



Folding vs Moments; Background studies

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University of
Zurich^{UZH}



1 Reminder

2 Fit Wars

3 Background

4 Summary



Plan

Method of moments:

- 1 On the last meeting I've showed the background moments in different q^2 bins and mass bins.
- 2 We did an update with smaller binning.
- 3 Also we compared
- 4 Many thanks to Tom for checking all my calculations.

For today:

- 1 How this method behaves in terms of background?



Fit vs MM

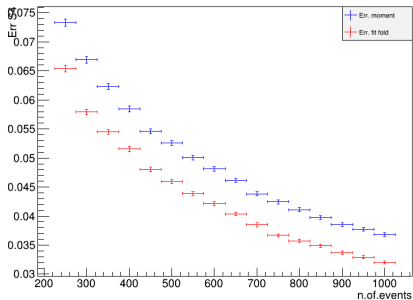
Not so long ago, in a building far away:

A test was perform

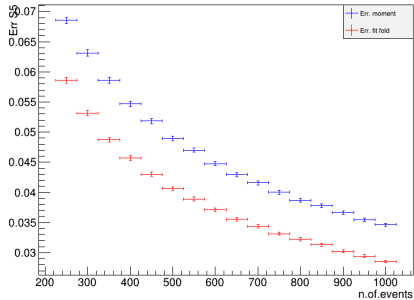
- Simulated toys according to SM PDF.
- Fold fit, calculated the moments, compare the error on pull distribution.
- See how the error changes with number of events.
- Make pull plots for each case as Tom asked.

Obtained sensitivity I

S4 Error



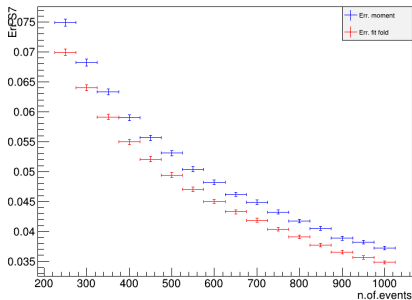
S5 Error



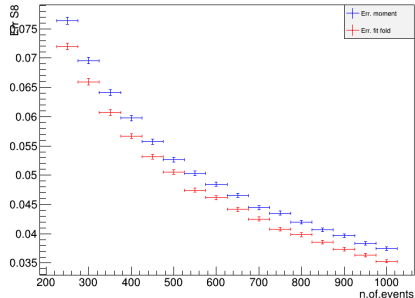
- Folding wins slightly over MM.

Obtained sensitivity II

S7 Error



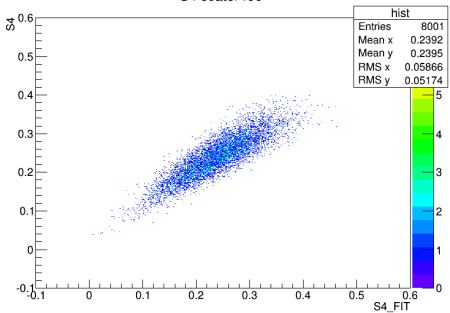
S8 Error



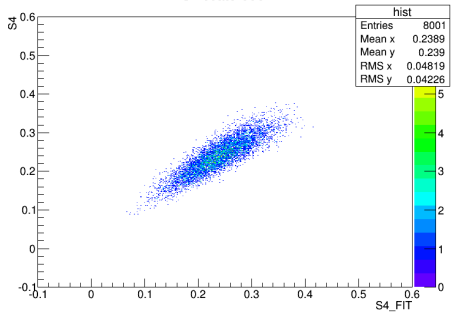
- Folding wins slightly over MM.

