

TPOL offline analysis status report



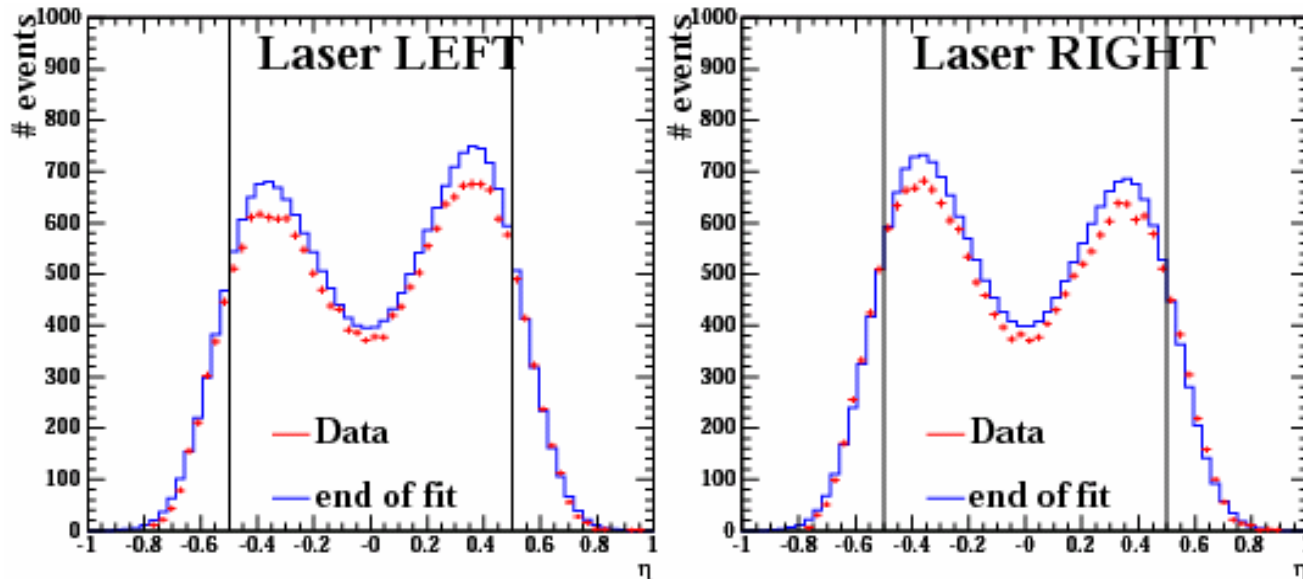
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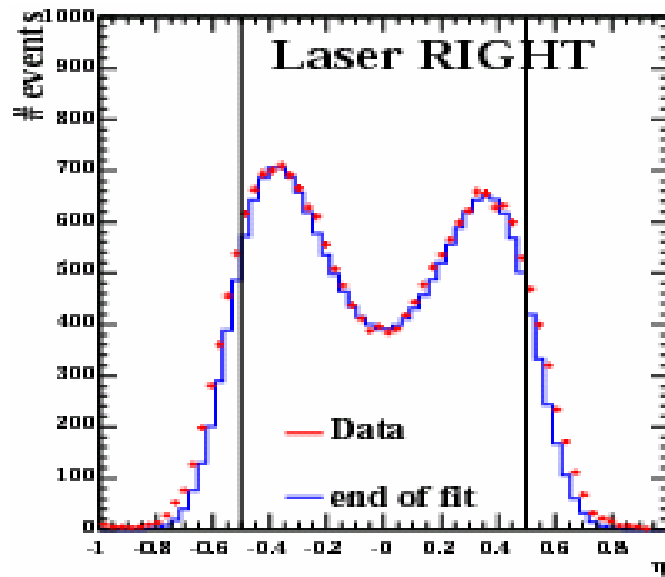
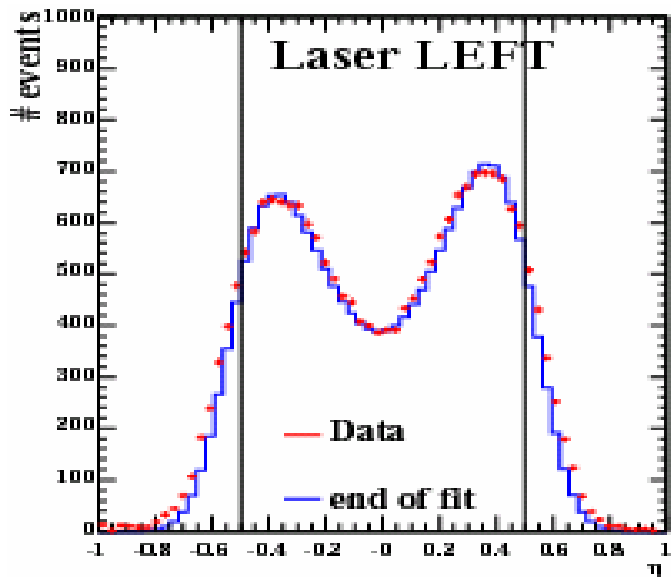
Outline

