

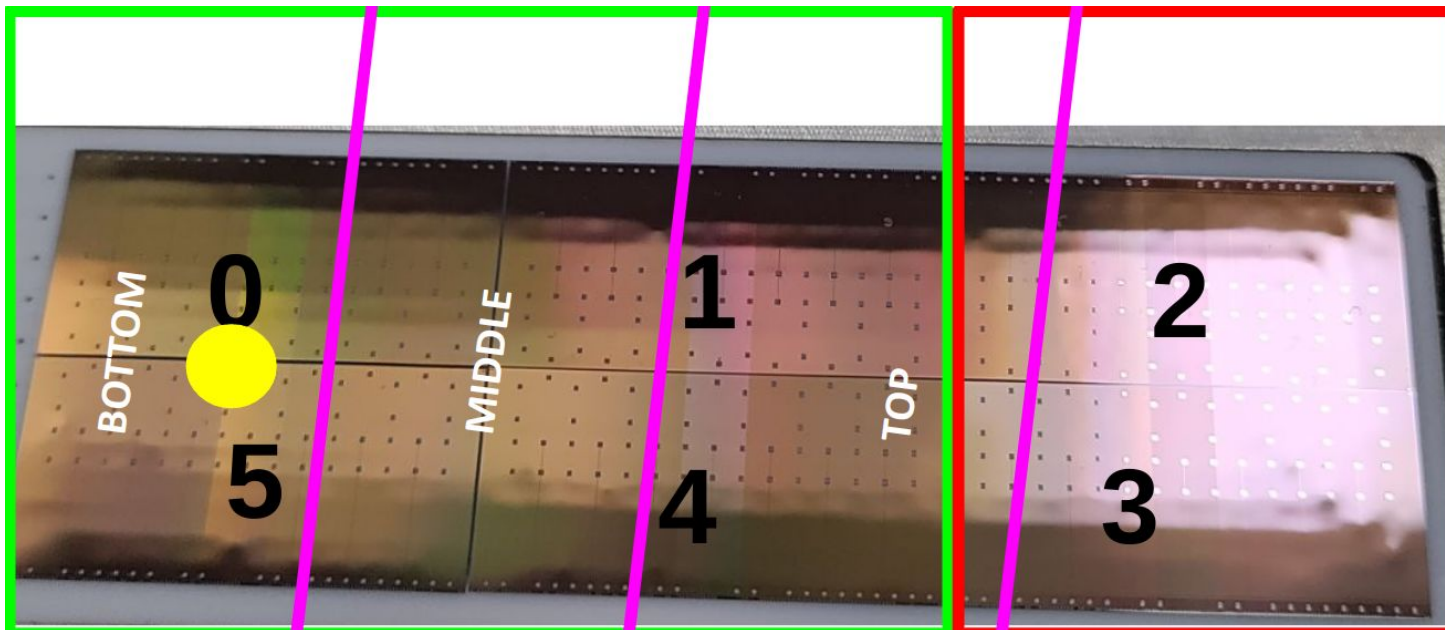
A detailed wireframe rendering of a particle accelerator facility. The central feature is a large, oval-shaped tunnel structure. Above it, a more complex structure with various rectangular and circular components is visible, representing different parts of the accelerator complex.

