Telescope with the μITS3 for the test beam in July 2021
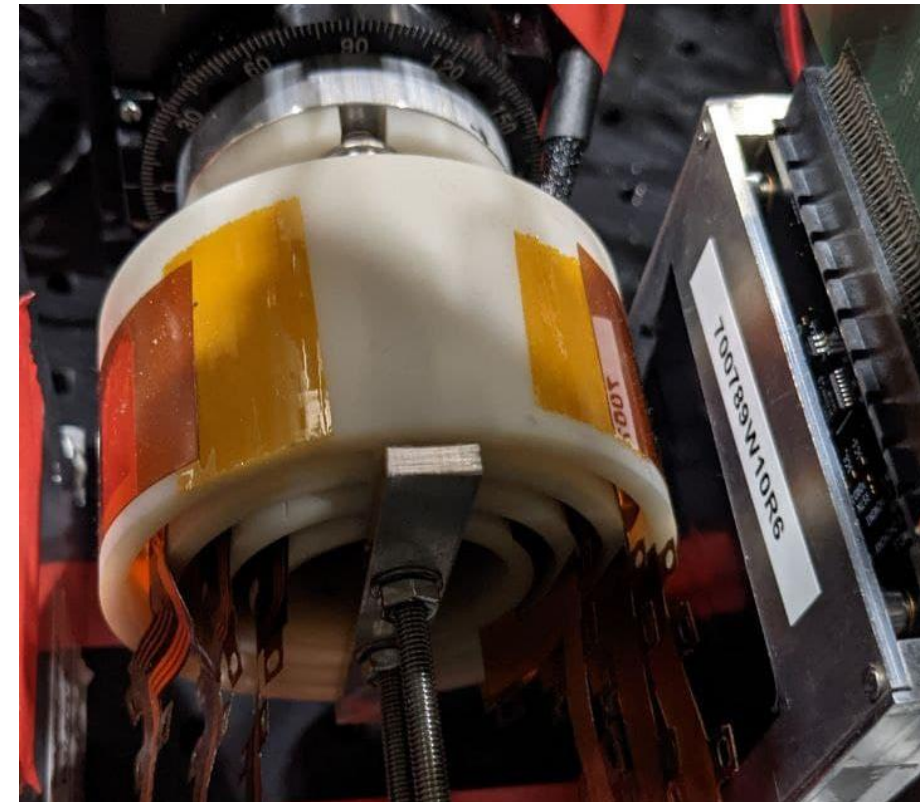