- Remainder : Two puzzles
 - The energy resolution
 - The skew factor
- Modified final parameter set
- Focus dependence
- Summary/On going

Remainder

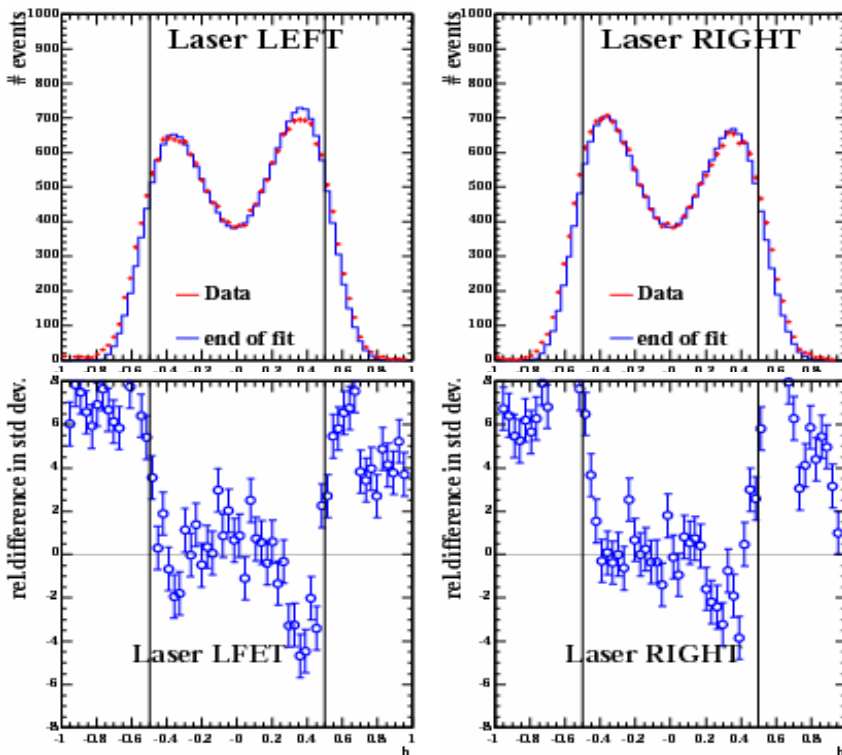


- With two parameters, the energy resolution and the skew factor free, the fitting results did not match to the data.
- \rightarrow needed to be fixed, then which value?



- Finally,
 - Energy resolution \rightarrow 20.3% (from Compton edge),
 - Skew factor \rightarrow 0.0
- With these two value, the fitting method seemed to reproduce the data.
- In estimating systematic errors from these sources,
 - Energy resolution \rightarrow 0.28% (fixed to CERN test beam)
 - Skew \rightarrow 4.21% (free)

- Finally, because a bug was included in my code, histograms looked strange with the skew and the resolution free.
- After the bug being fixed, it seems to be ok with
 - the skew is **fixed to be 0**.
 - the energy resolution
 - the stochastic term is **fixed to be 23.77%** (CERN test beam)
 - the constant term is **free**.