Scatter plots I

S4 scater400



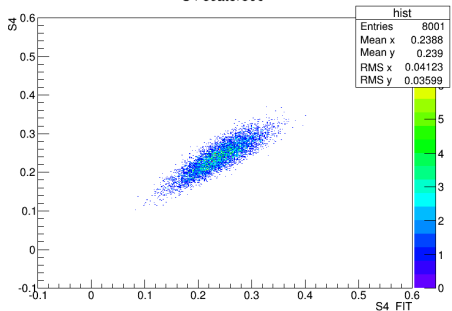
S4 scater600



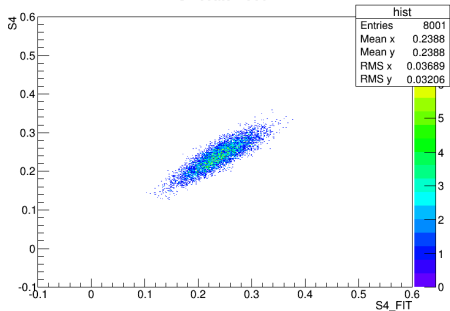
- Highly correlated, everything in order.
- Far more plots of this in the backups.

Scatter plots II

S4 scater800



S4 scater1000

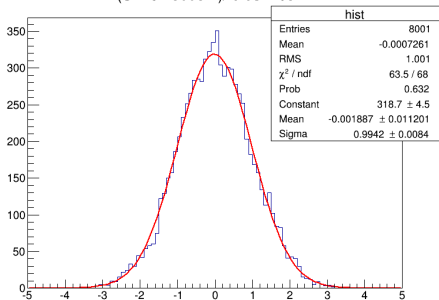


- Highly correlated, everything in order.
- Far more plots of this in the backups.

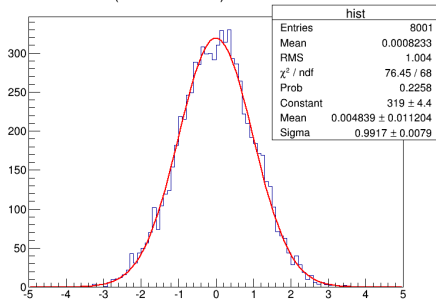
Pull distributions I

- For each point(n of events) we made a pull distribution.

(S4- 0.238932)/ 0.0377031

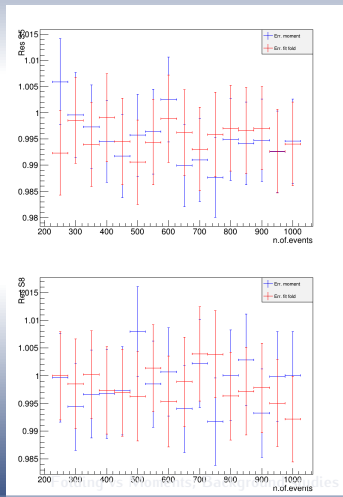
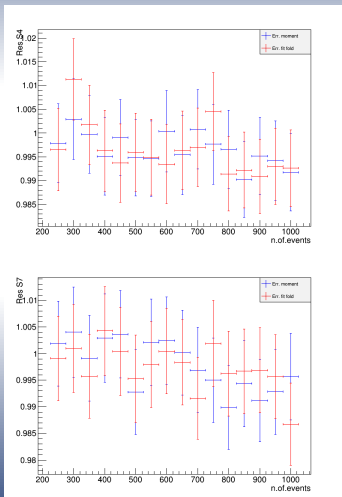


(S5- -0.416675)/ 0.0518357





Pool distributions II





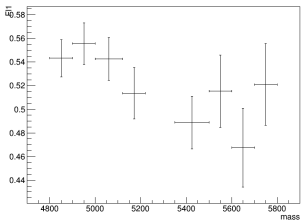
Bck moments

- Last time I showed the moments in the side-bands.
Today I prepared update with smaller q^2 binning:
0.1, 0.98, 1.1, 2, 4, 6, 8, 11, 11.75, 12.5, 15, 17, 18

