[r]) r++;
TH1F *hist3 = new TH1F("Histogram3", "My Title", 30, 1, 10);
for(Int_t g=0; g<r; g++) hist3 -> Fill(z[g]);  endl;
hist3->SetFillColor(kGreen);
hs->Add(hist3);

TCanvas *cs = new TCanvas("cs","cs",10,10,900,900);
TText T; T.SetTextFont(42);  T.SetTextAlign(21);
cs->cd(1); hs->Draw();
T.DrawTextNDC(.5,.95,"Comparison TOP-MIDDLE-BOTTOM - Bari 2021");
```

In the middle part of the code, the program draws a histogram for each telescope and then it combines the three histograms into one.

```
TLegend leg(.9,.7,.7,.9,"Legend:");
leg.SetFillColor(0);
leg.AddEntry(hist1,"TOP","f");
leg.AddEntry(hist2,"MIDDLE","f");
leg.AddEntry(hist3,"BOTTOM","f");
leg.DrawClone("Same");
return cs;}
```

In the final part of the code it's explained how we drew the legend for the histogram.

OBSERVATIONS ON ROOT'S RESULTS

Observing the histograms obtained, it is possible to note that the tendency to increase the multiplicity of hits was general and also involved the other two telescopes considered.
This work allowed us to notice this aspect with an immediate and clear visual impact.

