中国科学技术大学
University of Science and Technology of China

Isobar hypernuclei

2022/9/21

- Isobar list:

  /star/u/suyuann/pwg/Isobar.Blind/isobar_ana/picoRaw_phy_20220807.list

- Analysis:

  based on /star/u/xli/pwg/gpc_CSB/02_kfparticle/H4L

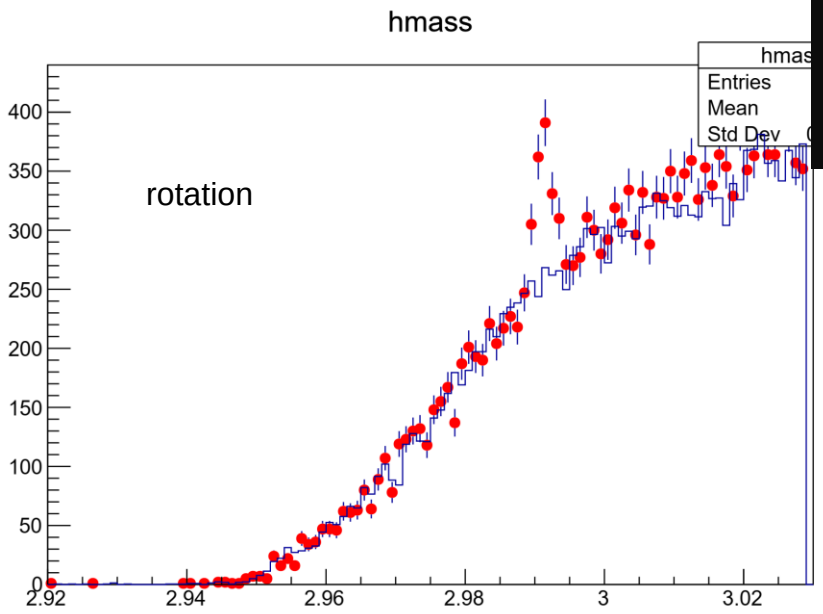
  in /star/u/dsli/pwg/Isobarhypernuclei/02_kfparticle/H3L_mix

