

ALERT meeting - Kalman Filter
updates

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- ▶ The new AHDC geometry is available in **coatjava** and **gemc**
 - **coatjava** since the release **13.6.0**
 - **gemc** in dev version only
- ▶ I moved the **Kalman Filter** in **ALERTEngine**
 - Require **AHDCEngine** to have been run before
 - Remove redundant attributes in the object **Track** (everything with the **_kf** extension)
 - Update the bank **AHDC::hits** in the ALERTEngine
 - Define the **number of iterations** and the **PID** as variable in the Kalman Filter
 - A pull request has been submitted

- ▶ For now, moving the Kalman Filter in ALERTEngine has no effect on the result but:
 - the new implementation allows us to use it several times
 - example: **KF 1** → **clean bad hits** → **KF 2**
- ▶ Also, it was a mistake at the beginning, but now these quantities can be filled independently (the values for the Helix fitter are empty.)

```
position for [AHDC::track] == 21525
* NODE * group = 23000, item = 21, type =
  trackid :      1
    x :    -0.0069
    y :     0.0908
    z :   -366.9206
    px :   187.7031
    py :    14.2650
    pz :   -82.4034
  n_hits :      0
  sum_adc :      0
  path :     0.0000
  dEdx :     0.0000
  p_drift :  0.0000
  chi2 :     0.0000
  sum_residuals : 0.0000
```

```
Choose (n=next,p=previous,q=quit,h=help),
position for [AHDC::kftrack] == 21673
* NODE * group = 23000, item = 26, type =
  trackid :      1
    x :    -0.0266
    y :    -0.0307
    z :  -116.4564
    px :   175.5621
    py :    13.6844
    pz :   -90.1957
  n_hits :      8
  sum_adc :    2330
  path :    77.2190
  dEdx :    30.1739
  p_drift : 195.5157
  chi2 :     0.2074
  sum_residuals : -0.5212
```

1. Make a routine to eventually clean bad hits after a first use of the Kalman Filter
2. Include the ATOF hit in the Kalman Filter
 - It was one of interest of moving the KF in ALERTEngine
 - For now, the AHDC-ATOF matching is only done with **wedges**. We ideally would like to use **ATOF bars**
3. Check that the PID is correctly used by the Kalman Filter (RungeKutta and energy lost)

- ▶ Run 22712 on D2 target, 2.23951 GeV beam energy
- ▶ Elastic cuts: $3.4 \text{ GeV}^2 < W^2 < 3.9 \text{ GeV}^2$ and $\Delta\phi < 45^\circ$
- ▶ Deposited energy dEdx versus momentum p of the track (after the Kalman filter)