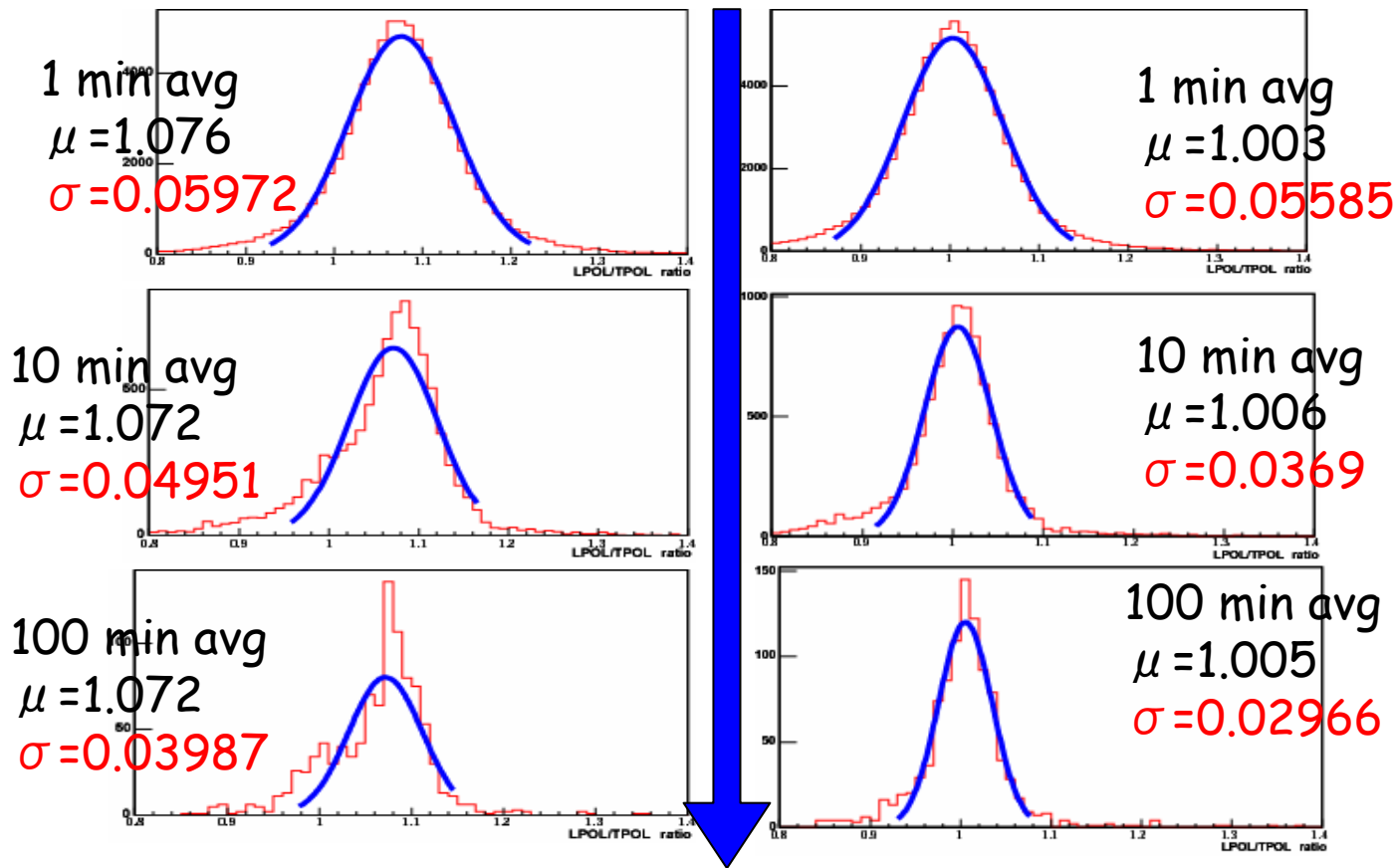


- Even if the skew is free, the fitting method also seems to reproduce the data.
- If it is true, why systematic error was so large when it was free.
- To investigate the problem, look at the L/T ratio with more averaging time.