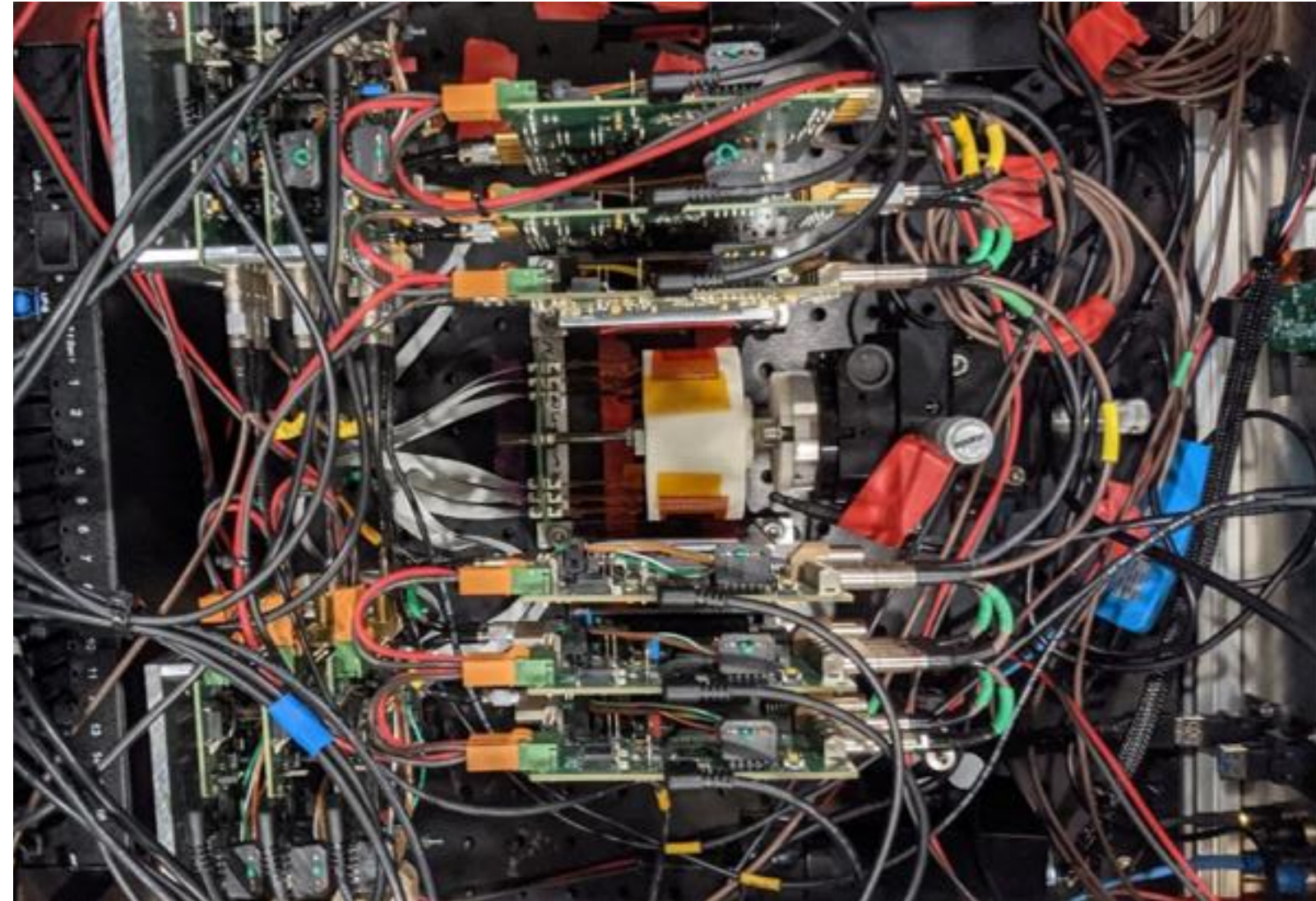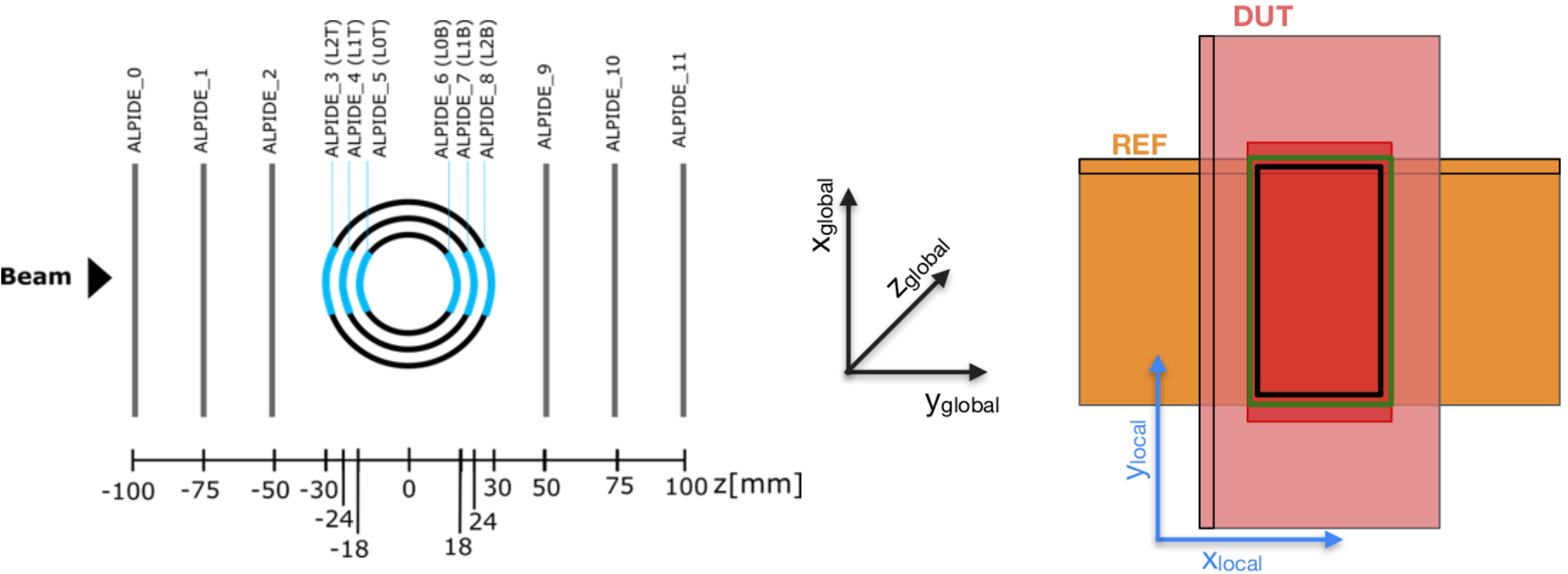