ALPIDE Update

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Mainz, October 8th, 2023

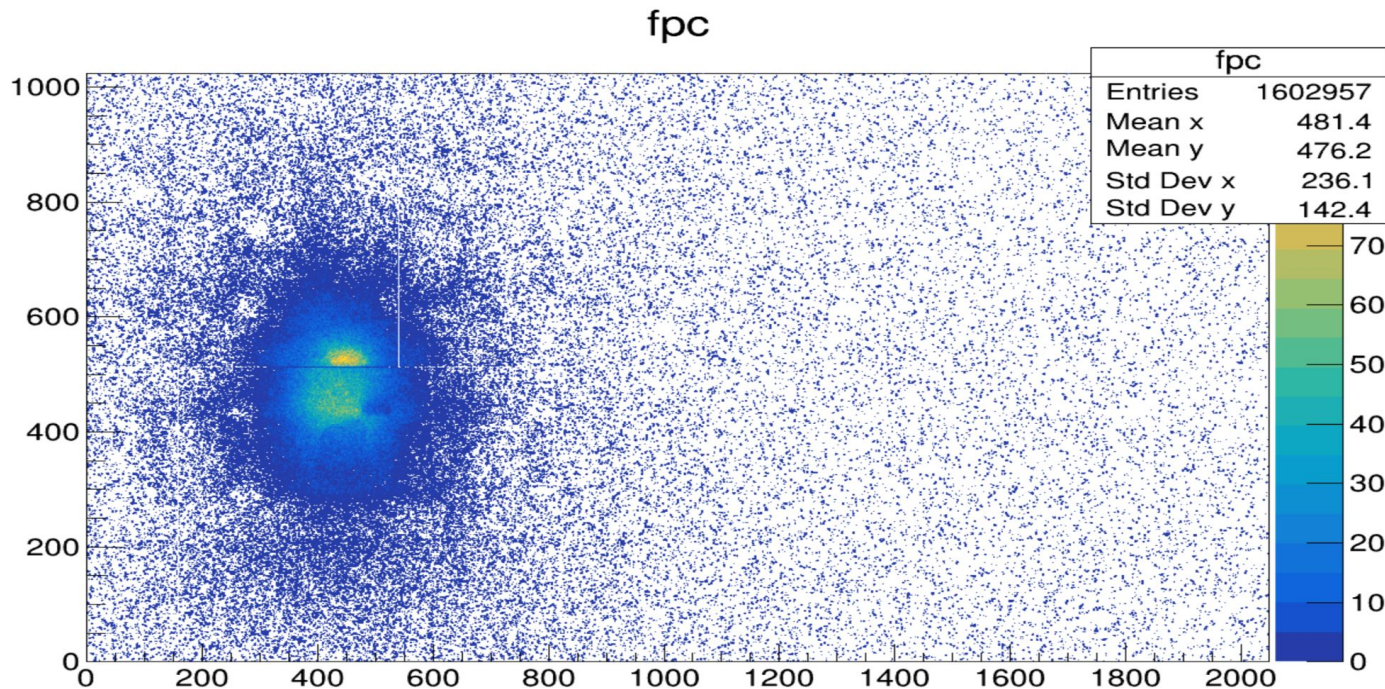
ALPIDE Update - source testing

- Colorscheme:
 - green: chips in place, ready to be read-out
 - red: chips missing
 - **bold number**: respective chip ID (which we see in the data)
- ^{90}Sr source, random trigger used, measuring random coincidences