→ Next slide

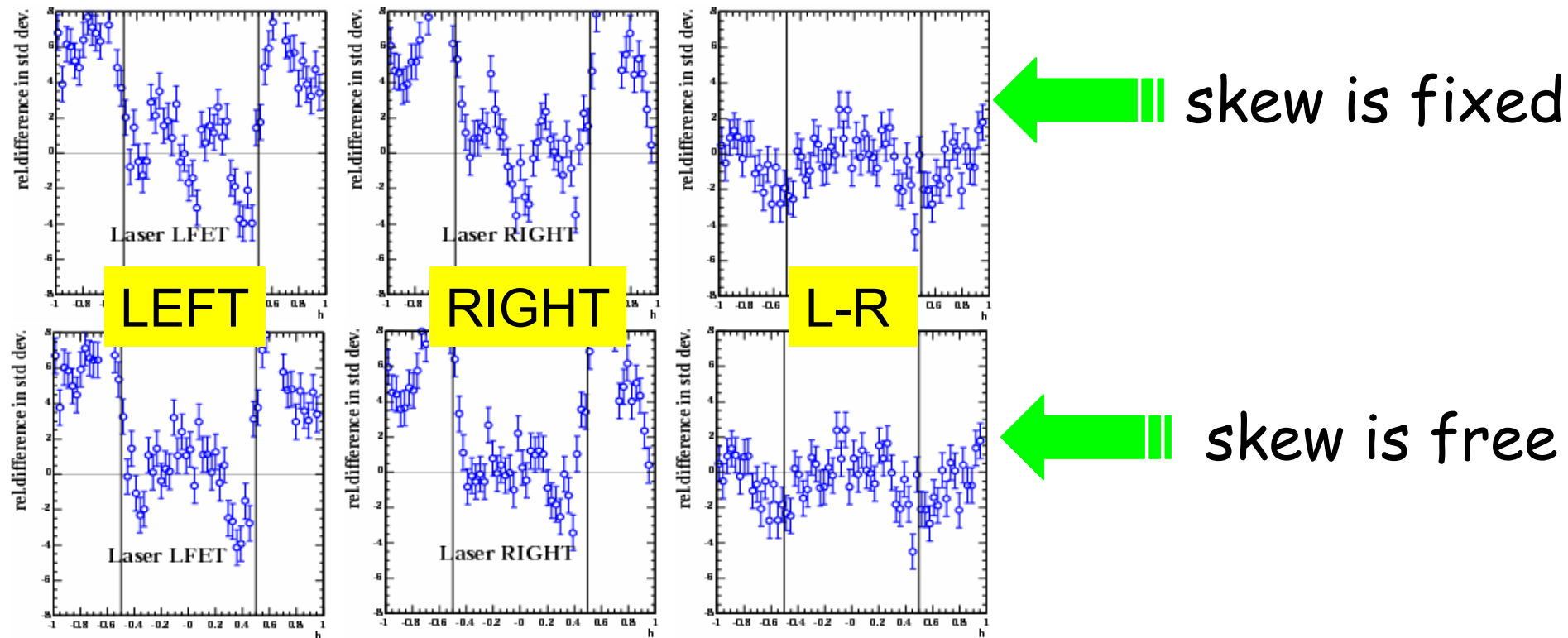
skew free

skew fix to 0

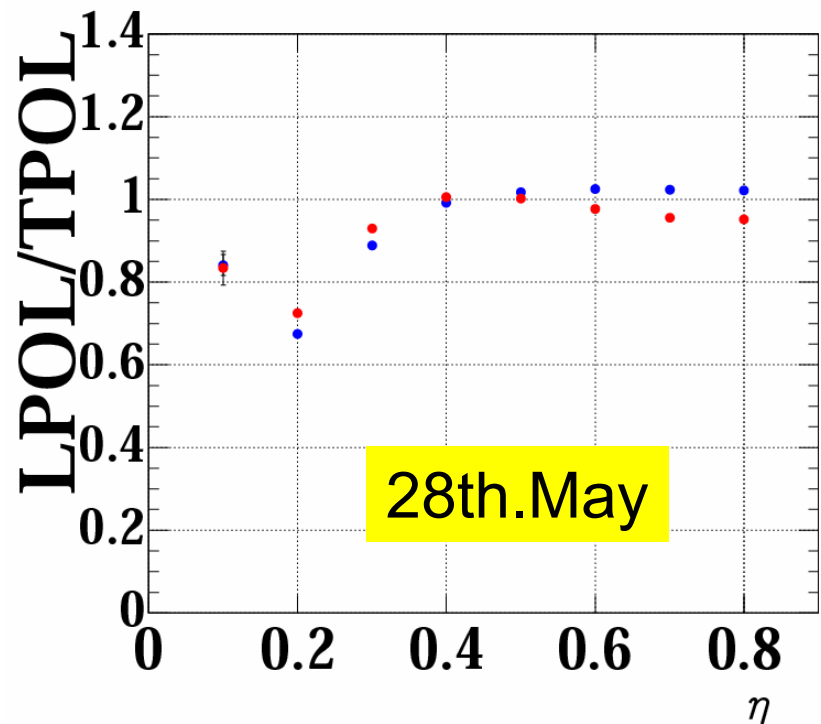
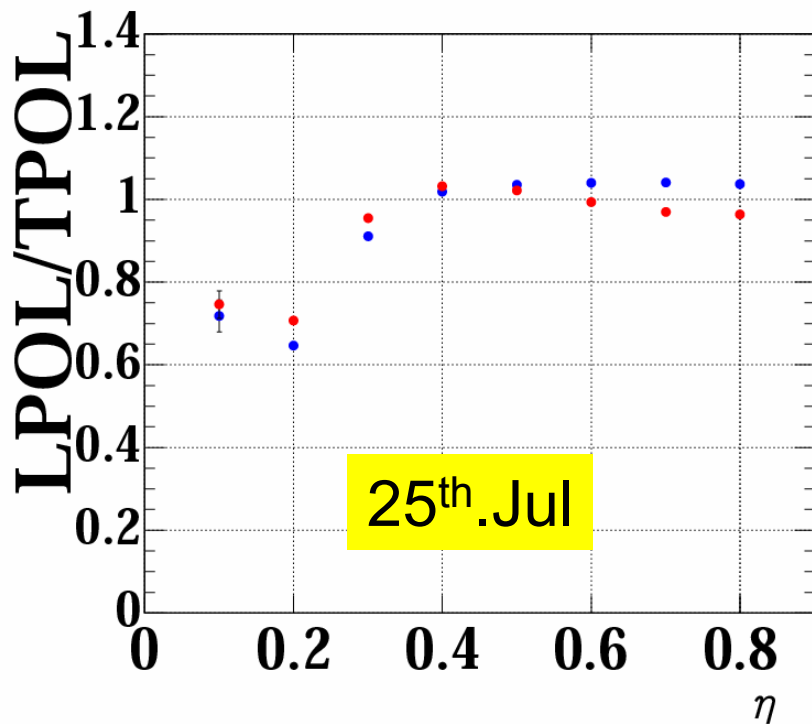


More averaging time

- Looking at histograms with the skew free, there exist **some dips** with more averaging time. It indicates some unknown systematic errors are still included in the results.