CONCLUSIONS

Comparing with TRIN-01 and BOLO-04, we can easily spot that in the Top Chamber of BARI-01 telescope the hit multiplicity rate swings and generally tends to rise in the months of February and March 2021. In the Middle Chamber the average value was fluctuating between relatively acceptable values in 2019, with a visible worsening starting from 2020. For the Bottom Chamber we see a noticeable worsening in February/March 2021, when the average reached a value higher than 3.

The students:

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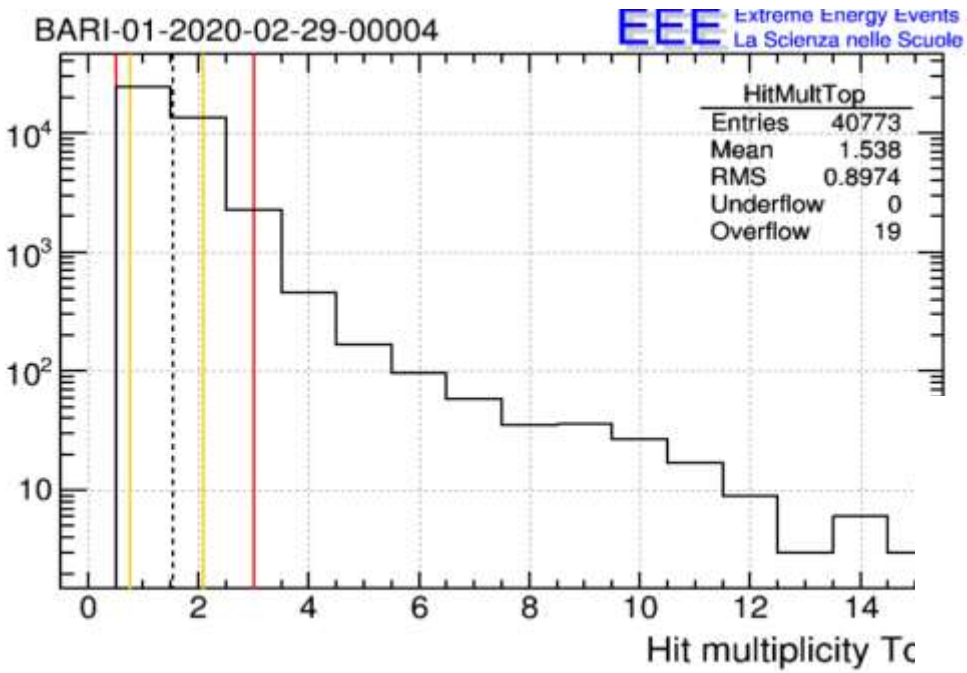
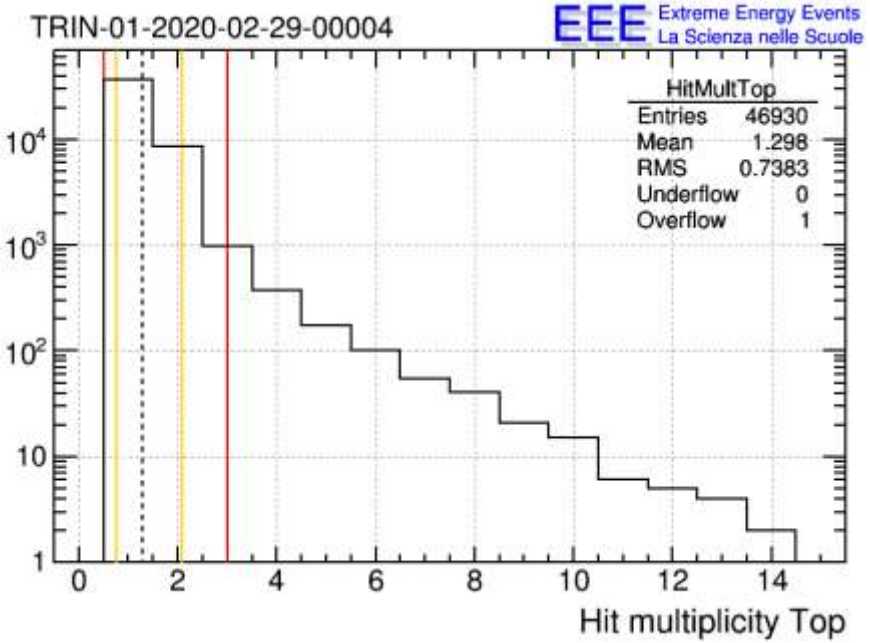
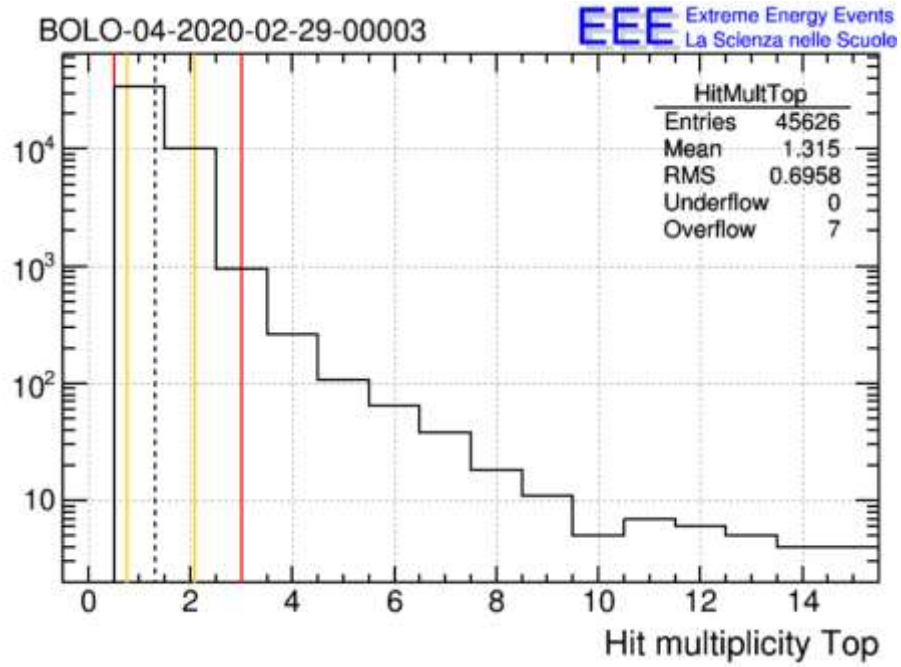
TEAM EEE- Liceo Scientifico «A.Scacchi» Bari

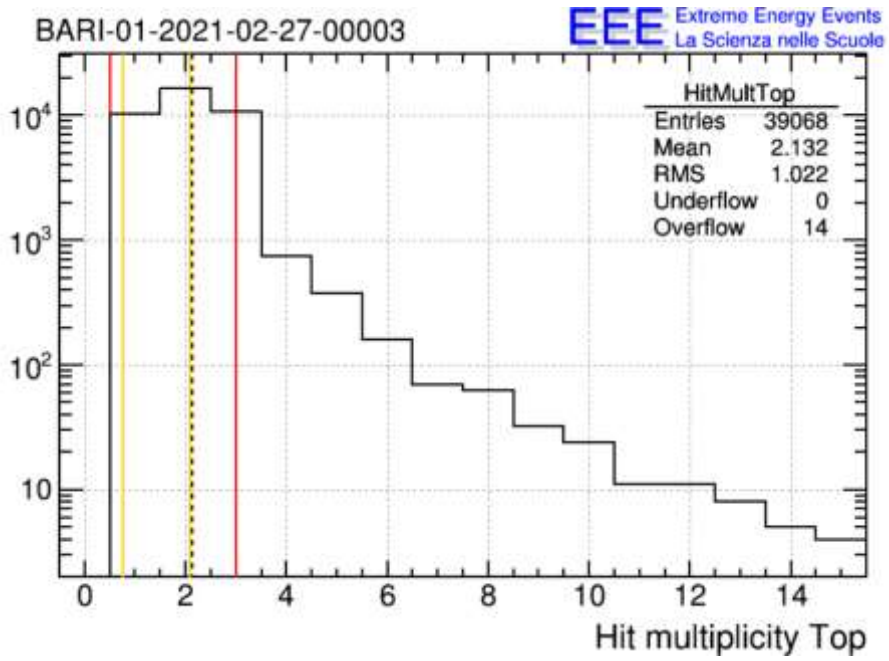
LICEO SCIENTIFICO STATALE
"Arcangelo Scacchi"

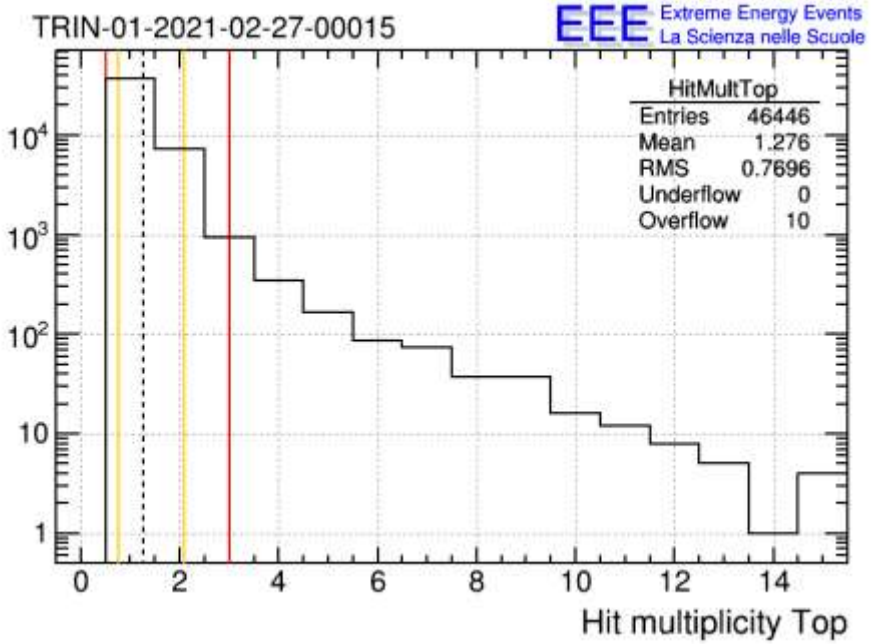
Additional Slides

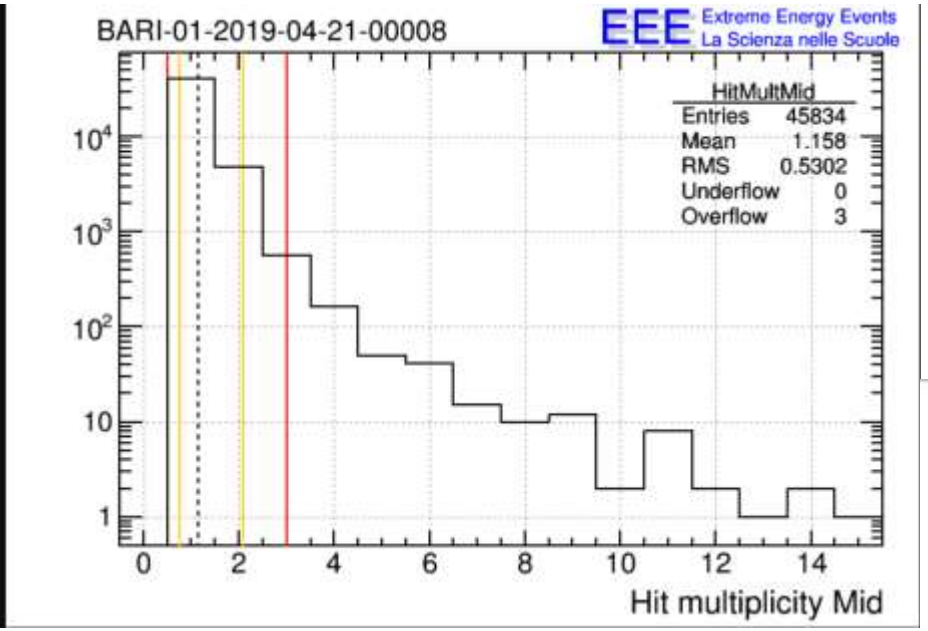

BARI-01-2020-02-29-00004
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultTop
Entries 40773
Mean 1.538
RMS 0.8974
Underflow 0