  #evt in buffer = 5, same topo cuts

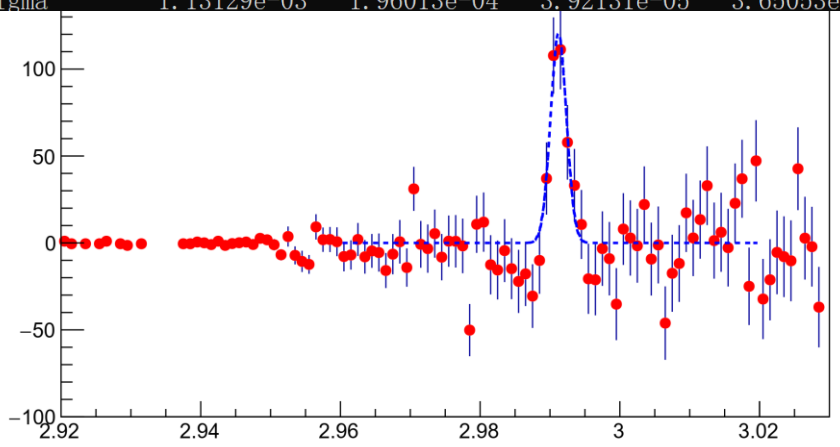
  #real evt ~2.9033784e+09

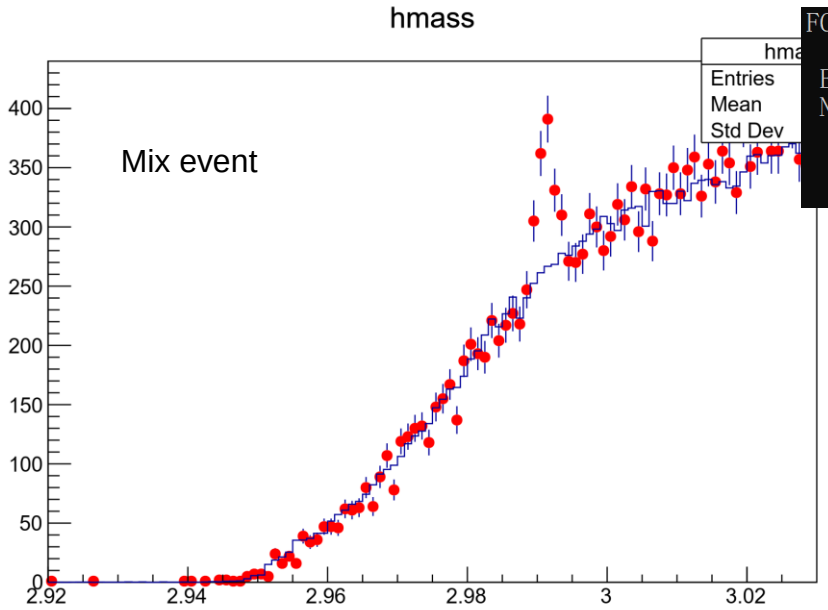
  #mixed evt ~2.8248821e+10

  #bkg scaled by 2.9033784e+09 / 2.8248821e+10

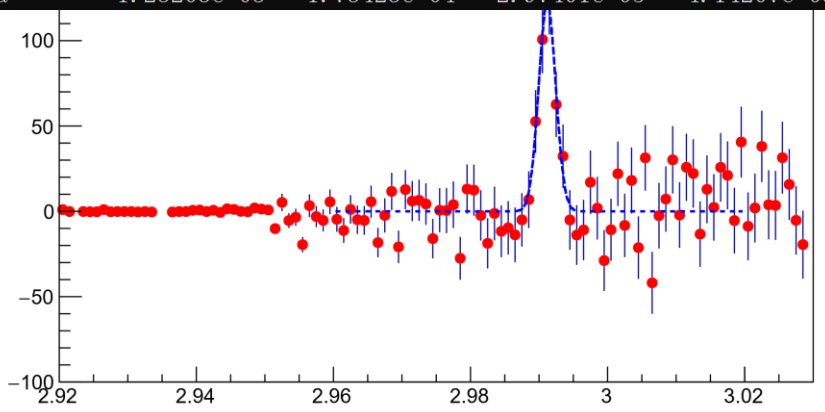


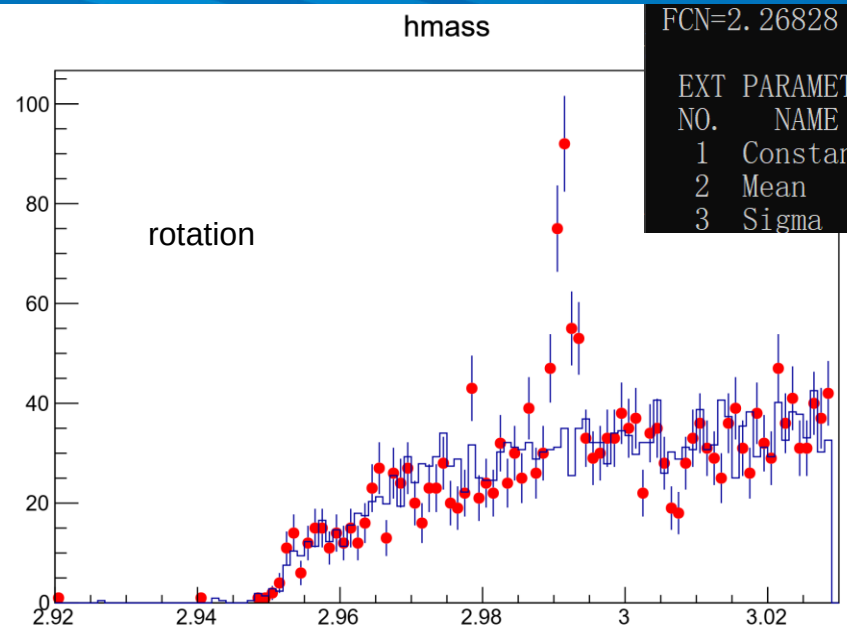

```
FCN=4.8357 FROM MIGRAD    STATUS=CONVERGED      80 CALLS          81 TOTAL
                     EDM=1.58061e-08    STRATEGY= 1      ERROR MATRIX ACCURATE
 EXT PARAMETER                                   STEP         FIRST
 NO.   NAME      VALUE            ERROR          SIZE      DERIVATIVE
  1  Constant     1.20689e+02   1.92731e+01   1.85057e-02   5.35280e-06
  2  Mean         2.99122e+00   2.11844e-04   1.42632e-06  -7.57245e-01
  3  Sigma        1.13129e-03   1.96013e-04   3.92131e-05   3.65053e-03
```