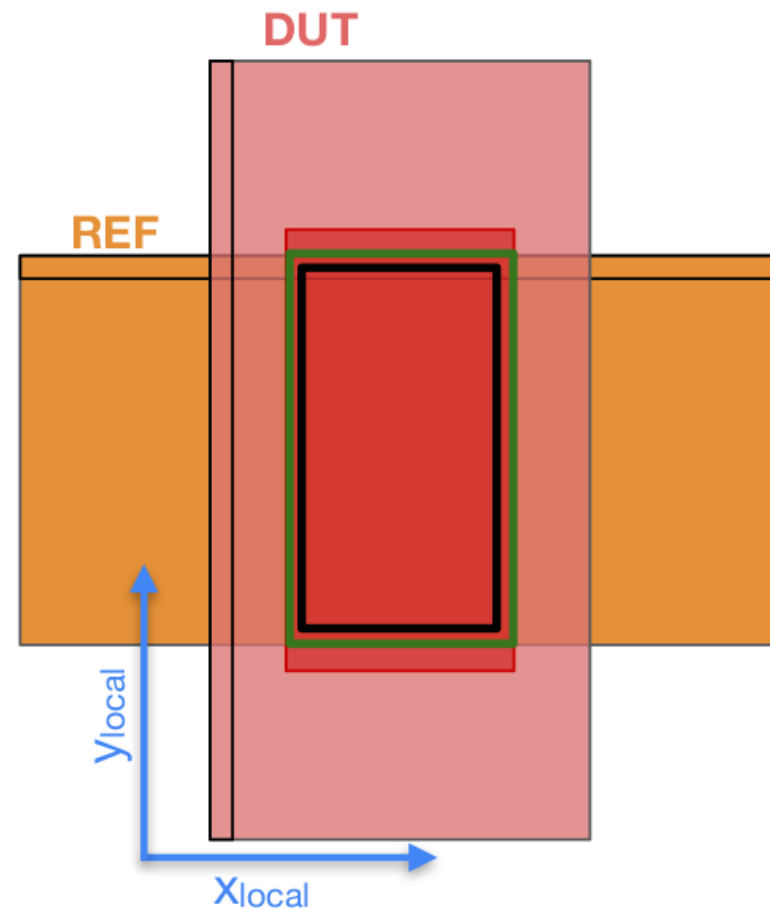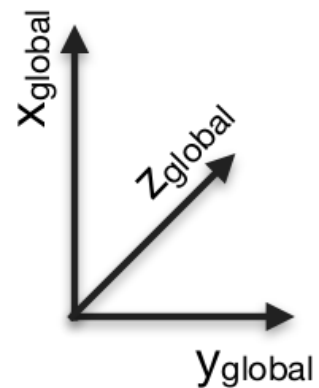