Overflow 19
Hit multiplicity To

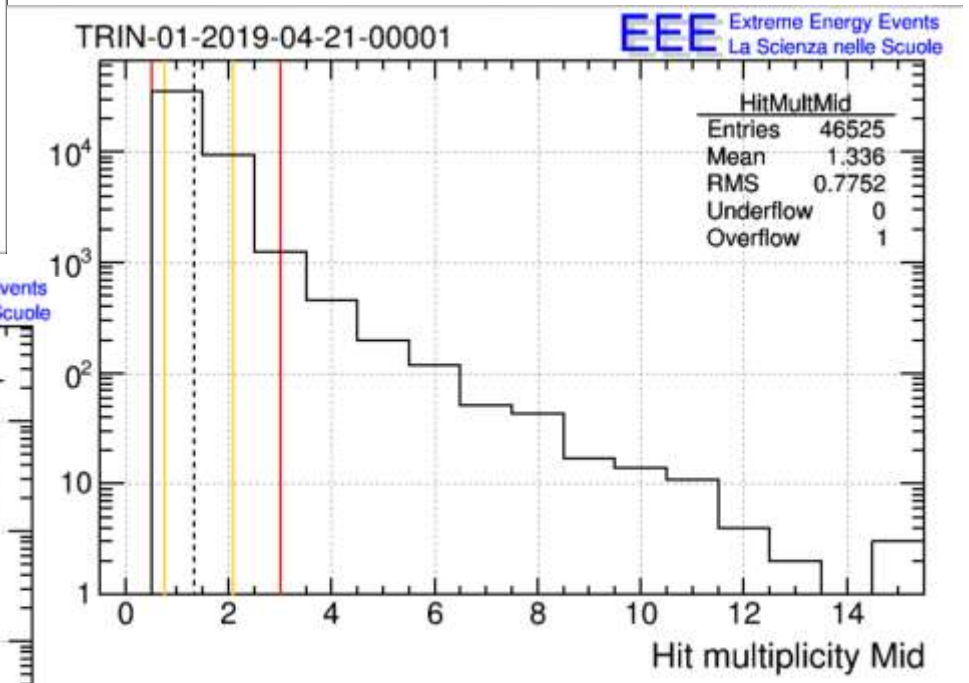

TRIN-01-2020-02-29-00004
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultTop
Entries 46930
Mean 1.298
RMS 0.7383
Underflow 0
Overflow 1
Hit multiplicity Top

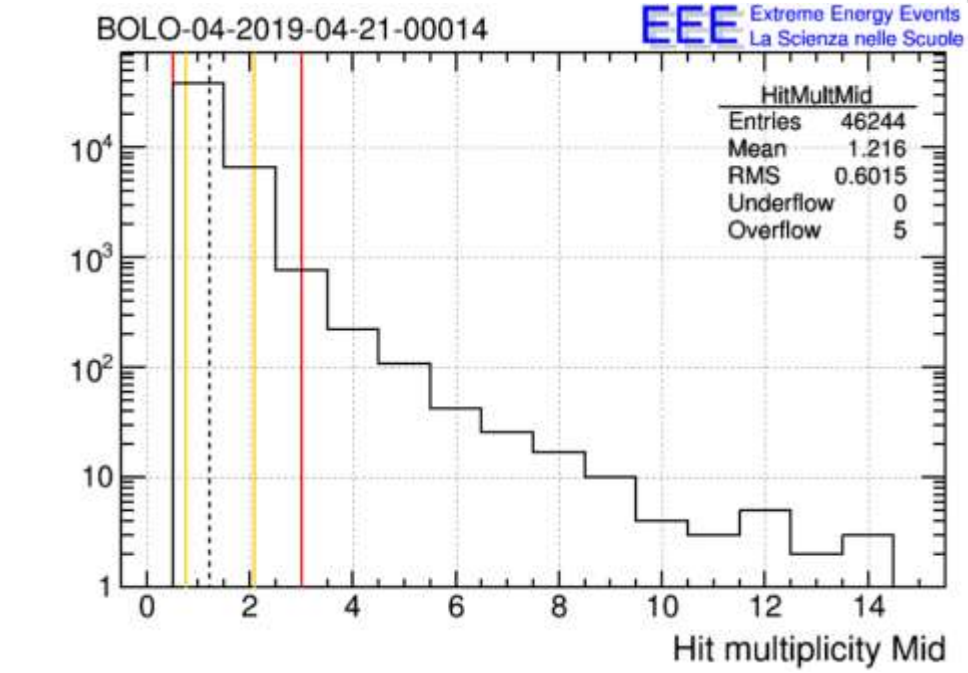

BOLO-04-2020-02-29-00003
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultTop
Entries 45626
Mean 1.315
RMS 0.6958
Underflow 0
Overflow 7
Hit multiplicity Top

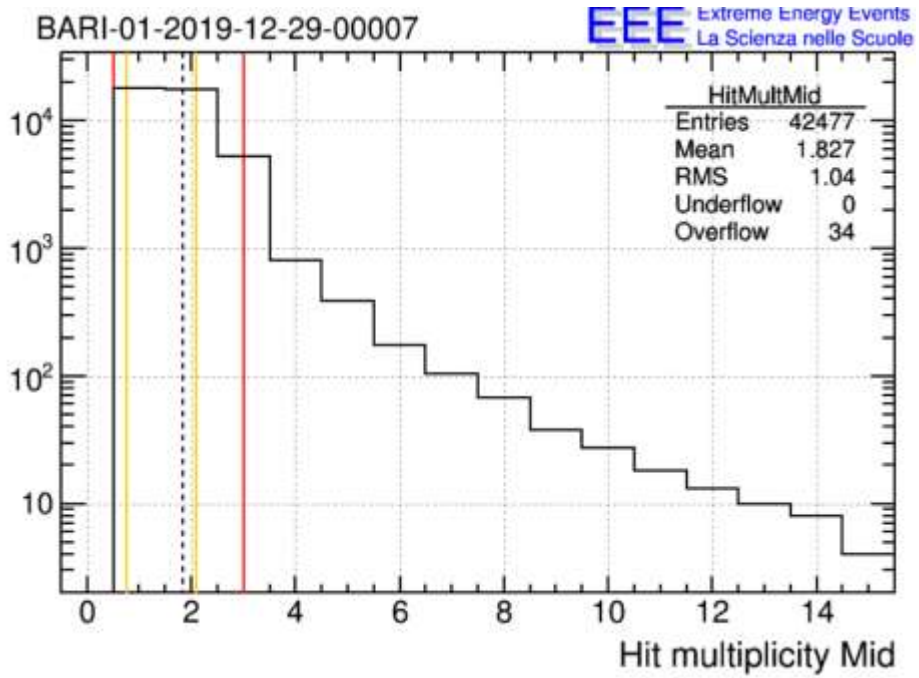

BARI-01-2021-02-27-00003
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultTop
Entries 39068
Mean 2.132
RMS 1.022
Underflow 0
Overflow 14
Hit multiplicity Top

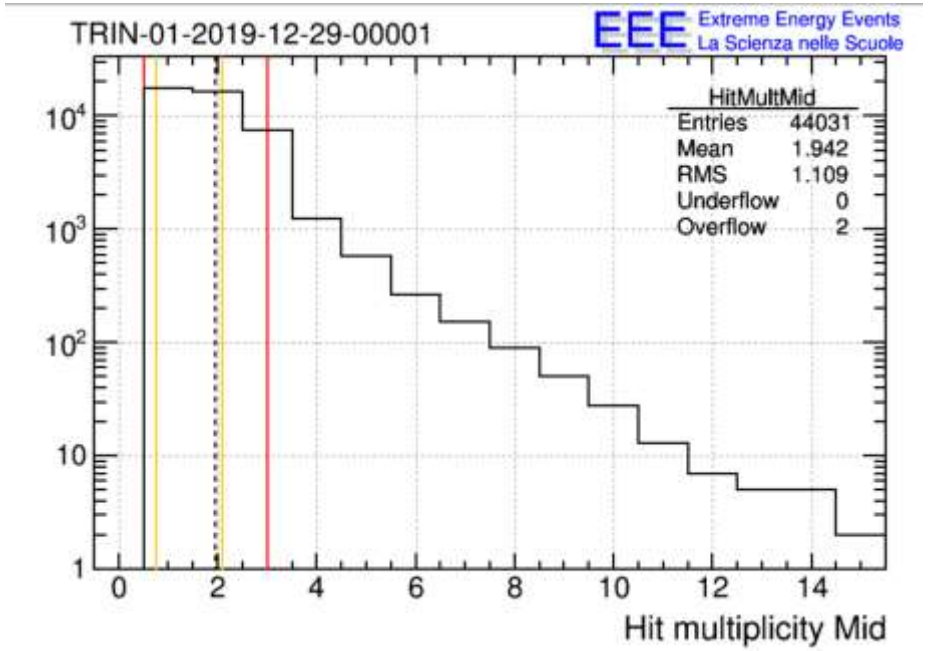

TRIN-01-2021-02-27-00015
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultTop
Entries 46446
Mean 1.276
RMS 0.7696
Underflow 0
Overflow 10
Hit multiplicity Top

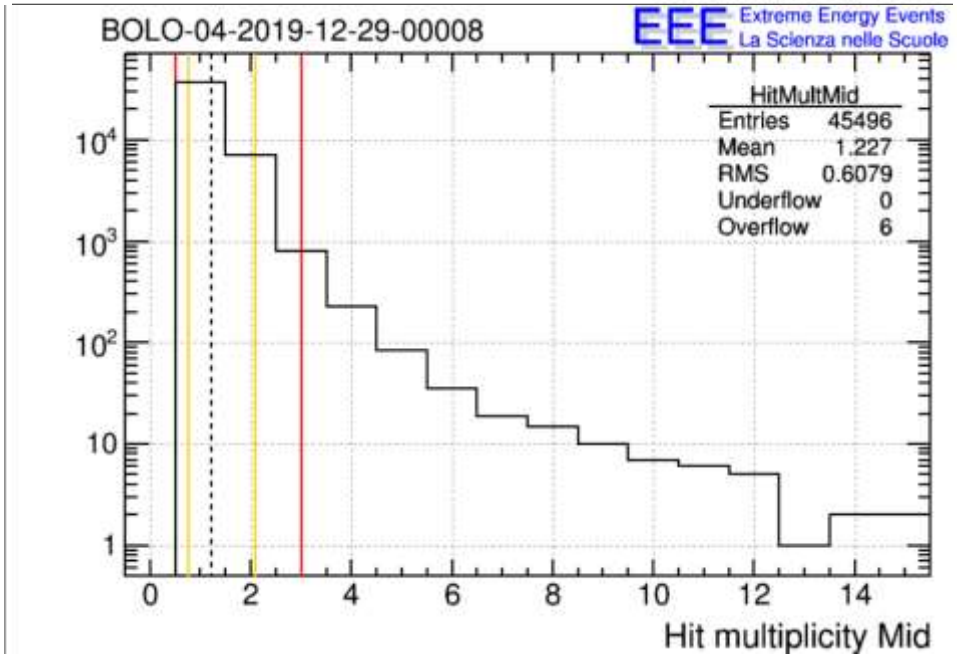

BARI-01-2019-04-21-00008
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 45834
Mean 1.158
RMS 0.5302
Underflow 0
Overflow 3
Hit multiplicity Mid

