

# Misalignment impact

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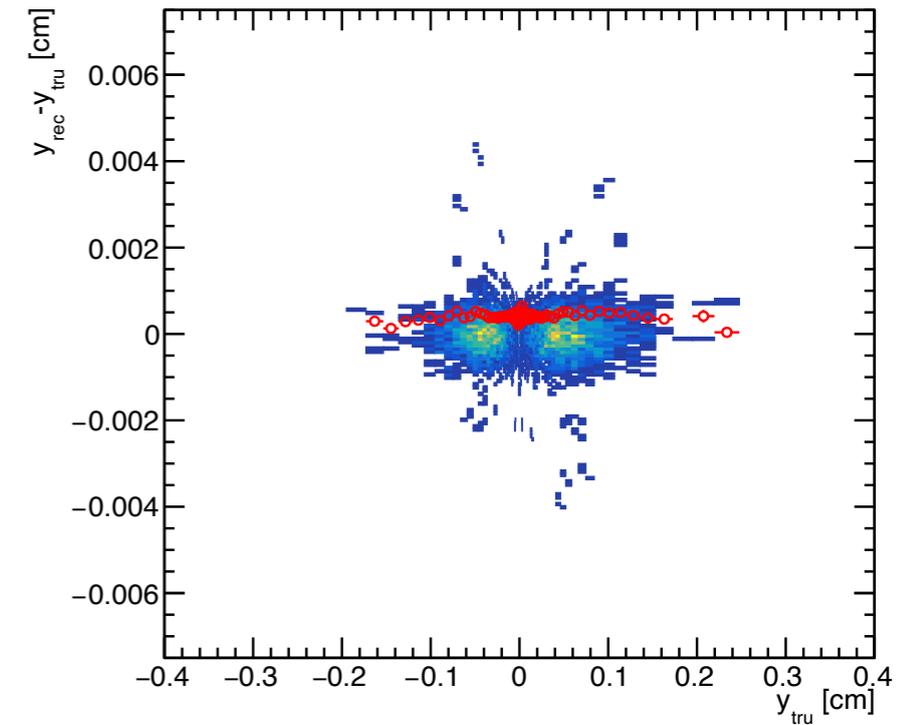
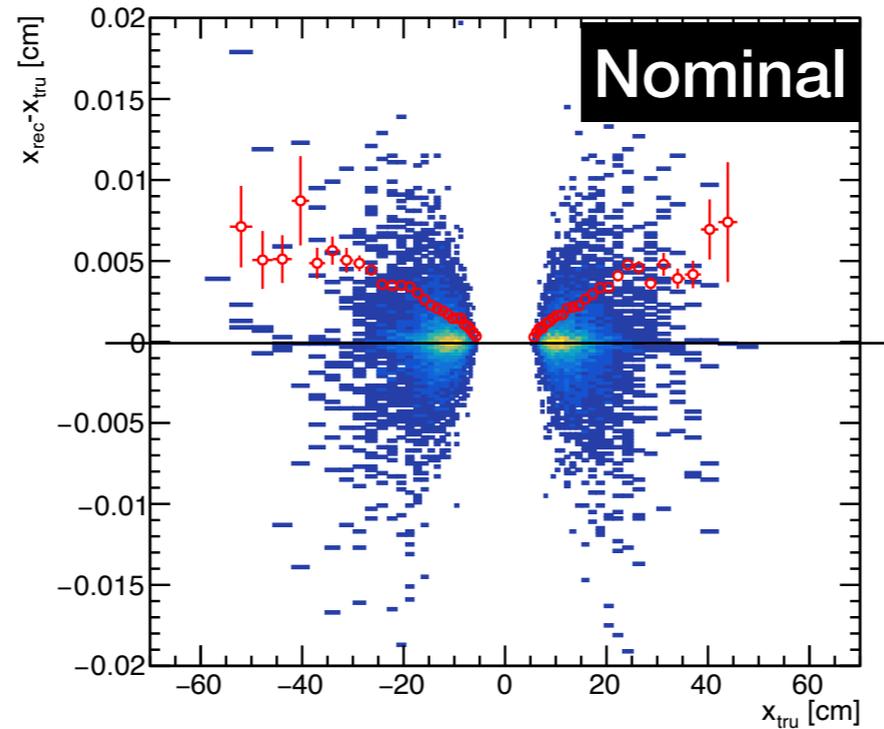