ALPIDE Update - plots

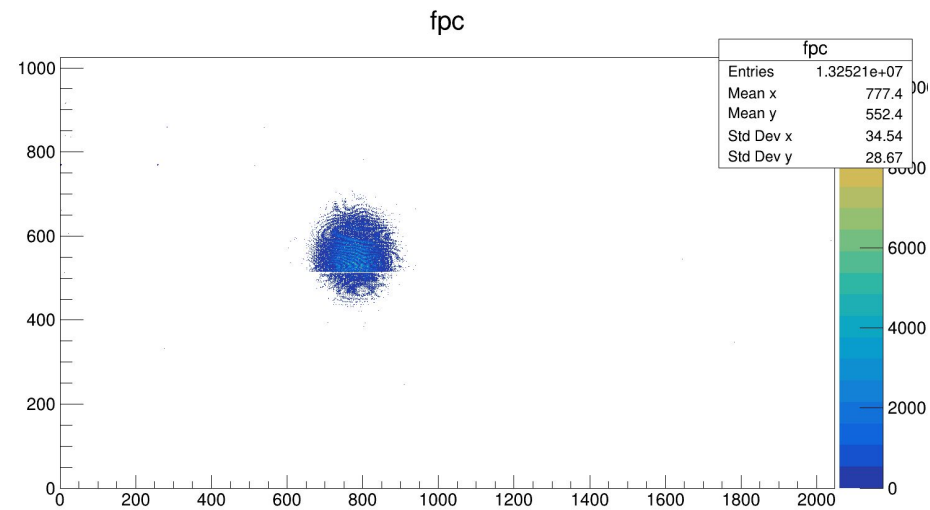
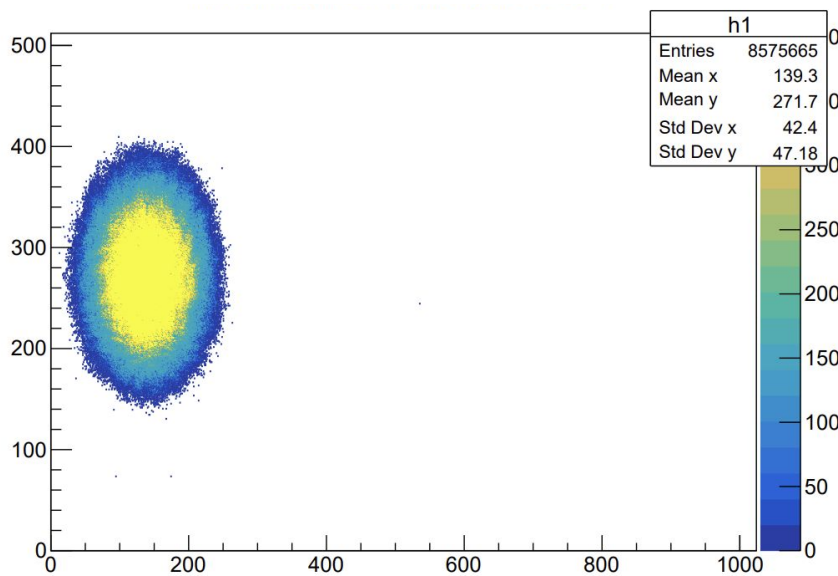
- **X axis:** hit position in X ... sensor changes at value 1024
- **Y axis:** hit position in Y ... sensor changes at value 512
 - Can see clear 'break' between neighbouring chips



ALPIDE Update - Laser test SCC vs FPC.



- Laser test works for both
 - FPC (Flexible Printed Circuit) = multiple chip sensor, right side
 - SSC (Single Carrier Card) = single chip sensor, left side



Readout issues



- Number of chips fired in a readout cycle seems inconsistent?
 - High intensity laser, firing every 1 ms (1 kHz regular pulser)
- Consistently every other event there are **zero** pixels fired!
 - Doesn't make sense ... (picture below)
- Timestamp problems since Jülich ... we need to sit down and work on it 🪑

- ❑ **Snapshot below:** each number represents amount of pixels fired in each consecutive event.
- ❑ Event number increasing left to right, wrapping with a newline after 32 events