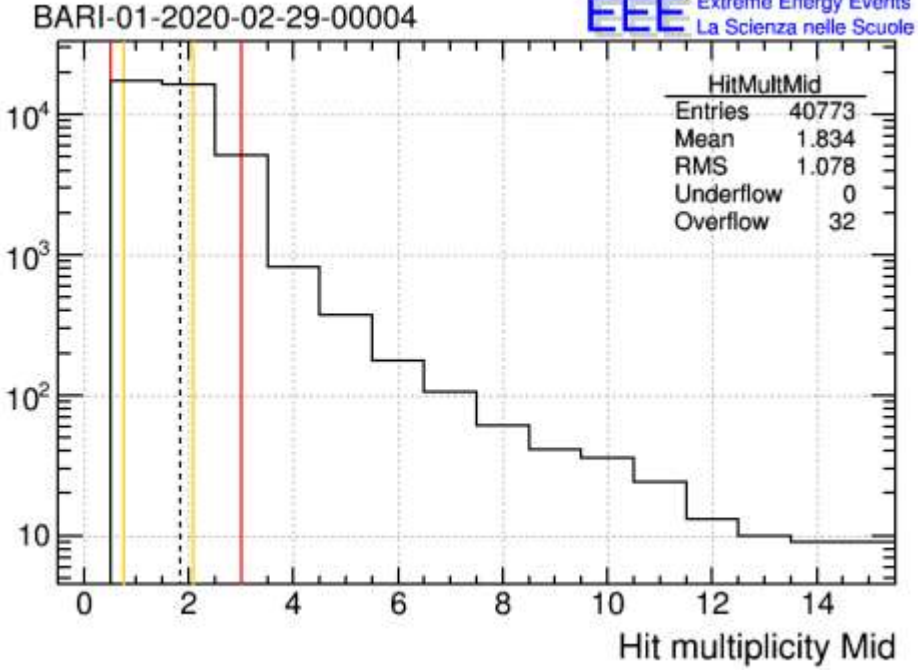

TRIN-01-2019-04-21-00001
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 46525
Mean 1.336
RMS 0.7752
Underflow 0
Overflow 1
Hit multiplicity Mid

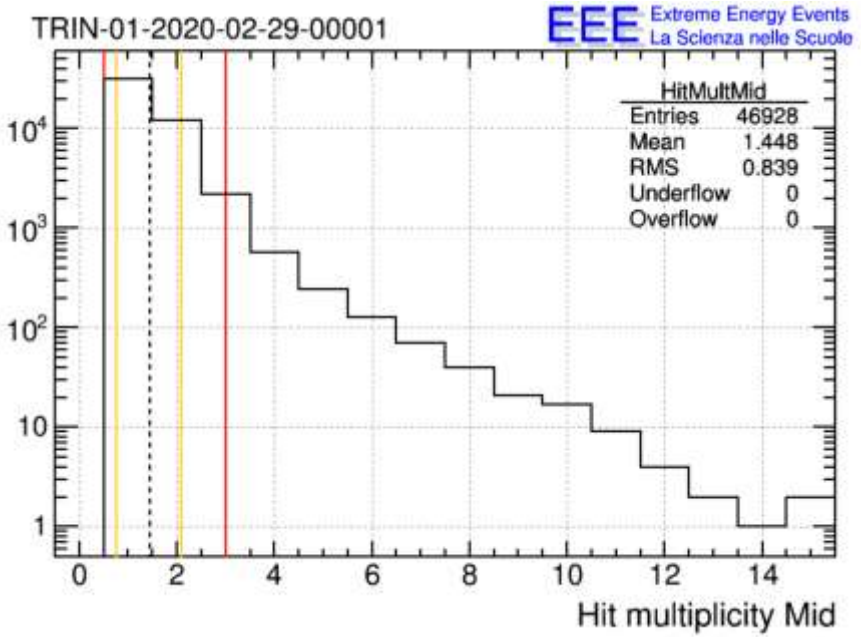

BOLO-04-2019-04-21-00014
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 46244
Mean 1.216
RMS 0.6015
Underflow 0
Overflow 5
Hit multiplicity Mid

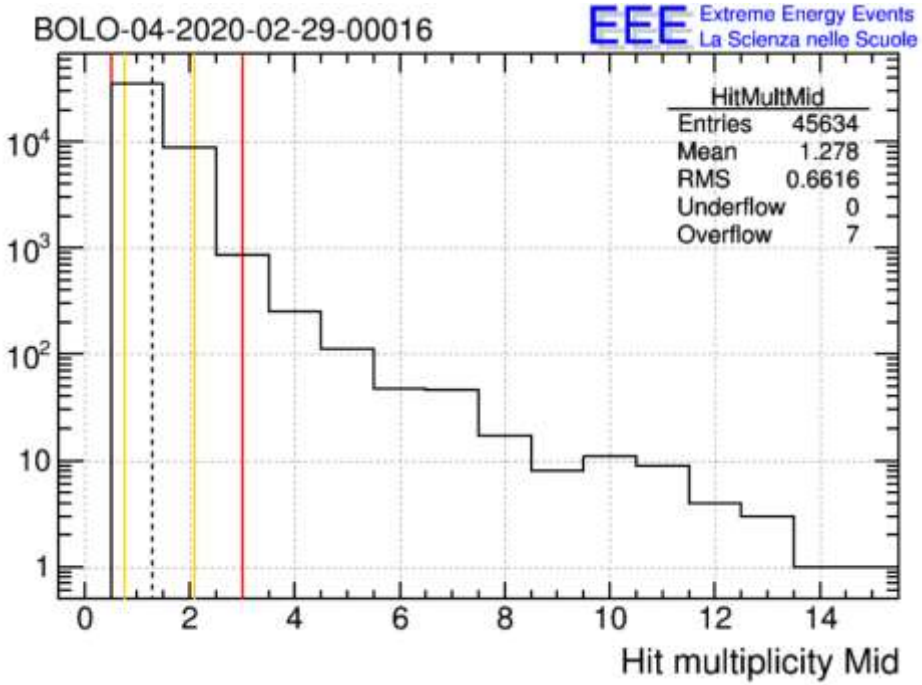

BARI-01-2019-12-29-00007
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 42477
Mean 1.827
RMS 1.04
Underflow 0
Overflow 34
Hit multiplicity Mid

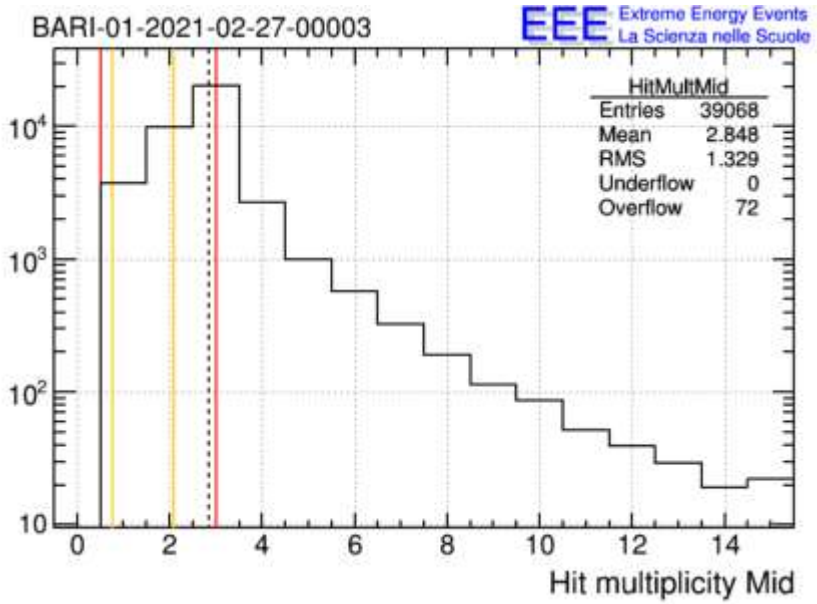

TRIN-01-2019-12-29-00001
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 44031
Mean 1.942
RMS 1.109
Underflow 0
Overflow 2
Hit multiplicity Mid

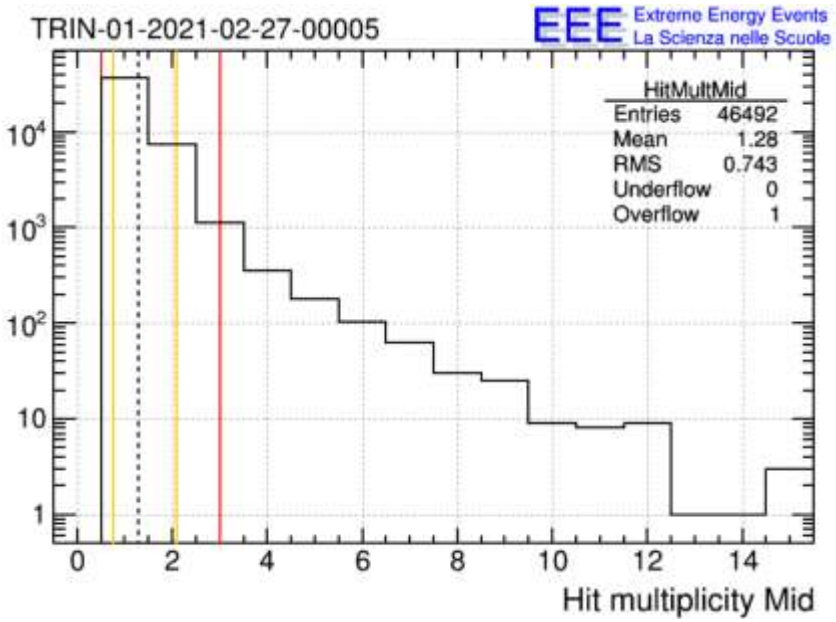

BOLO-04-2019-12-29-00008
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 45496
Mean 1.227
RMS 0.6079
Underflow 0
Overflow 6
Hit multiplicity Mid

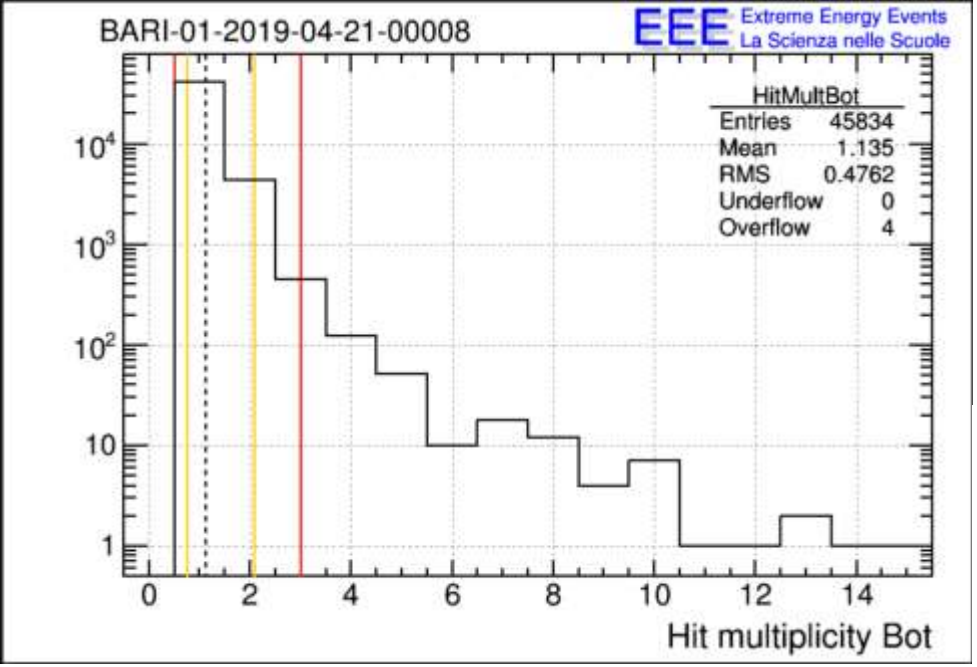

BARI-01-2020-02-29-00004
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 40773