# Preliminary systematics study

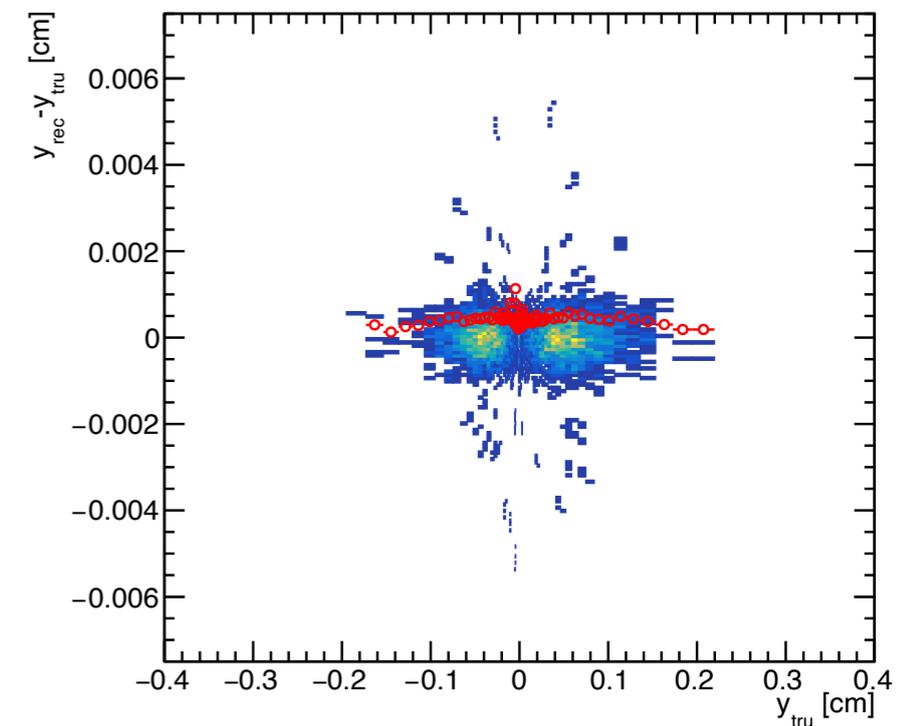
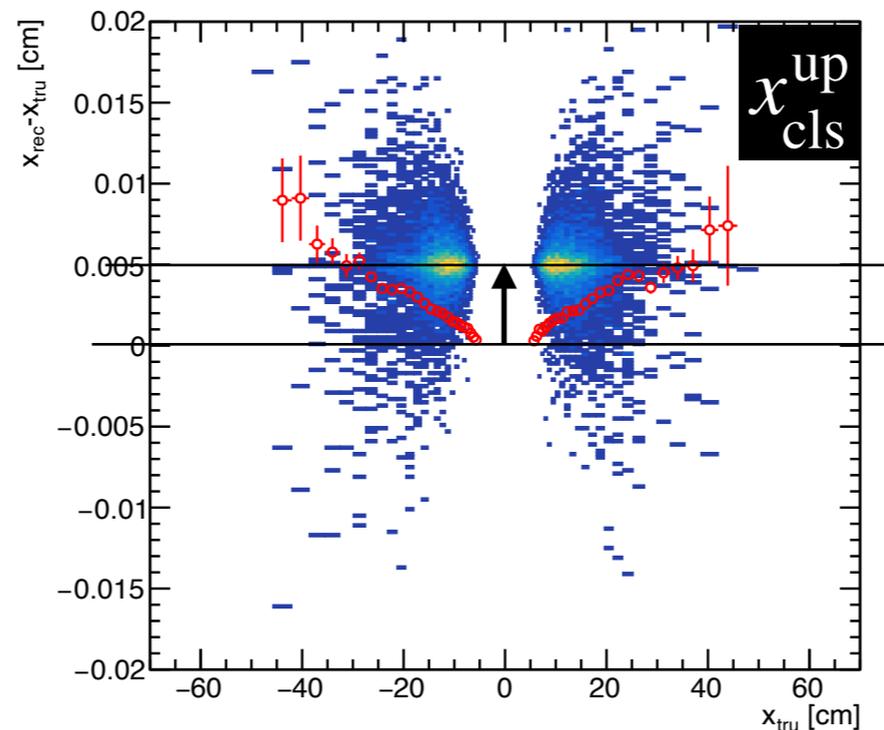
- ◉ See background in <https://indico.desy.de/indico/event/26057/>
- ◉ Including semi-realistic background
- ◉ Changed to nominal dipole volume and reduced from 2 T to 1.7 T
- ◉ Now: just 40 BPPP events from the previous (2019) signal campaign
- ◉ Assuming that
  - ◉ the tracker's staves are perfectly aligned on their tray
    - ◉ in reality we should be able to measure their position to below 10  $\mu\text{m}$
  - ◉ the entire IP detector 3D position is known within 50  $\mu\text{m}$
- ◉ This study in practice:
  - ◉ shifting all “digitised” clusters systematically by  $\Delta x = +50 \mu\text{m}$  along x
  - ◉ rerunning the reconstruction and comparing to the nominal case  $\Delta x = 0$
  - ◉ compare the resolutions and the energy resolution (ignore selection for now)