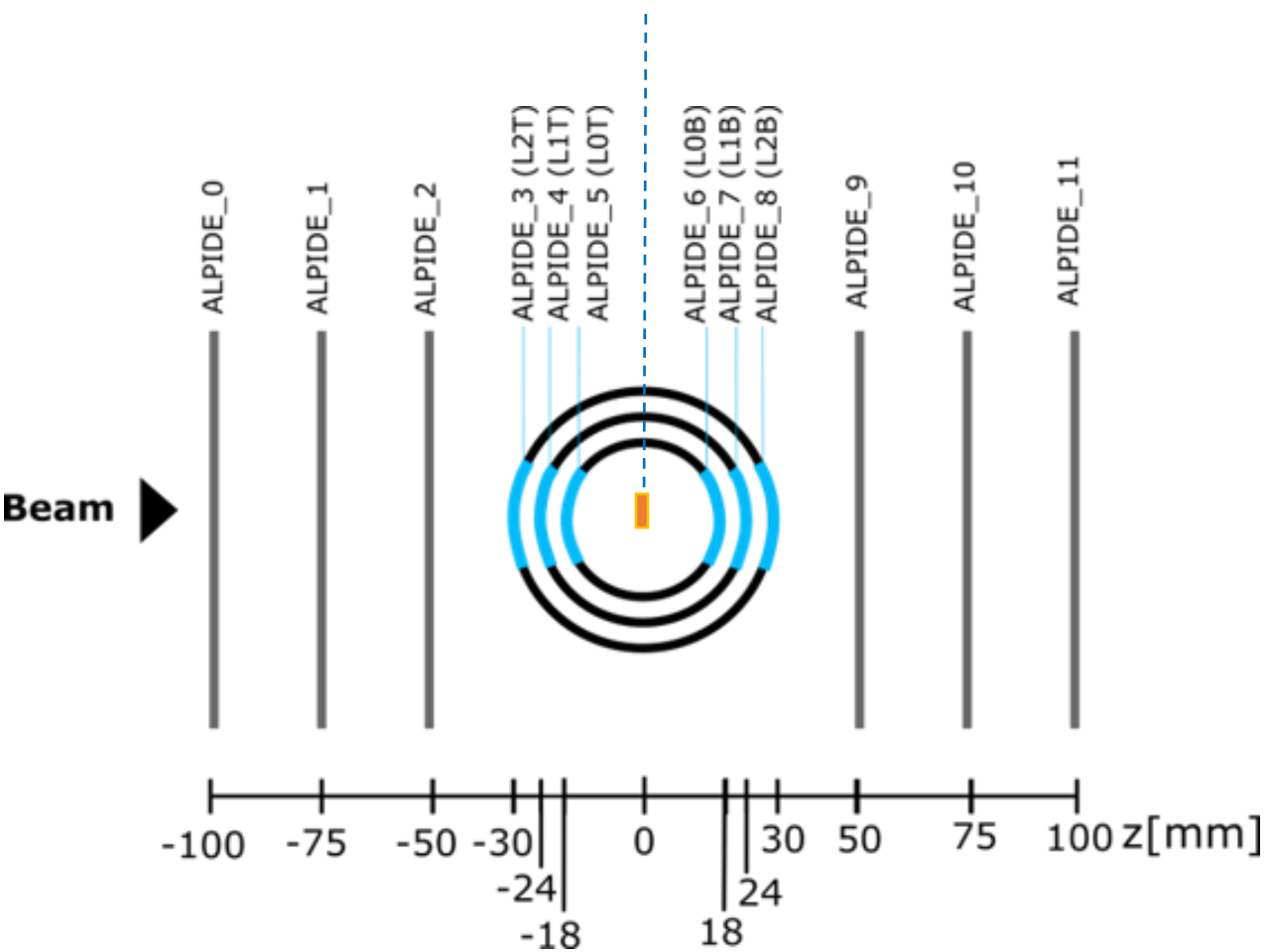
Telescope: 6REF (flat ALPIDEs) + 6DUT (bent ALPIDEs)