Mean 1.834
RMS 1.078
Underflow 0
Overflow 32
Hit multiplicity Mid

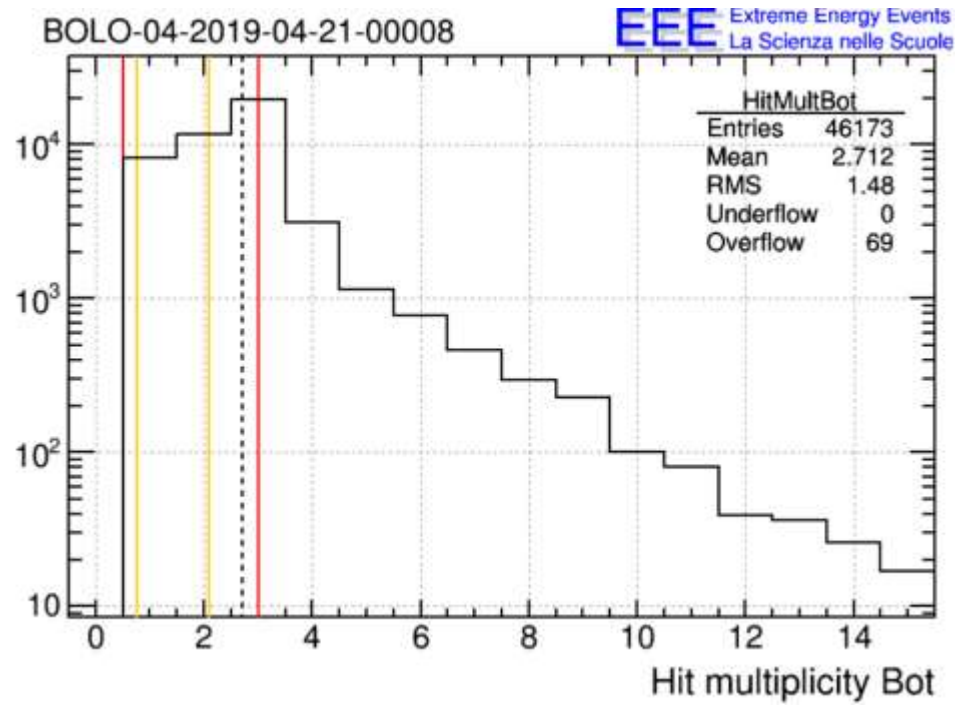

TRIN-01-2020-02-29-00001
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 46928
Mean 1.448
RMS 0.839
Underflow 0
Overflow 0
Hit multiplicity Mid

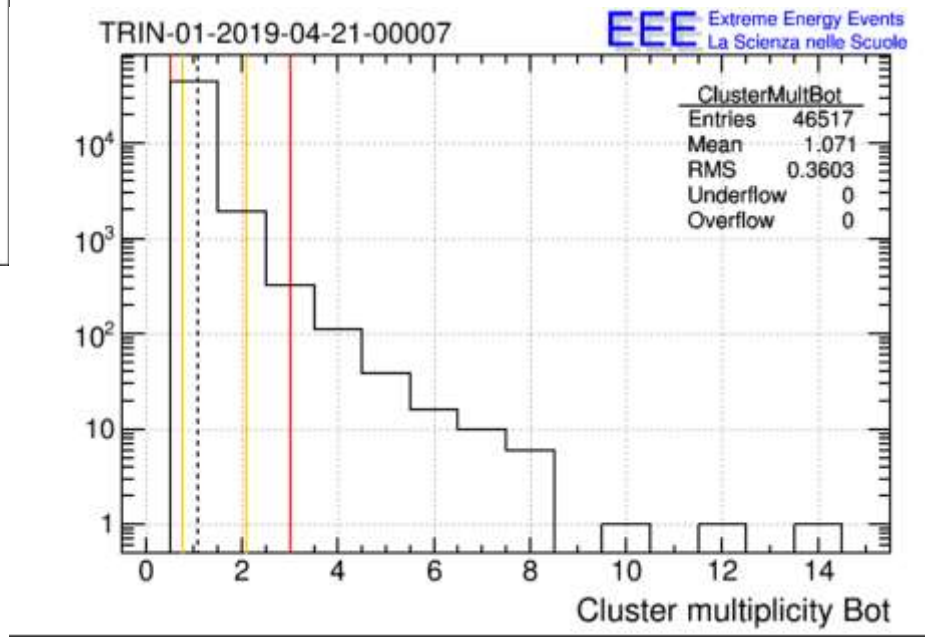

BOLO-04-2020-02-29-00016
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 45634
Mean 1.278
RMS 0.6616
Underflow 0
Overflow 7
Hit multiplicity Mid

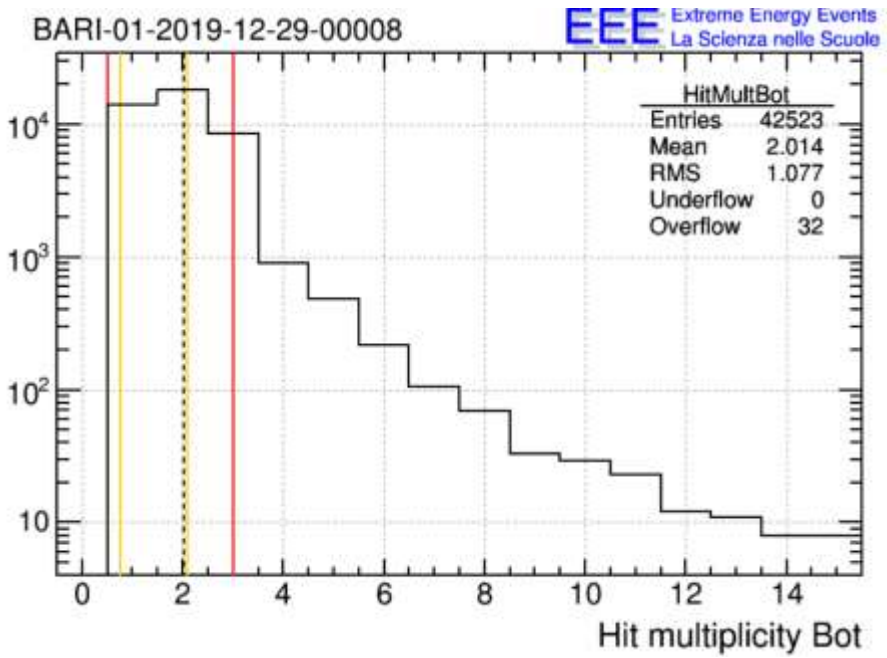

BARI-01-2021-02-27-00003
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 39068
Mean 2.848
RMS 1.329
Underflow 0
Overflow 72
10^4
10^3
10^2
10
0 2 4 6 8 10 12 14
Hit multiplicity Mid

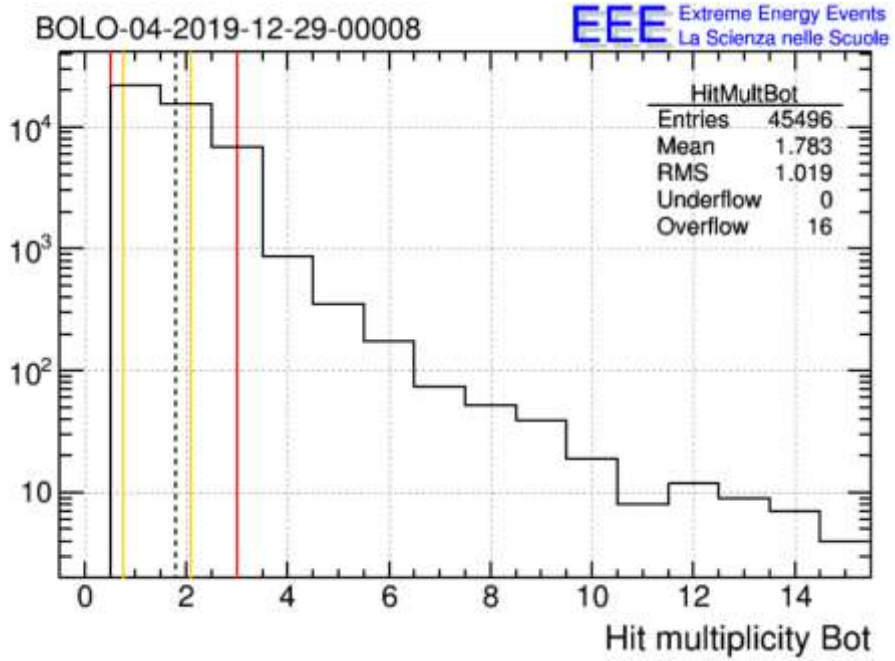

TRIN-01-2021-02-27-00005
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 46492
Mean 1.28
RMS 0.743
Underflow 0
Overflow 1
10^4
10^3
10^2
10
1
0 2 4 6 8 10 12 14
Hit multiplicity Mid

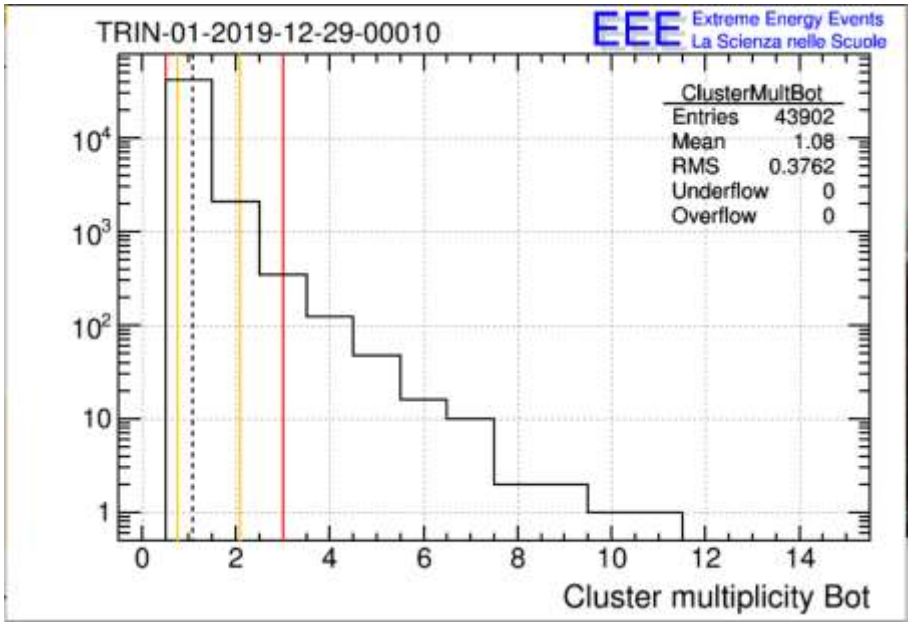

BARI-01-2019-04-21-00008
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 45834