# $\Delta x(\text{or } y) \text{ vs } x(\text{or } y)$

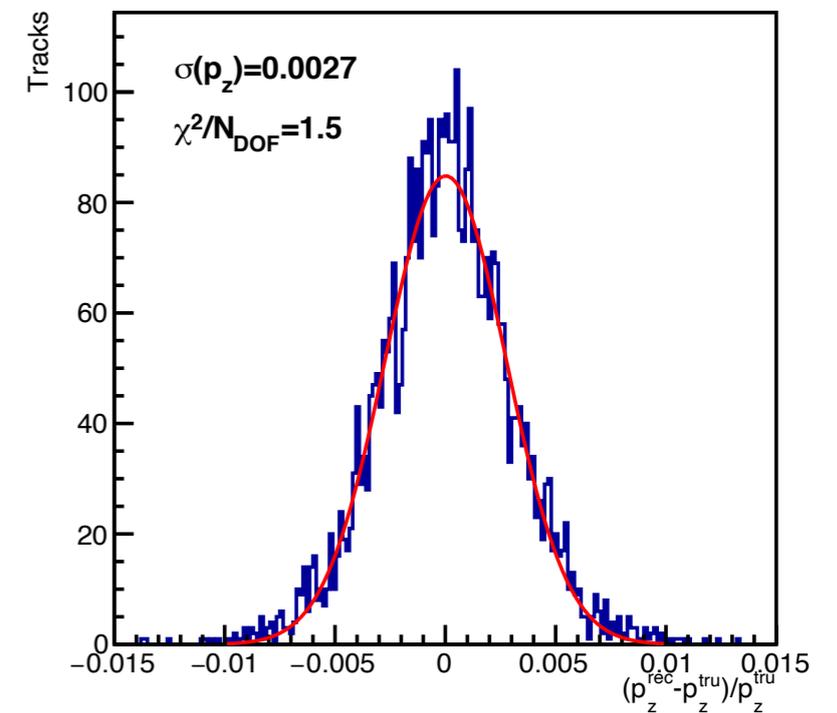