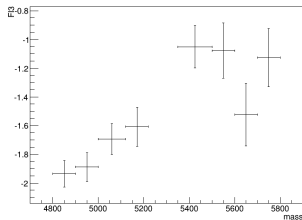


Bck moments

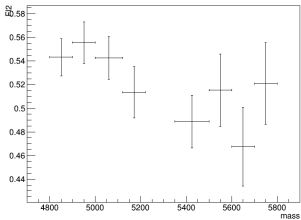
Q[0_1-0_98]_F1



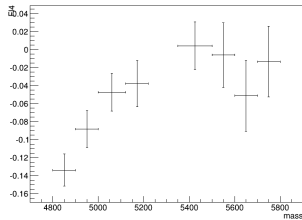
Q[0_1-0_98]_F3



Q[0_1-0_98]_F2



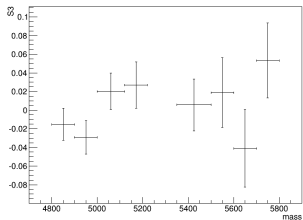
Q[0_1-0_98]_F4



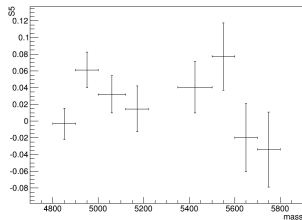


Bck moments

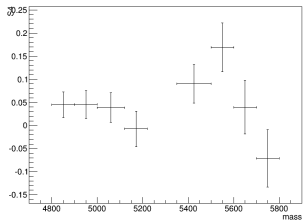
Q[0_1-0_98]_S3



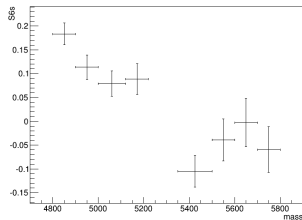
Q[0_1-0_98]_S5



Q[0_1-0_98]_S4



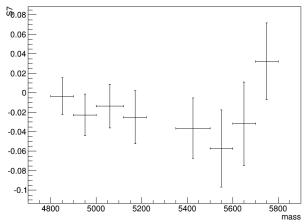
Q[0_1-0_98]_S6s



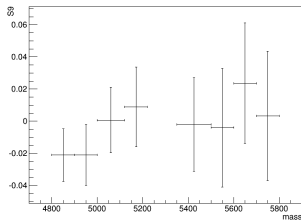


Bck moments

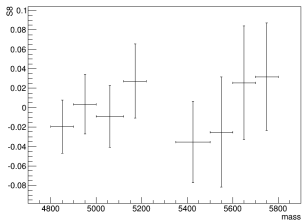
Q[0_1-0_98]_S7



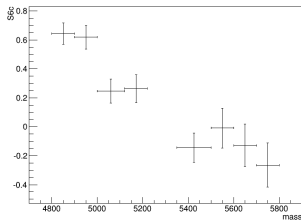
Q[0_1-0_98]_S9



Q[0_1-0_98]_S8



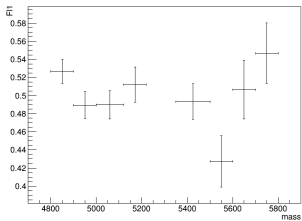
Q[0_1-0_98]_S6c



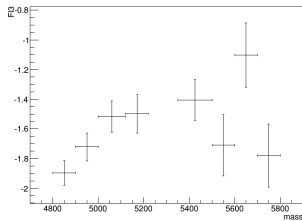


Bck moments

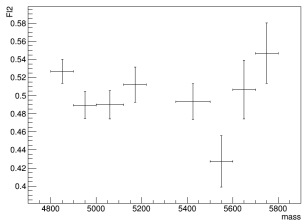
Q[1_1-2]_F1



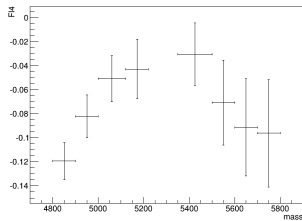
Q[1_1-2]_F3



Q[1_1-2]_F2



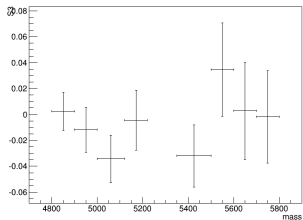
Q[1_1-2]_F4