Mean 1.135
RMS 0.4762
Underflow 0
Overflow 4
Hit multiplicity Bot

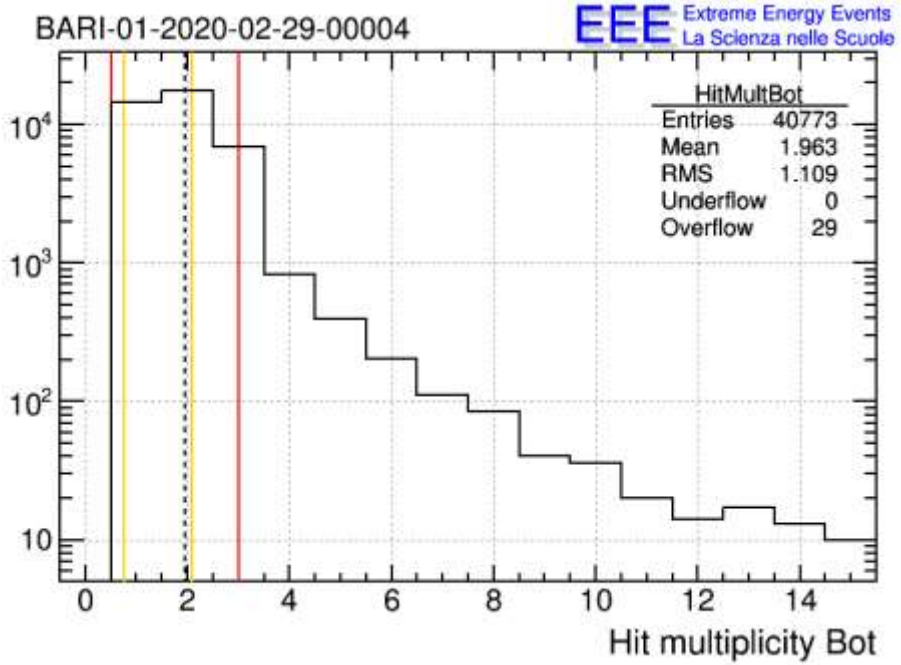

BOLO-04-2019-04-21-00008
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 46173
Mean 2.712
RMS 1.48
Underflow 0
Overflow 69
Hit multiplicity Bot

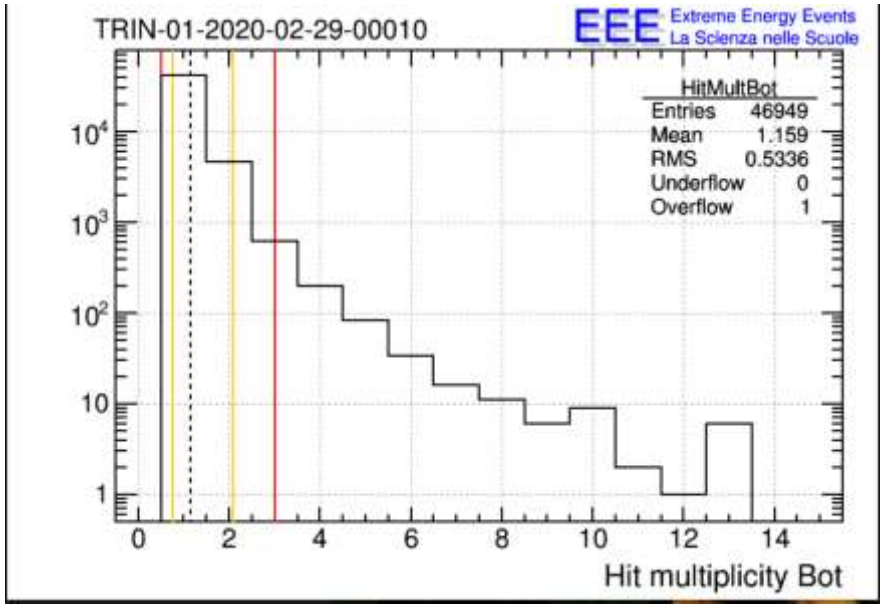

TRIN-01-2019-04-21-00007
EEE Extreme Energy Events
La Scienza nelle Scuole
ClusterMultBot
Entries 46517
Mean 1.071
RMS 0.3603
Underflow 0
Overflow 0
Cluster multiplicity Bot

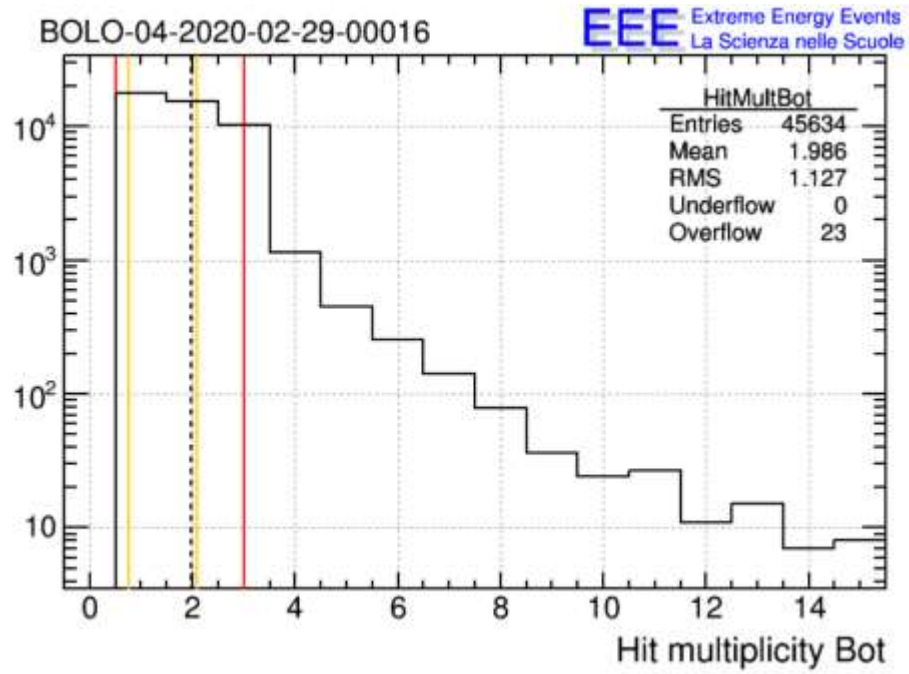

BARI-01-2019-12-29-00008
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 42523
Mean 2.014
RMS 1.077
Underflow 0
Overflow 32
Hit multiplicity Bot

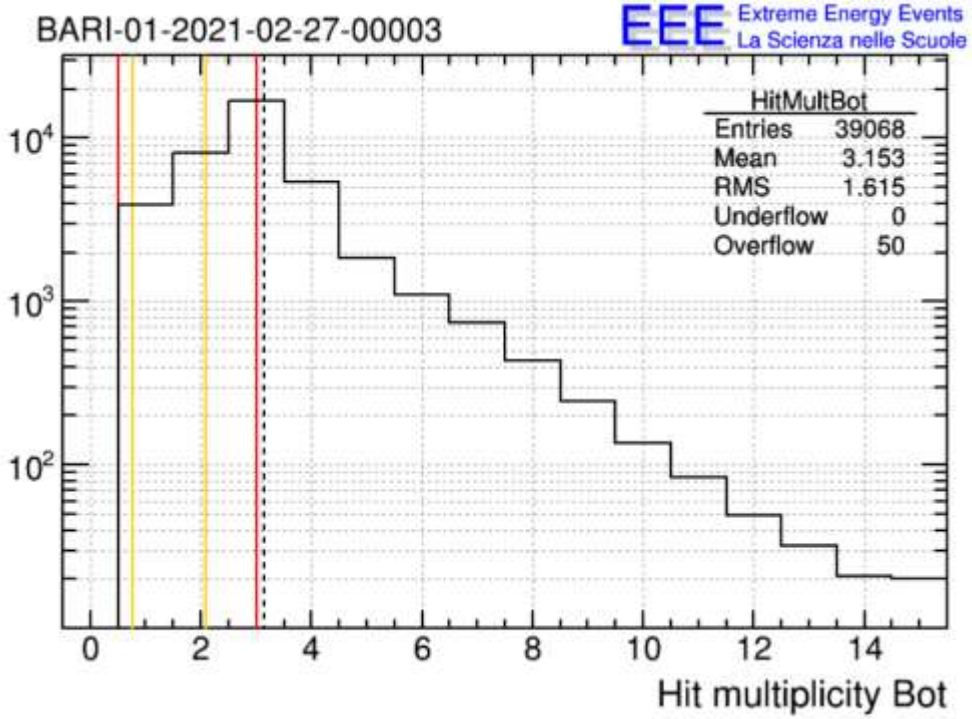

BOLO-04-2019-12-29-00008
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 45496
Mean 1.783
RMS 1.019
Underflow 0
Overflow 16
Hit multiplicity Bot

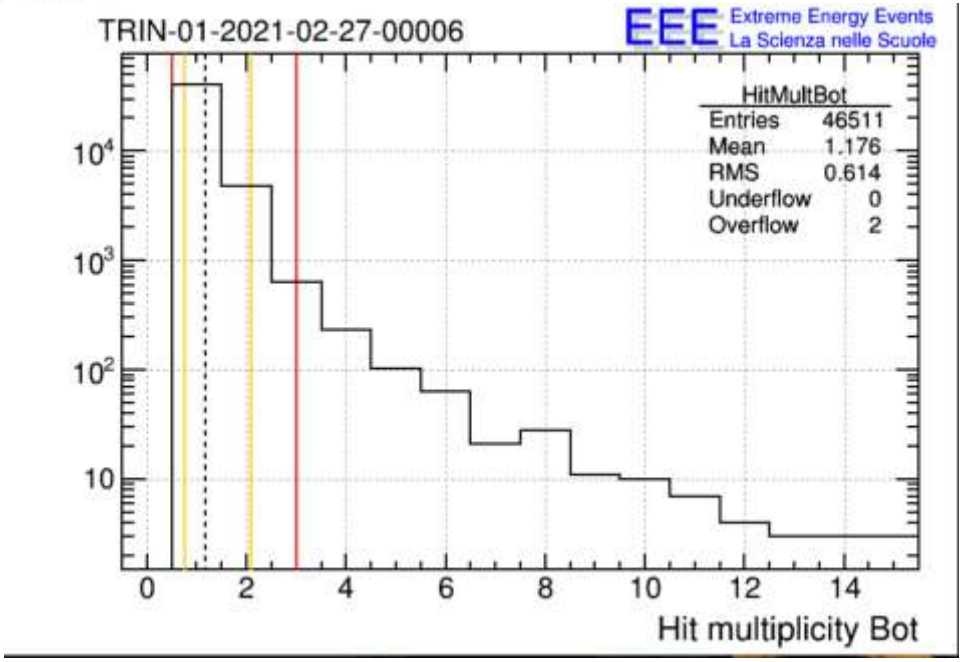

TRIN-01-2019-12-29-00010
EEE Extreme Energy Events
La Scienza nelle Scuole
ClusterMultBot
Entries 43902
Mean 1.08
RMS 0.3762
Underflow 0
Overflow 0
Cluster multiplicity Bot