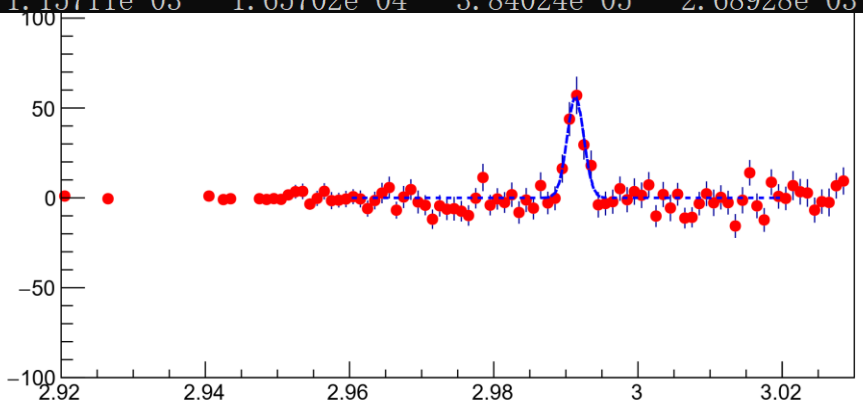


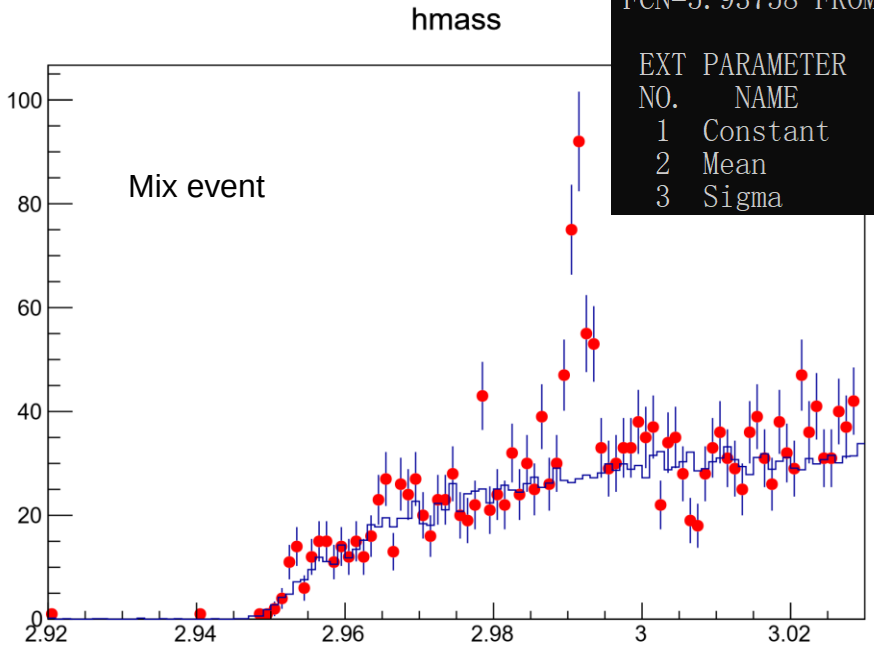

```
FCN=1.14402 FROM MIGRAD    STATUS=CONVERGED      63 CALLS          64 TOTAL
                     EDM=4.55379e-08    STRATEGY= 1      ERROR MATRIX ACCURATE
 EXT PARAMETER                                   STEP         FIRST
 NO.   NAME      VALUE            ERROR          SIZE      DERIVATIVE
  1  Constant     1.22820e+02   1.64936e+01   9.62410e-03  -7.58900e-07
  2  Mean         2.99119e+00   1.82312e-04   1.42631e-06  -1.22425e+00
  3  Sigma        1.23203e-03   1.73423e-04   2.97401e-05   4.14207e-03
```



