The Big Tuning

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on behalf of the working group

Outline

- Motivation
- Procedure
- Results
- Considerations

Motivation

- The output of the data coming from the fast-digitization shows a signal collected on the strip with a smaller amplitude with respect to the experimental data
- Many variables play a role in the parametrization of the simulation and few of them have been selected to improve the matching between simulation and experimental data
- Up to now there are two parameter of interest that have been tuned in order to improve the matching within 30%
  --> gain factor: 4.5
  --> space diffusion factor: 2
- To improve the agreement a finest scan of these parameter will be performed looking at the following variables
  --> cluster charge
  --> cluster size
  --> charge centroid resolution
  --> μTPC resolution

Procedure

- Experimental data without magnetic field have smaller errors and it will be used for the tuning
- Once the agreement without magnetic field will be reached then a test with the data with the magnetic field will be performed
- Several simulation with different values of the parameter of interest will be performed
- 100'000 events for each angle in each configuration are used to measure the variable of interest with a minimized error
- The values that minimize the chi-square will be used for the final tuning

$$\sum_{i,j} \frac{exp_{i,j} - sim_{i,j}}{error_{i,j}}$$

where *i* is the angle_ID from 0° to 60°

j is the variable of interest (charge, size, CC, μTPC)

the error is measured from the experimental data

Consideration

RUN ID	GAIN FACTOR	DIFFUSION FACTOR	CHI2	CHI2/ndf	@ 0°	@ 5°	@ 10°	@ 15°	@ 20°	@ 30°	@ 40°	@ 45°	@ 60°
1	1	1	130850	3634.74	30.429	26.243	25.107	90.972	257.11	620.18	21979	6758.9	2924.7
2	1	2	1002.6	27.851	47.038	22.095	33.325	22.687	22.268	19.744	23.541	27.85	32.108
3	1.5	1	990.14	27.504	29.791	32.158	20.66	16.531	18.853	18.748	25.432	41.393	43.97
4	1.5	2	599.73	16.659	14.386	20.066	21.665	15.526	15.054	13.803	15.12	18.551	15.761
5	2	1	749.15	20.81	20.552	28.71	15.899	12.886	14.791	13.38	18.199	28.056	34.814
6	2	2	432.22	12.006	12.187	14.498	14.439	10.842	10.896	9.994	10.671	13.357	11.172
7	2.5	1	598.1	16.614	15.056	26.292	12.253	10.327	11.343	14.011	14.386	20.077	25.779
8	2.5	2	323.29	8.9804	9.539	12.341	11.736	8.062	7.6367	6.8982	7.2925	9.1863	8.132
9	3	1	450.77	12.521	13.097	24.447	9.5927	8.3415	8.3625	7.081	9.4729	13.831	18.468
10	3	2	246.23	6.8398	7.8676	10.875	8.46	5.4488	5.1921	4.5186	4.6133	8.0462	6.5366
11	3.5	1	387.08	10.752	12.114	22.183	8.3482	6.9056	5.9857	5.0298	8.1441	11.334	16.725
12	3.5	2	203.76	5.6599	9.714	10.538	5.8436	3.939	3.7086	2.5871	3.0199	6.1328	5.4567
13	4.5	1	310.18	[illegible]	10.815	20.894	6.8043	4.3043	4.7709	2.9087	5.2008	10.166	11.681
14	4.5	2	190.9	5.3027	15.835	11.29	4.2346	2.1265	1.591	0.44998	1.2952	5.0154	5.8864
15	5	1	306.87	[illegible]	14.696	21.233	6.3119	4.0966	3.1279	2.9302	5.6703	7.7163	10.936
16	5	2	215.45	5.9846	18.856	14.109	5.1842	1.964	1.4254	0.10904	1.2573	4.6395	6.3172
17	5.5	1	291.82	8.1061	13.047	20.65	6.4254	3.3257	3.0527	2.835	4.8381	7.0817	11.699
18	5.5	2	265.61	7.378	22.089	17.523	5.9614	2.9284	1.5399	0.19361	2.2084	6.1009	7.8577
19	6	1	308.7	8.575	14.733	20.062	6.4315	3.1956	2.9664	2.0894	5.7698	10.473	11.454
20	6	2	301.44	8.3732	24.44	17.354	7.2097	3.518	2.2276	0.84134	2.9579	7.5984	9.2124
21	6.5	1	321.16	8.921	16.418	20.744	6.4249	3.2912	3.2256	3.8037	5.7953	9.3571	11.229
22	6.5	2	356.92	9.9144	29.481	18.315	8.2026	4.9659	3.2906	1.4331	4.4374	8.017	11.086
23	7	1	351.45	9.7624	17.637	20.633	6.3875	3.7279	3.7801	3.8216	7.2288	11.461	13.184
24	7	2	443.22	12.312	34.152	20.284	10.308	6.5898	5.4355	2.7119	6.0847	11.742	13.497

Consideration

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The smaller chi2/ndf has the same parameters found by the previous studies. This validate the approach.
This method can be used once the digitization will be completed to performe a finite scan of the pameters.