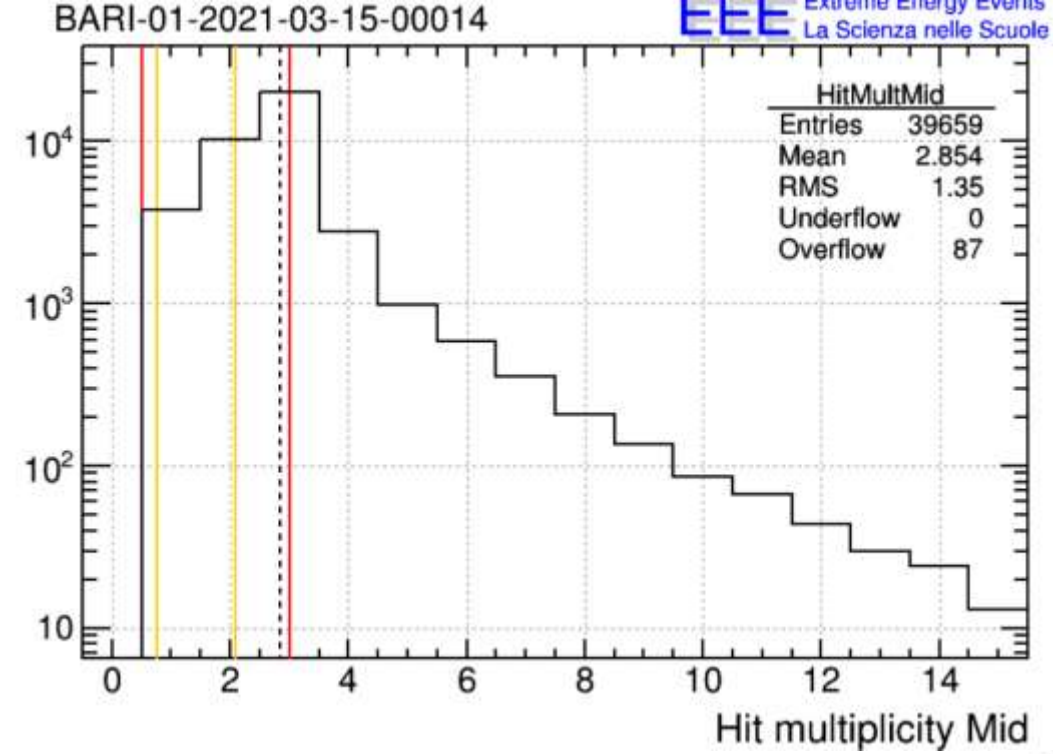

BARI-01-2020-02-29-00004
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 40773
Mean 1.963
RMS 1.109
Underflow 0
Overflow 29
Hit multiplicity Bot


TRIN-01-2020-02-29-00010
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 46949
Mean 1.159
RMS 0.5336
Underflow 0
Overflow 1
Hit multiplicity Bot

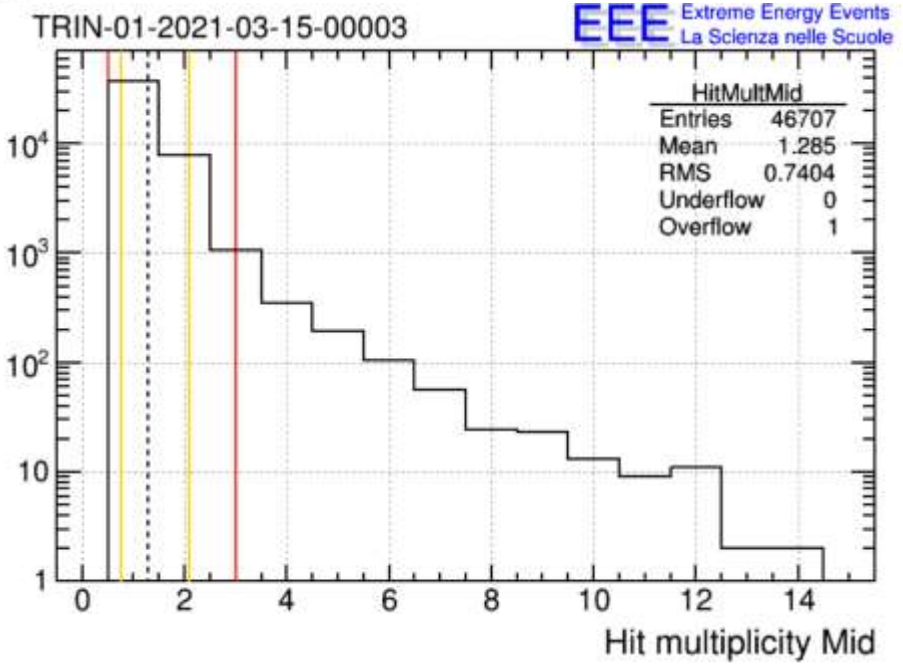

BOLO-04-2020-02-29-00016
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 45634
Mean 1.986
RMS 1.127
Underflow 0
Overflow 23
Hit multiplicity Bot

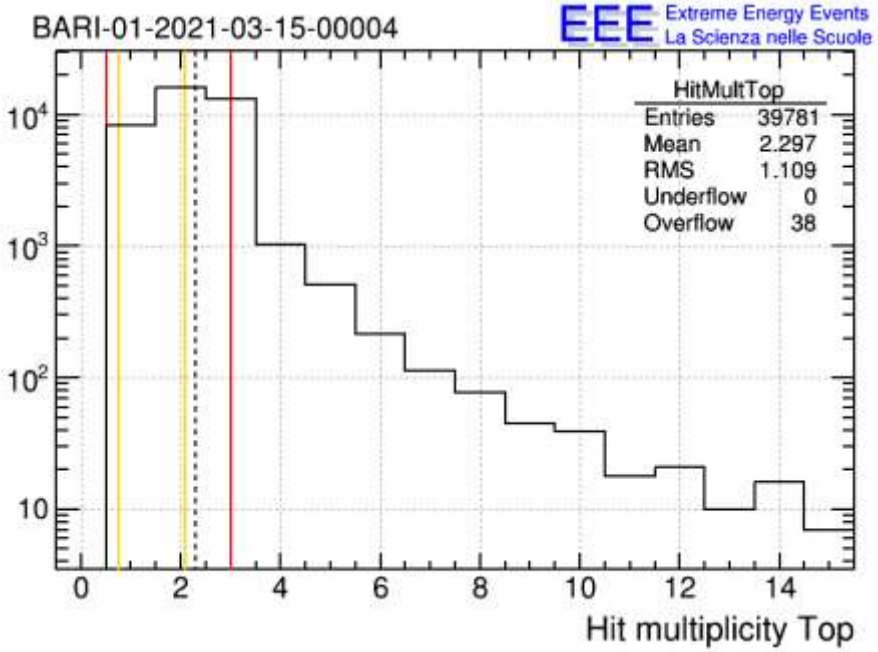

BARI-01-2021-02-27-00003
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 39068
Mean 3.153
RMS 1.615
Underflow 0
Overflow 50
10^4
10^3
10^2
0 2 4 6 8 10 12 14
Hit multiplicity Bot


TRIN-01-2021-02-27-00006
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 46511
Mean 1.176
RMS 0.614
Underflow 0
Overflow 2
10^4
10^3
10^2
10
0 2 4 6 8 10 12 14
Hit multiplicity Bot

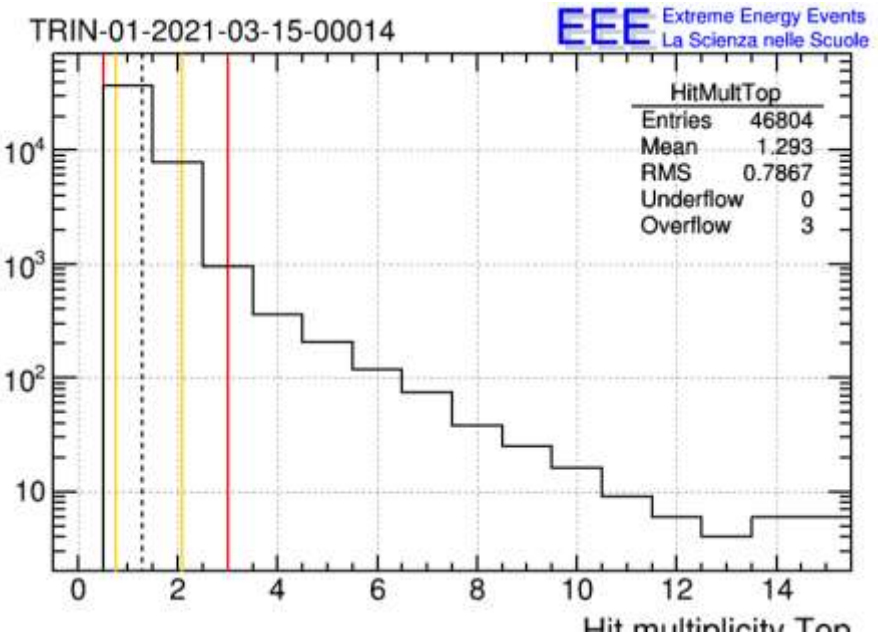

BARI-01-2021-03-15-00014
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 39659