- The skew factor probably causes strange bias to the results though each pull can be improved than before.
- Due to this strange bias, the error comes from the skew **should not consider** as a systematic uncertainty.
- Probably, this parameter is extra, over-parameterization

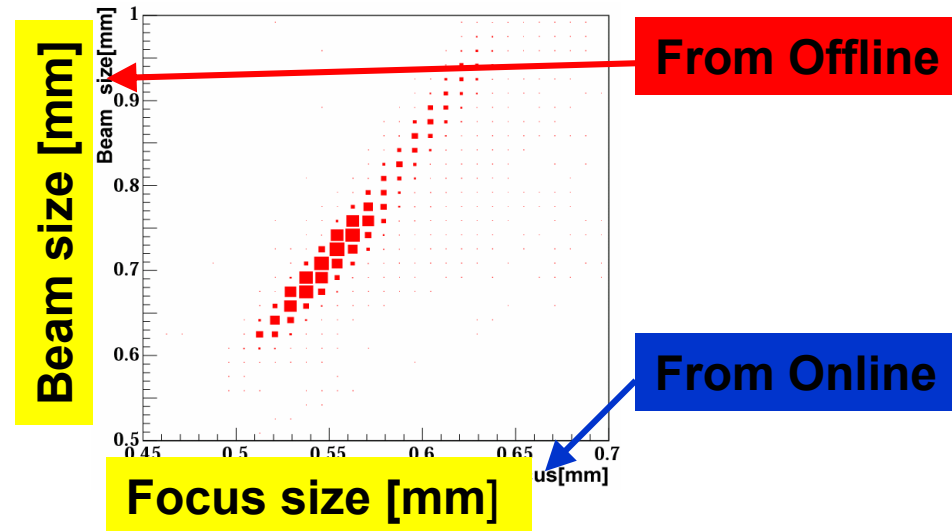
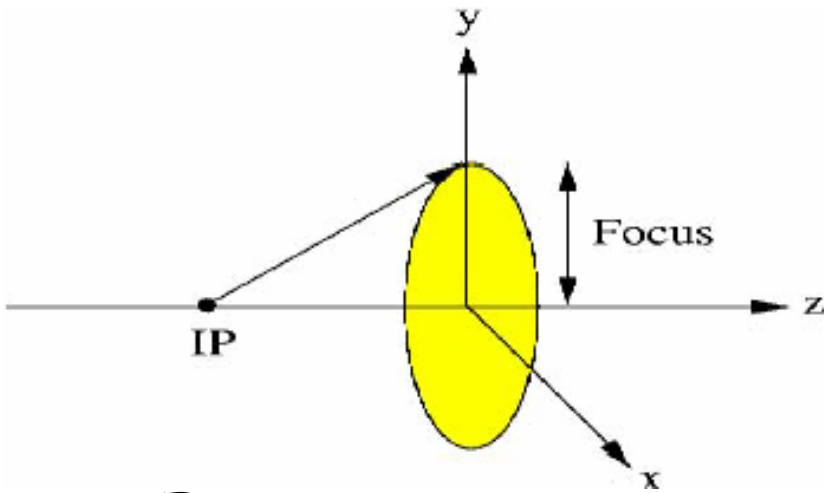


- Checked η range again with new condition(the skew is 0 and the resolution is 23.77%)
 - Comparing two mode, the Normal mode is stable than the Table scan mode.
 - As a nominal, selected the Normal mode for the $\eta - y$ curve.
- Finally, two puzzles are solved.
 - The skew is fixed to 0.
 - The energy resolution fixed to 23.77%