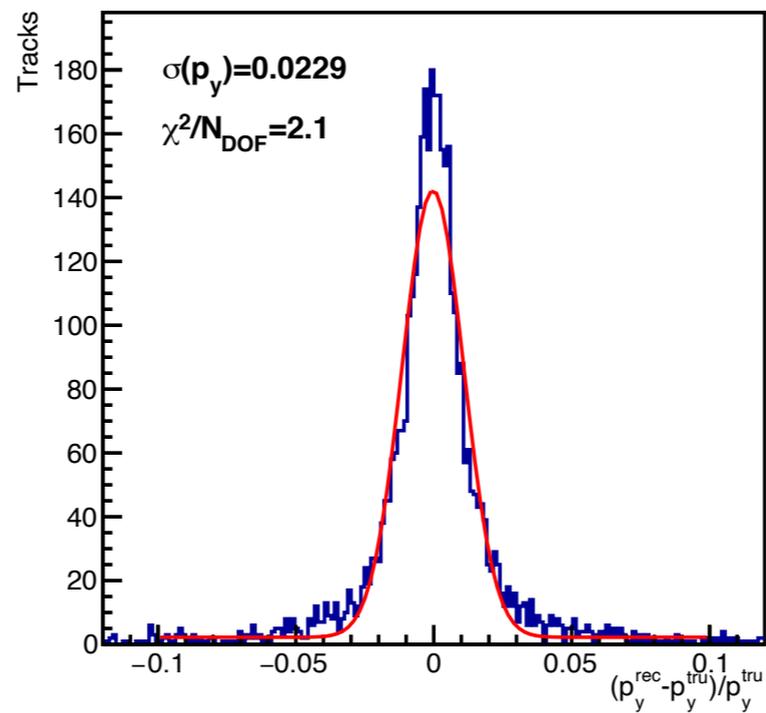
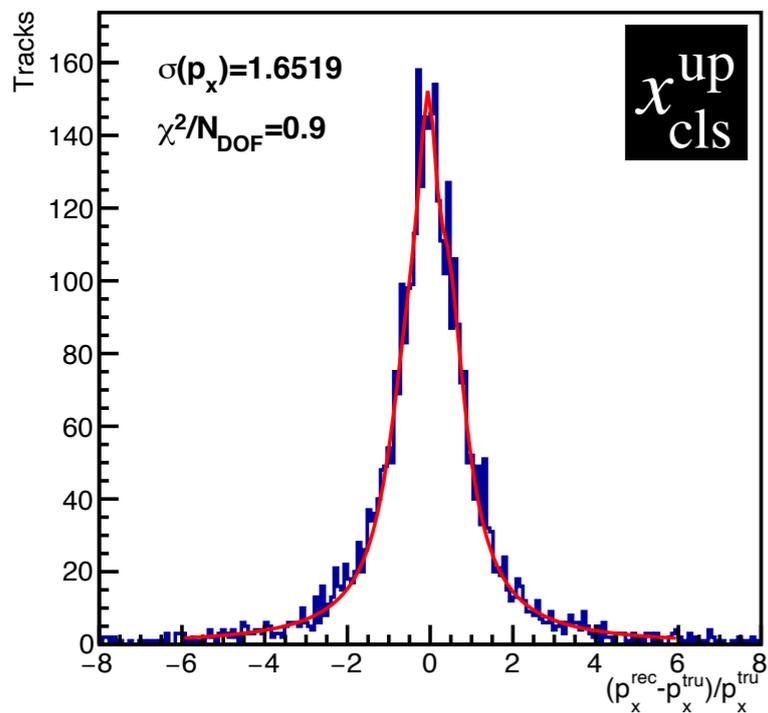
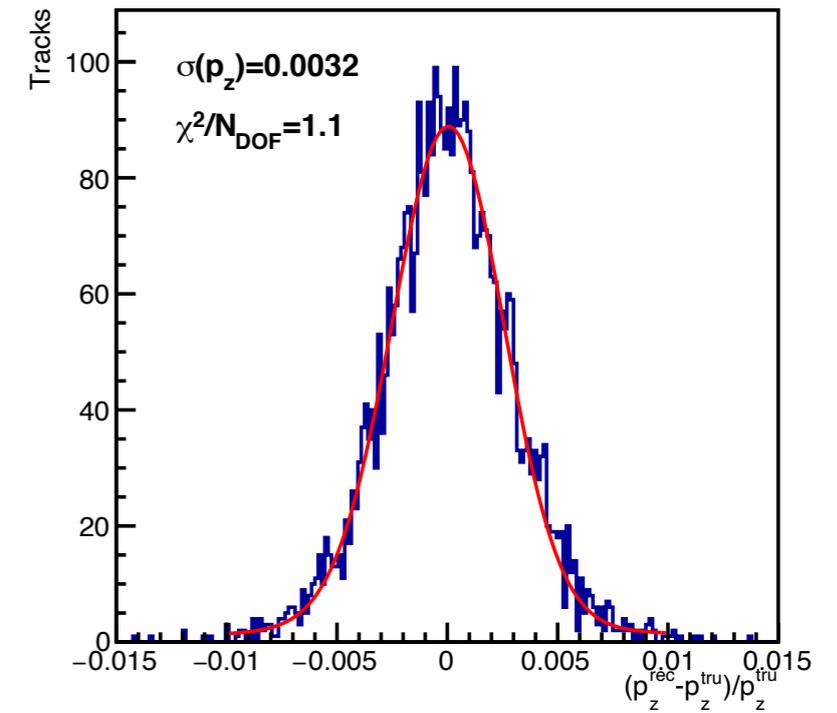