Mean 2.854
RMS 1.35
Underflow 0
Overflow 87
Hit multiplicity Mid

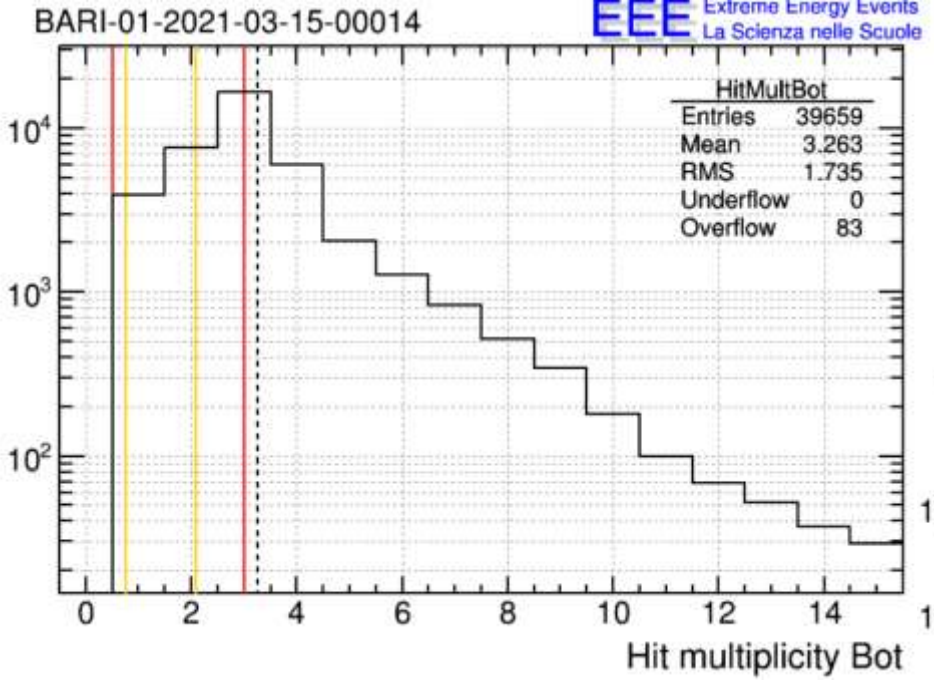
2021

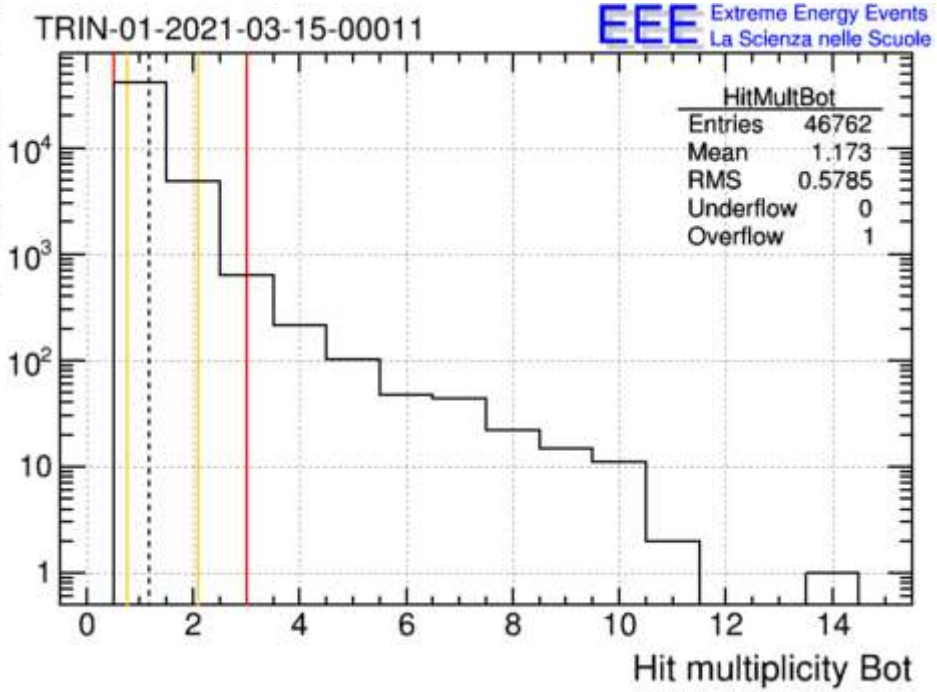

TRIN-01-2021-03-15-00003
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultMid
Entries 46707
Mean 1.285
RMS 0.7404
Underflow 0
Overflow 1
Hit multiplicity Mid


BARI-01-2021-03-15-00004
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultTop
Entries 39781
Mean 2.297
RMS 1.109
Underflow 0
Overflow 38
10^4
10^3
10^2
10
0 2 4 6 8 10 12 14
Hit multiplicity Top

2021


TRIN-01-2021-03-15-00014
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultTop
Entries 46804
Mean 1.293
RMS 0.7867
Underflow 0
Overflow 3
10^4
10^3
10^2
10
0 2 4 6 8 10 12 14


BARI-01-2021-03-15-00014
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 39659
Mean 3.263
RMS 1.735
Underflow 0
Overflow 83
Hit multiplicity Bot


TRIN-01-2021-03-15-00011
EEE Extreme Energy Events
La Scienza nelle Scuole
HitMultBot
Entries 46762
Mean 1.173
RMS 0.5785
Underflow 0
Overflow 1
Hit multiplicity Bot

2021