final parameter set

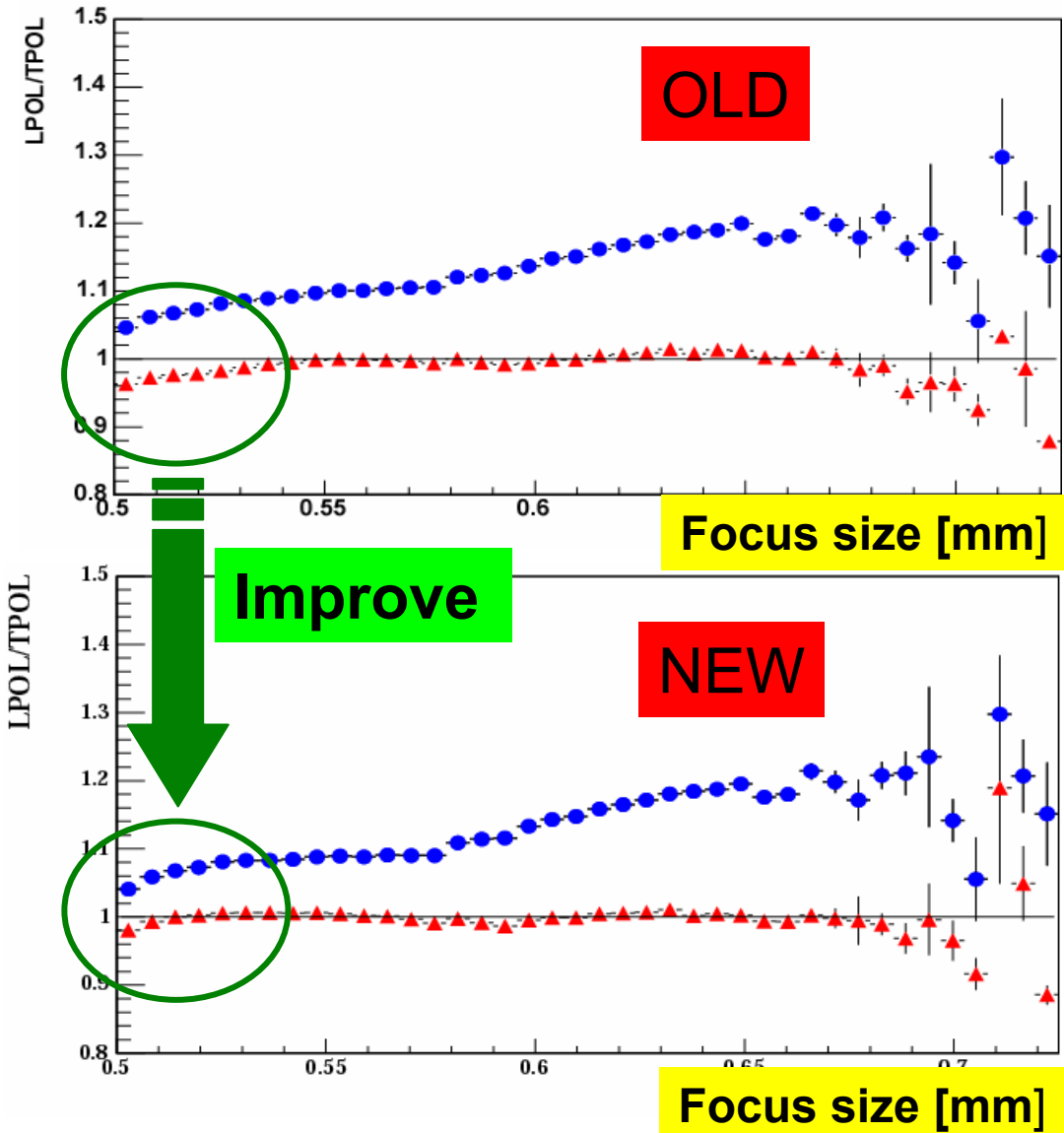
| | |
|------------------------------|-----------------|
| $\eta - \gamma$ 4 parameters | Normal mode |
| η range | +/- 0.5 |
| beam offset | free |
| beam size | free |
| CAL miscalibration | free |
| distance | fixed to 65m |
| skew factor | fixed to 0.0 |
| a (stochastic term) | fixed to 23.77% |
| b (constant term) | free |