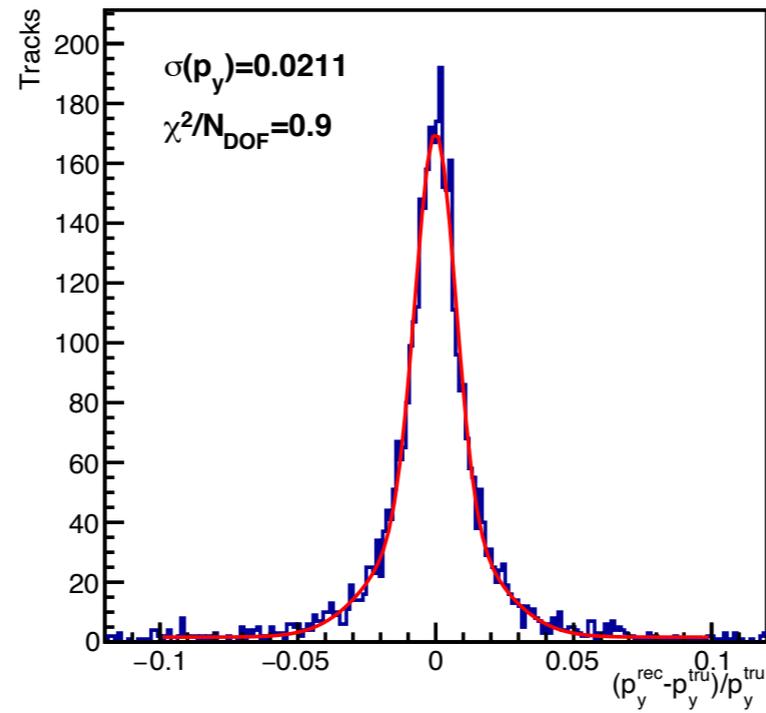
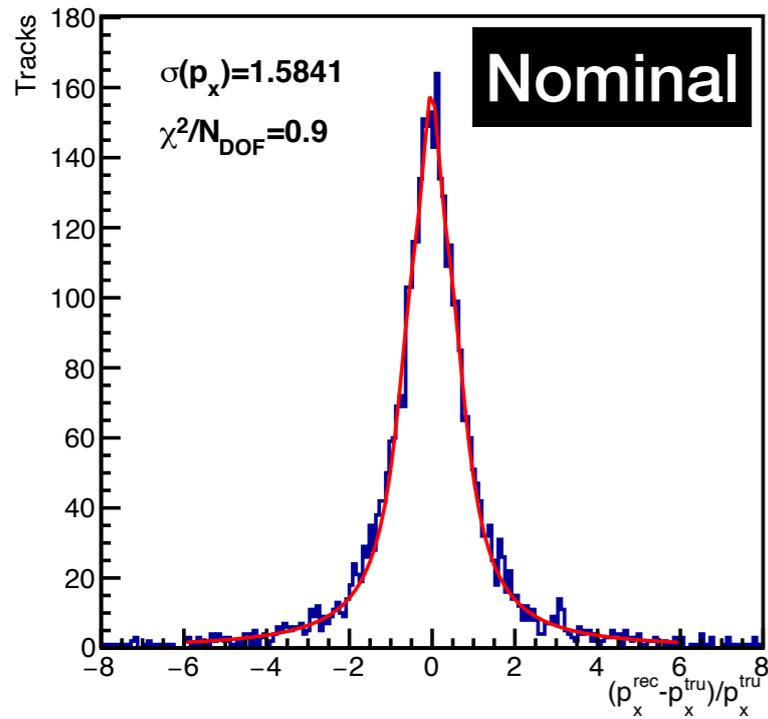
● Nominal  
(40 events only!)