Beam: 120 GeV hadrons (pions(60-70%), protons(25%), muons & electrons(5-15%)).

Copper target at z=0 (thickness = 1.16mm)

Telescope: 6REF (flat ALPIDEs) + 6DUT (bent ALPIDEs)

Beam: 120 GeV hadrons (pions(60-70%), protons(25%), muons & electrons(5-15%)).

Analysis workflow with Corryvreckan

1- Reading/converting raw data

```
12 [Metronome]
13 triggers=1     #### 1 event for each trigger
14
15 [EventLoaderEUDAQ2]
16 file_name = "@DataDir@/run@RunNumber@.raw"
17 long_detector_id=true
```

2- Noisy/hot pixel masking

Pixels that fire when there is no trigger are masked from the analysis (pixels firing more than 1000 times the average pixel on the sensor).

```
18 [MaskCreator]
19 frequency_cut=1000
```

3- Clustering and pre-alignment

```
19 [ClusteringSpatial]
20 use_trigger_timestamp=false
21 charge_weighting=true
22 reject_by_roi=true
23
24 [Correlations]
```

4- Tracking

```
26 [TrackingSpatial]
27 track_model="straightline"
28 min_hits_on_track=6
29 exclude_dut = false
30 spatial_cut_abs=1mm,1mm
31 reject_by_roi=true
```

```
25 [Tracking4D]
26 track_model="straightline"
27 time_cut_abs=10s
28 spatial_cut_abs=1mm,1mm
29 min_hits_on_track=6
30 exclude_dut=true
31 #momentum = 5.4GeV
32 momentum = 120GeV
33 volume_scattering = false
34 volume_radiation_length = 304.2m
35 reject_by_roi=true
```

```
22 [TrackingMultiplet]
23 scatterer_position=3mm
24 upstream_detectors=ALPIDE_0,ALPIDE_1,ALPIDE_2
25 downstream_detectors=ALPIDE_4,ALPIDE_5,ALPIDE_6
26 min_hits_upstream=3
27 min_hits_downstream=3
28 isolation_cut=0
29 scatterer_matching_cut = 1mm
30 time_cut_abs=10s
31 spatial_cut_abs = 1mm, 1mm
32 track_model="straightline"
33 momentum=5.4GeV
```

Particle tracking based on the Multiplet track model. This track model is defined by two so-called tracklets (upstream & downstream), which are track fits to hits in the corresponding subsets of detectors. These tracklets are connected at a certain position along z, where an arbitrary kink of the track is allowed, representing a scatterer.

5- Alignment

```
33 [AlignmentMillepede]
34 residual_cut = 0.05mm
35 residual_cut_init = 1mm
36 iterations = 3
37 dofs = true, true, false, false, false, true
38 sigmas = 50um, 50um, 50um, 0.005rad, 0.005rad, 0.005rad
39 exclude_dut = false
40 number_of_stddev = 0
41 convergence = 10e-5
```

6- DUT analysis

```
37 [DUTAssociation]
38 spatial_cut_abs=100um,100um
39 time_cut_abs=1e99
40
41 [AnalysisDUT]
42 time_cut_frameedge=20ns
43 chi2ndof_cut=3
44 use_closest_cluster=true
45
46 [AnalysisEfficiency]
47 time_cut_frameedge=20ns
48 chi2ndof_cut=3
49 inpixel_bin_size=1um
```

Useful links:

Getting started with ITS3 WP3 test beam analysis:
https://twiki.cern.ch/twiki/bin/viewauth/ALICE/GettingStartedWithTestbeamAnalysis

Test beam of July 2021:
https://twiki.cern.ch/twiki/bin/viewauth/ALICE/ITS3WP3SPS2021July

Corryvreckan manual:
https://gitlab.cern.ch/corryvreckan/corryvreckan/-/jobs/21230830/artifacts/raw/public/usermanual/corryvreckan-manual.pdf

Corryvreckan ITS3 repository:
https://gitlab.cern.ch/alice-its3-wp3/corryvreckan