0	152	0	159	0	0	0	150	0	6309	0	101	0	0	0	377	0	93	0	4057	0	307	0	0	0	0	145	0	205	0	3979	0	103
0	280	0	4482	0	228	0	281	0	0	0	310	0	260	0	217	0	147	0	256	0	80	0	0	0	0	270	0	134	0	141	0	0
0	6365	0	0	0	273	0	289	0	0	0	427	0	0	0	273	0	351	0	241	0	174	0	253	0	302	0	142	0	179	0	377	
0	147	0	413	0	174	0	148	0	299	0	227	0	0	0	284	0	225	0	305	0	6086	0	255	0	131	0	201	0	0	0	5314	
0	0	0	175	0	219	0	296	0	259	0	167	0	218	0	211	0	88	0	173	0	147	0	127	0	6254	0	197	0	241	0	426	
0	145	0	301	0	6592	0	176	0	148	0	141	0	280	0	4826	0	372	0	237	0	148	0	365	0	215	0	0	0	7123	0	315	
0	5511	0	203	0	193	0	153	0	0	0	282	0	71	0	422	0	187	0	156	0	0	0	309	0	89	0	393	0	0	0	4781	
0	266	0	0	0	5147	0	237	0	133	0	185	0	258	0	259	0	194	0	269	0	212	0	201	0	267	0	173	0	112	0	6757	
0	137	0	168	0	315	0	103	0	0	0	236	0	85	0	293	0	0	0	4196	0	219	0	328	0	149	0	0	0	199	0	0	
0	0	0	383	0	108	0	167	0	354	0	222	0	235	0	5687	0	0	0	189	0	309	0	110	0	149	0	323	0	234	0	226	
0	288	0	178	0	182	0	176	0	241	0	123	0	5988	0	4668	0	257	0	243	0	6003	0	217	0	204	0	5253	0	211	0	0	
0	142	0	0	0	349	0	325	0	248	0	269	0	0	0	107	0	366	0	198	0	5296	0	309	0	4342	0	5456	0	6497	0	86	
0	123	0	260	0	237	0	133	0	6011	0	251	0	4477	0	0	0	0	0	223	0	274	0	150	0	0	0	5939	0	246	0	84	
0	292	0	143	0	162	0	277	0	0	0	318	0	195	0	5712	0	123	0	5363	0	5637	0	4650	0	5875	0	163	0	133	0	246	
0	172	0	90	0	301	0	5093	0	0	0	393	0	212	0	197	0	265	0	144	0	209	0	0	0	168	0	213	0	0	0	306	
0	248	0	6540	0	196	0	112	0	204	0	105	0	174	0	299	0	0	0	228	0	6096	0	185	0	222	0	225	0	215	0	144	
0	297	0	5303	0	265	0	297	0	304	0	0	0	6027	0	346	0	4967	0	0	0	291	0	4549	0	264	0	247	0	3970	0	5282	
0	181	0	210	0	5853	0	268	0	186	0	0	0	331	0	124	0	337	0	201	0	4892	0	183	0	264	0	74	0	251	0	3774	
0	149	0	0	0	5034	0	111	0	385	0	5059	0	0	0	573	0	128	0	178	0	0	0	185	0	4858	0	332	0	300	0	114	
0	145	0	104	0	285	0	196	0	82	0	0	0	287	0	0	0	161	0	364	0	186	0	161	0	275	0	151	0	210	0	159	
0	115	0	171	0	188	0	163	0	263	0	0	0	0	0	105	0	177	0	294	0	223	0	0	0	242	0	5149	0	209	0	234	
0	199	0	245	0	276	0	4893	0	7623	0	5759	0	190	0	0	0	176	0	55	0	5377	0	241	0	168	0	261	0	188	0	5621	
0	291	0	92	0	254	0	164	0	4383	0	147	0	361	0	4429	0	210	0	398	0	192	0	196	0	0	0	95	0	328	0	199	
0	197	0	236	0	5131	0	228	0	228	0	262	0	197	0	175	0	332	0	177	0	231	0	0	0	138	0	281	0	334	0	6406	
0	3999	0	451	0	196	0	126	0	4072	0	128	0	5640	0	171	0	0	0	157	0	6389	0	240	0	5207	0	196	0	213	0	200	
0	0	0	0	0	4699	0	376	0	299	0	0	0	208	0	143	0	187	0	322	0	102	0	138	0	310	0	0	0	220	0	391	
0	194	0	56	0	5916	0	4940	0	282	0	386	0	282	0	221	0	248	0	298	0	0	0	5129	0	245	0	157	0	5936	0	4270	
0	0	0	190	0	154	0	4879	0	6859	0	143	0	120	0	297	0	221	0	254	0	299	0	190	0	211	0	263	0	210	0	107	
0	184	0	5580	0	132	0	247	0	225	0	93	0	226	0	274	0	79	0	347	0	4904	0	72	0	5358	0	149	0	4497	0	164	
0	130	0	129	0	459	0	220	0	89	0	335	0	206	0	294	0	0	0	0	0	182	0	394	0	201	0	172	0	0	0	228	
0	160	0	0	0	183	0	193	0	0	0	116	0	5238	0	269	0	246	0	4590	0	0	0	261	0	155	0	0	0	192	0	247	

ALPIDE Status summary



- We can clearly identify hit data
- Can verify geometry and see laser / charged particle hits.
- ALPIDE DAQ *likes* periodic triggers. With low payload < 20 pixels firing per cycle, can go up to 100 kHz readout rate.

- **Things to do:**
 - Threshold scan -> decided a simpler form for now.
 - Full glory after: <https://github.com/kLayz3/Alpide-thresholdscan>
 - Stability of readout? Why is data sent in this weird fashion?
 - Measure small chip position offsets on the PCB
 - CERN TS problems unexplored -> data fragmentation in <0.5% events
 - TS error bit raised for no apparent reason
 - Happens at low rate.
 - Do we care?