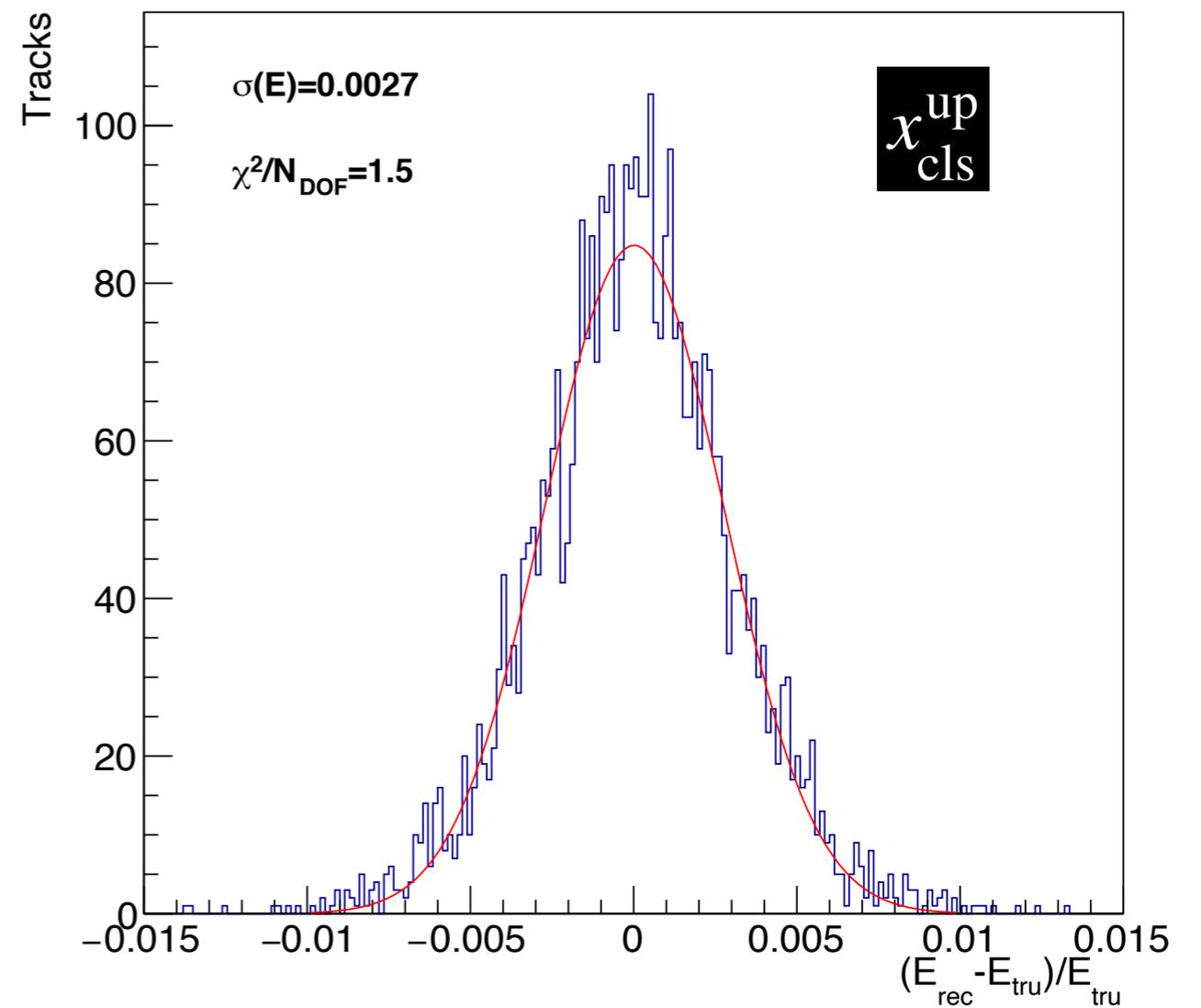
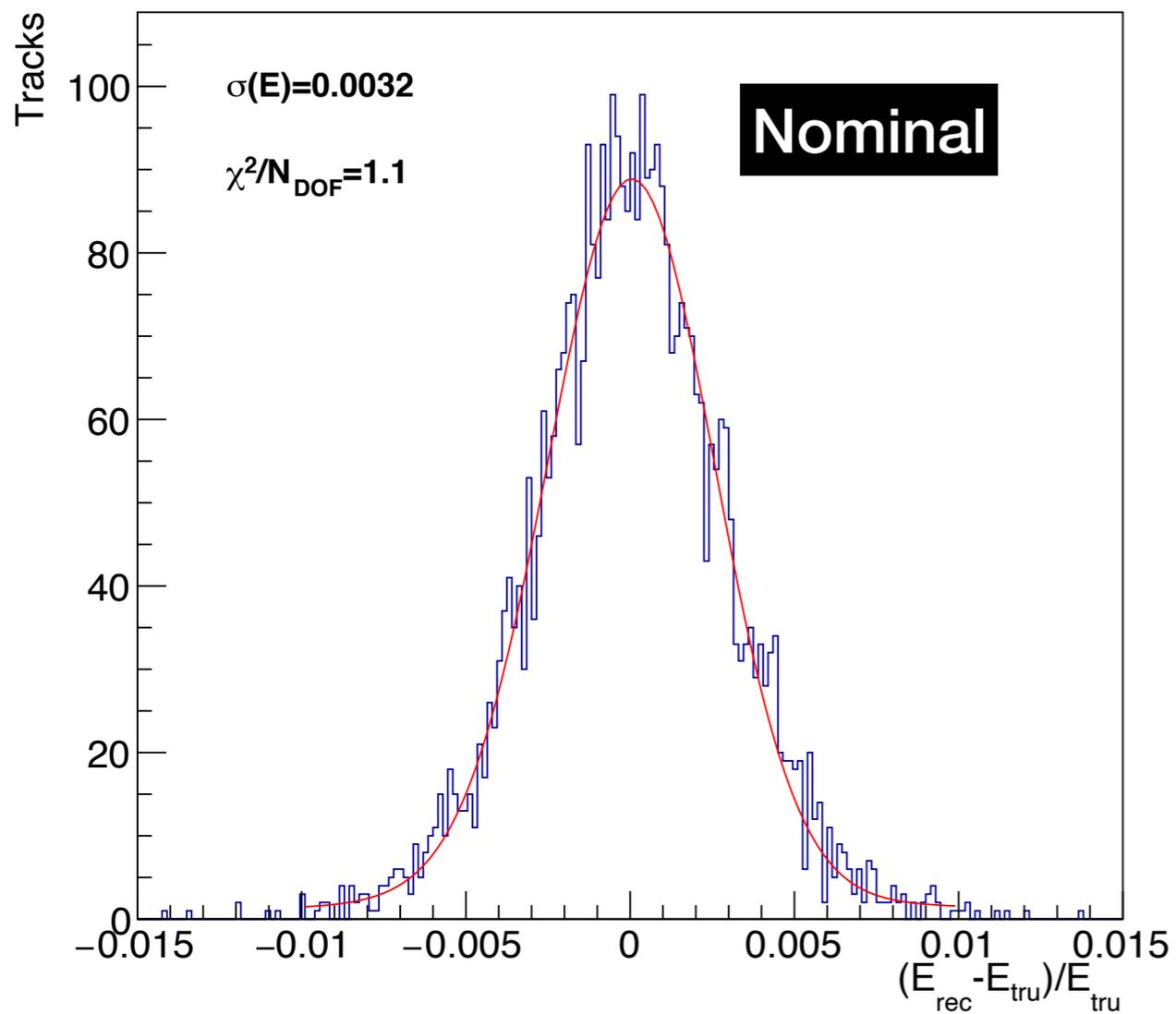
●  $x_{\text{cls}}^{\text{up}}$  : taking  
 $x \rightarrow x + 50 \mu\text{m}$   
(Same 40 events!)