Focus dependence



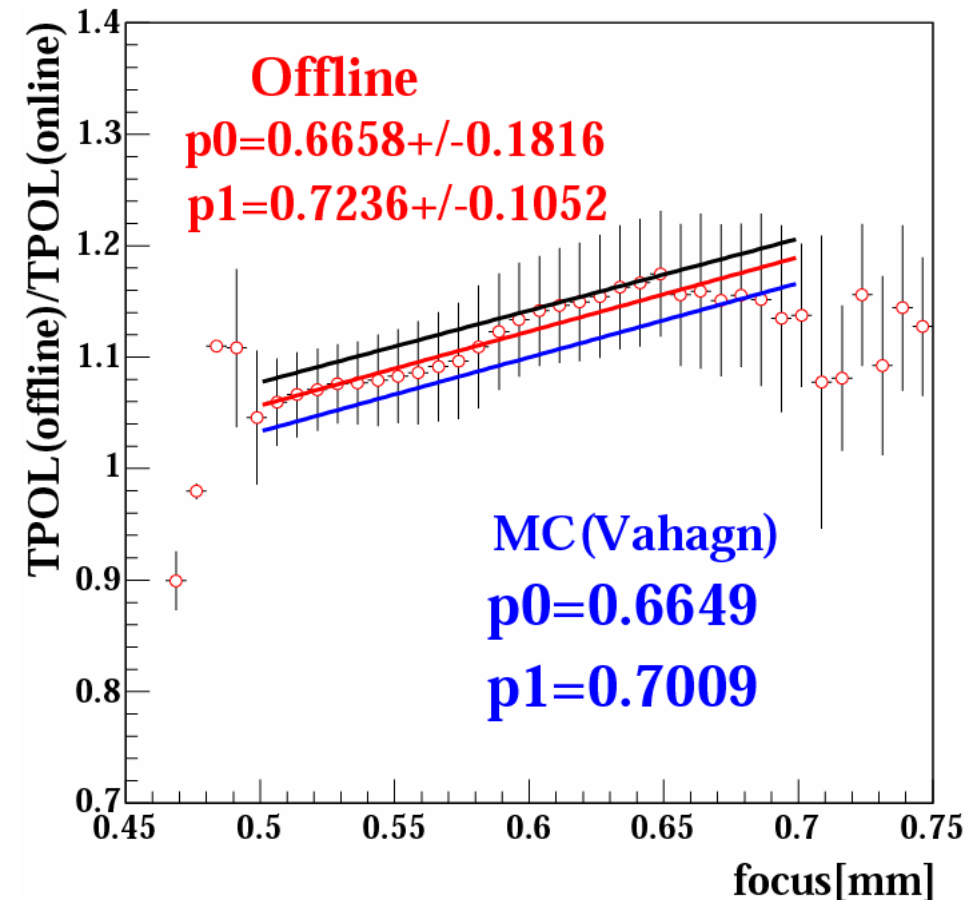
- Focus size
 - Vertical beam width on the calorimeter surface.
- Beam size
 - Vertical beam width at the Interaction Point.
- It is possible to check focus size dependence through the beam size.

cont'd...



- Comparing with old result, the fitting method with new condition can absorb the focus dependence which is clearly seen in the online.
- Focus dependence is *hardly seen*

Focus correction



- With new parameter set, the focus correction function is improved than before (black line).
- The slope and offset of the function agree with results from MC within its error.

Summary 1

- Before due to a bug, the fitting method did not match the data.
- After the bug being fixed, the method reproduces the data with
 - The energy resolution → fixed to the CERN test value (~24%)
 - The skew factor → fixed to be 0.
- Why the systematic error from the skew was so large?
 - If the skew is free, histograms have some dips and the results include unknown systematic errors.

Summary 2

- The skew has to be **fixed to 0** and should not consider as a total systematic uncertainty.
- This parameter is extra ones and **should be excluded**, otherwise it causes strange bias to the results.
- Looked at the focus dependence with new parameter set.
 - Focus dependence is **hardly seen**.
 - Focus correction function is improved more than before and **almost agree with the results from MC**.

On going

- Estimating systematic errors.
- Still struggling writing master thesis.
- Preparing for qualification examination (the presentation and the committee). It will take place on the end of Jan.