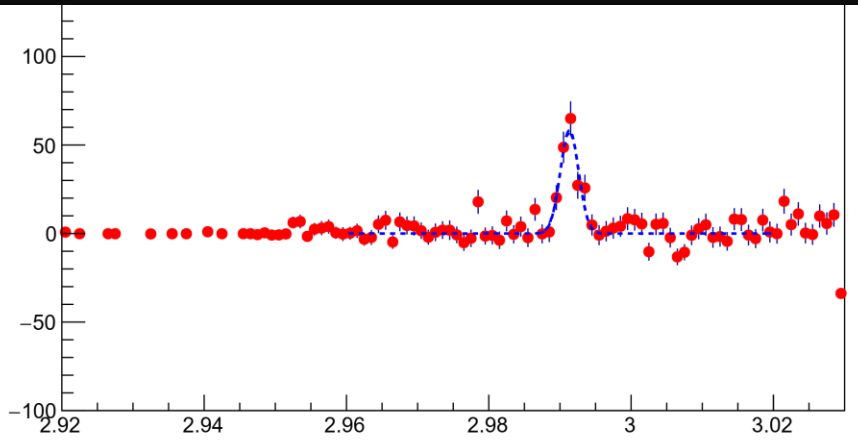



```
FCN=2.26828 FROM MIGRAD    STATUS=CONVERGED      70 CALLS          71 TOTAL
                     EDM=9.70106e-09    STRATEGY= 1      ERROR MATRIX ACCURATE
 EXT PARAMETER                                   STEP         FIRST
 NO.   NAME      VALUE            ERROR          SIZE      DERIVATIVE
  1  Constant   5.59213e+01   8.33095e+00   5.83667e-03  -1.92434e-05
  2  Mean       2.99133e+00   1.74493e-04   1.42638e-06   1.64121e-01
  3  Sigma      1.15711e-03   1.65702e-04   3.84024e-05  -2.68928e-03
```






```
FCN=5.93758 FROM MIGRAD    STATUS=CONVERGED      64 CALLS          65 TOTAL
                     EDM=1.73581e-07    STRATEGY= 1      ERROR MATRIX ACCURATE
 EXT PARAMETER                                   STEP         FIRST
 NO.   NAME      VALUE            ERROR          SIZE      DERIVATIVE
  1  Constant   5.82974e+01   7.67917e+00   7.39828e-03   7.55346e-05
  2  Mean       2.99134e+00   1.66150e-04   1.42638e-06  -2.47497e+00
  3  Sigma      1.28045e-03   1.69752e-04   4.15286e-05   1.28551e-02
```



Kfparticle reconstruction

1. The masses of ${}^{3}_{\Lambda}\mathrm{H}$ and ${}^{3}_{\Lambda}\overline{\mathrm{H}}$.

$2990.95 \pm 0.13(\mathrm{stat.}) \pm 0.11(\mathrm{syst.})\ \mathrm{MeV}/c^2$ for ${}^{3}_{\Lambda}\mathrm{H}$.

$2990.60 \pm 0.28(\mathrm{stat.}) \pm 0.11(\mathrm{syst.})\ \mathrm{MeV}/c^2$ for ${}^{3}_{\Lambda}\overline{\mathrm{H}}$.

$2990.89 \pm 0.12(\mathrm{stat.}) \pm 0.11(\mathrm{syst.})\ \mathrm{MeV}/c^2$ for combined ${}^{3}_{\Lambda}\mathrm{H}$ and ${}^{3}_{\Lambda}\overline{\mathrm{H}}$.

FCN=1.14402 FROM MIGRAD STATUS=CONVERGED 63 CALLS 64 TOTAL
EDM=4.55379e-08 STRATEGY= 1 ERROR MATRIX ACCURATE

EXT NO.	PARAMETER NAME	VALUE	ERROR	STEP SIZE	FIRST DERIVATIVE
1	Constant	1.22820e+02	1.64936e+01	9.62410e-03	-7.58900e-07
2	Mean	2.99119e+00	1.82312e-04	1.42631e-06	-1.22425e+00
3	Sigma	1.23203e-03	1.73423e-04	2.97401e-05	4.14207e-03