# 3 Momentum resolutions



# Energy resolution

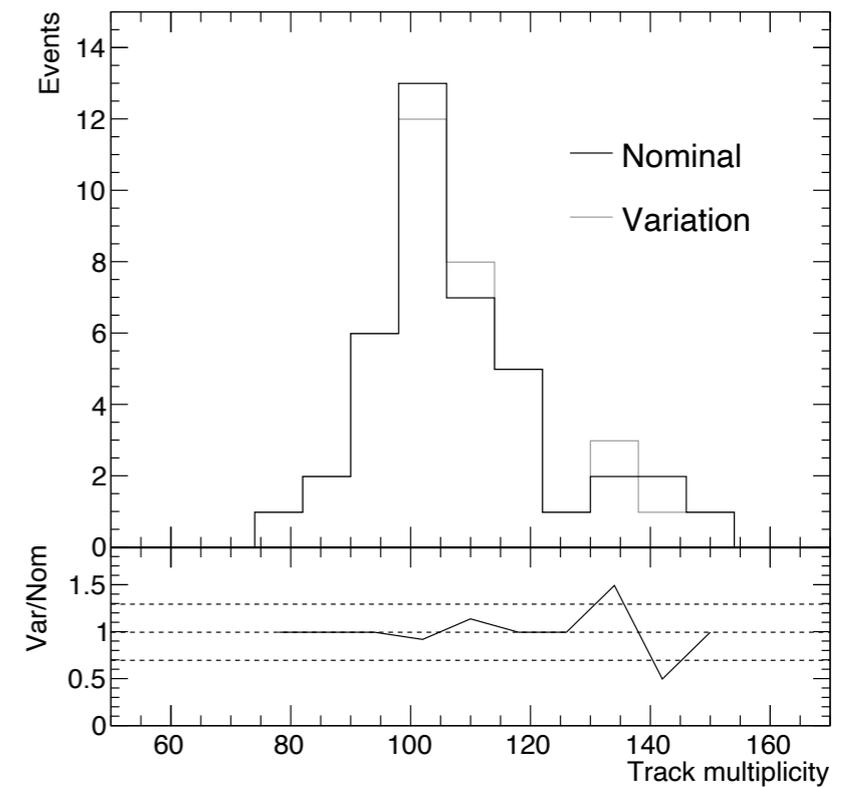
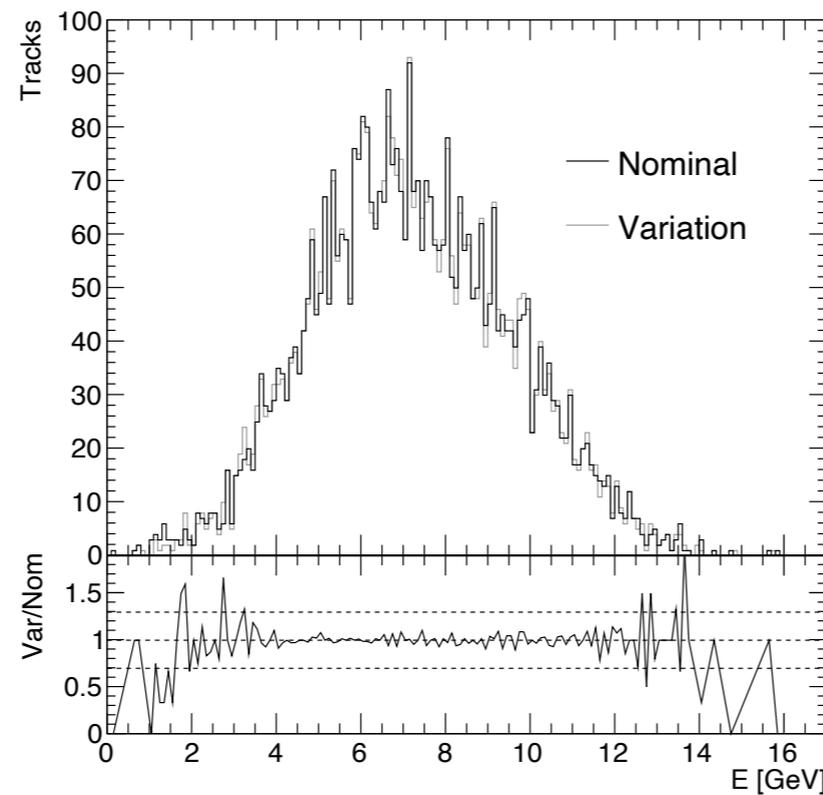


# Comparison

	Nominal	xup	xdown	diff [%]	
$\text{RMS}(x_{\text{rec}}-x_{\text{tru}})$	$\sim 5-50 \mu\text{m}$	$\sim 5-50 \mu\text{m}$	$\sim 5-50 \mu\text{m}$	—	
$\sigma(p_x)$	1.5841	1.6519	1.4861	+4.3% -6.2%	<b>Don't care</b>
$\sigma(p_y)$	0.0211	0.0229	0.0222	8.5%	
$\sigma(p_z)$	0.0032	0.0027	0.0028	15.6%	<b>Could be smaller with the full stat and after selection</b>
$\sigma(E)$	0.0032	0.0027	0.0028	15.6%	

# Energy and number of tracks

● After reconstruction (40 events only!)



● After selection (40 events only!)