Hypertriton

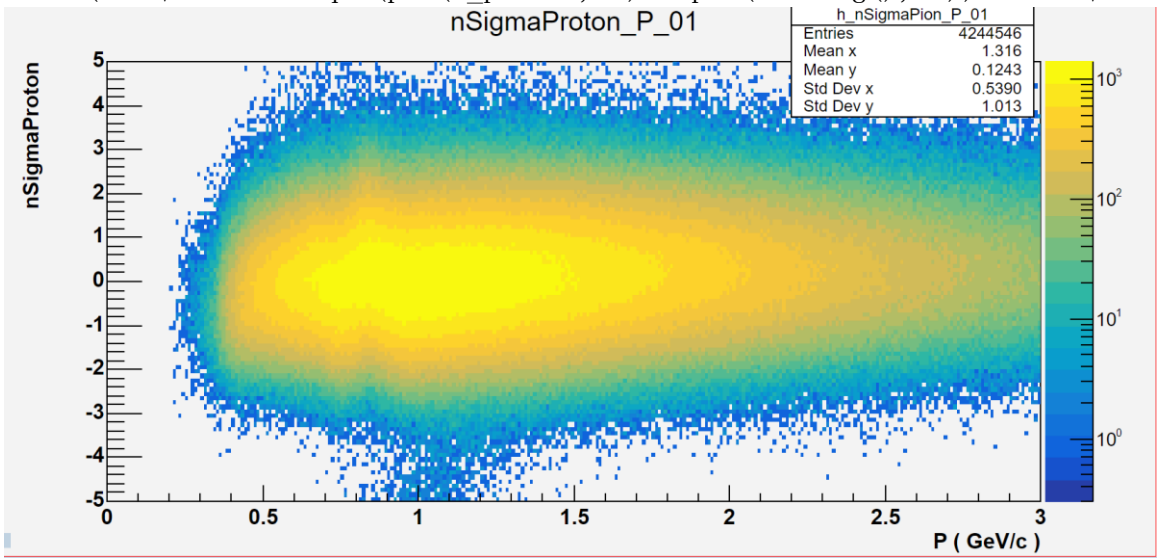
FCN=5.93758 FROM MIGRAD STATUS=CONVERGED 64 CALLS 65 TOTAL
EDM=1.73581e-07 STRATEGY= 1 ERROR MATRIX ACCURATE

EXT NO.	PARAMETER NAME	VALUE	ERROR	STEP SIZE	FIRST DERIVATIVE
1	Constant	5.82974e+01	7.67917e+00	7.39828e-03	7.55346e-05
2	Mean	2.99134e+00	1.66150e-04	1.42638e-06	-2.47497e+00
3	Sigma	1.28045e-03	1.69752e-04	4.15286e-05	1.28551e-02

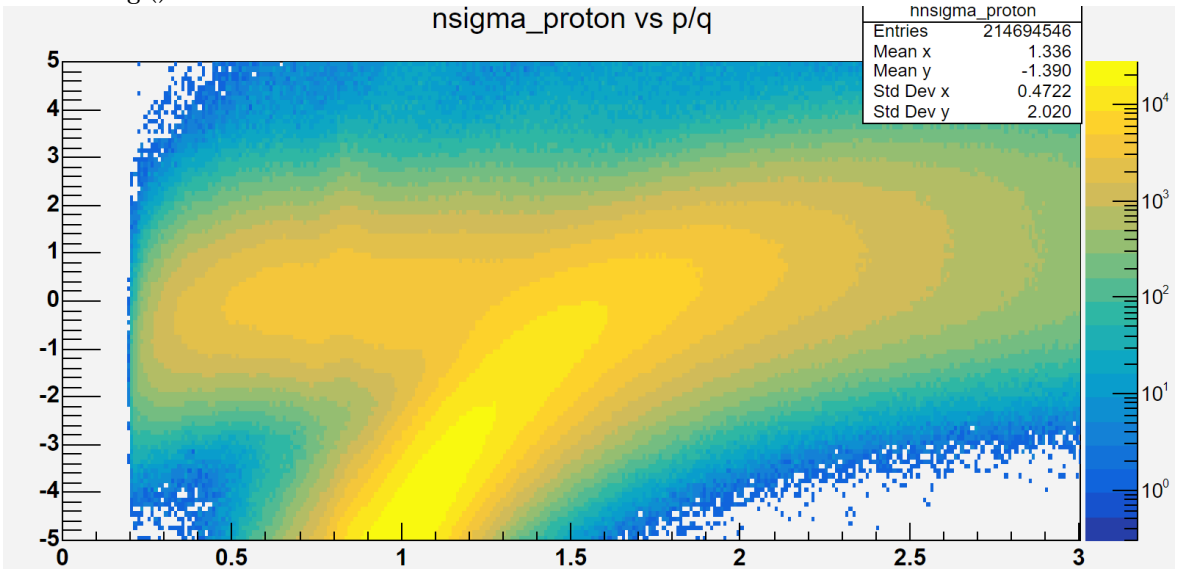
Anti-hypertriton

Kfparticle reconstruction

fabs(1.0 / beta - sqrt(pow(M_proton, 2) + pow(mom.Mag(), 2)) * 1.0 / mom.Mag()) < 0.01 && mom.Mag() > 0.2



mom.Mag() > 0.2



Kfparticle reconstruction