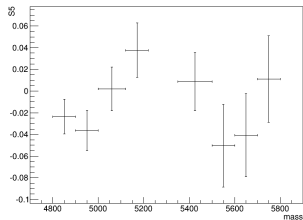


Bck moments

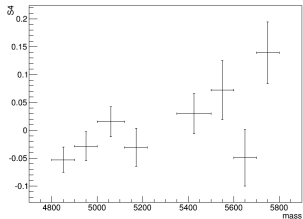
Q[1_1-2]_S3



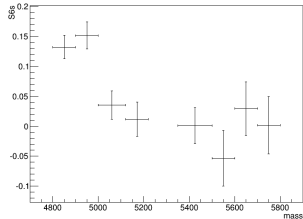
Q[1_1-2]_S5



Q[1_1-2]_S4



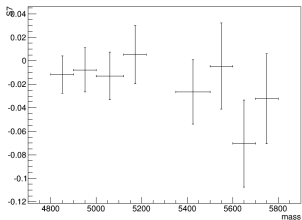
Q[1_1-2]_S6s



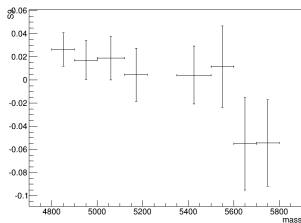


Bck moments

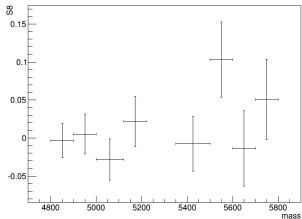
Q[1_1-2]_S7



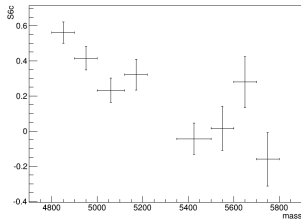
Q[1_1-2]_S9



Q[1_1-2]_S8



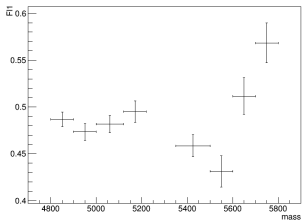
Q[1_1-2]_S6c



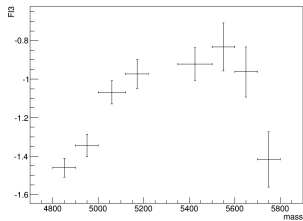


Bck moments

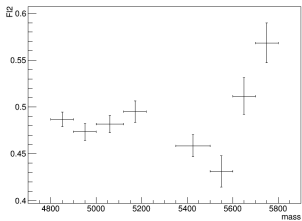
Q[2-4]_F1



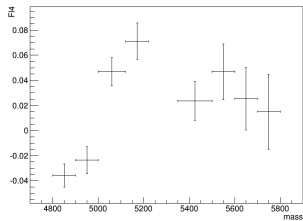
Q[2-4]_F3



Q[2-4]_F12



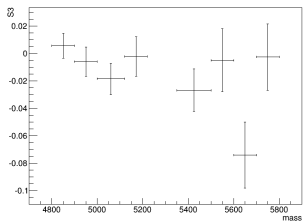
Q[2-4]_F4



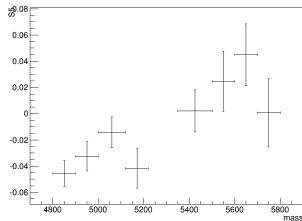


Bck moments

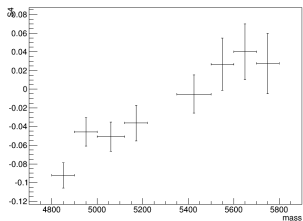
Q[2-4]_S3



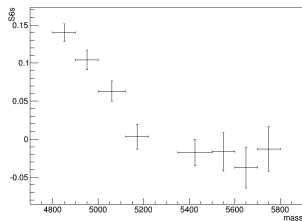
Q[2-4]_S5



Q[2-4]_S4



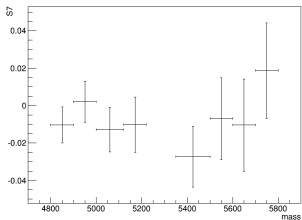
Q[2-4]_S6s



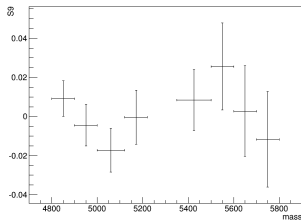


Bck moments

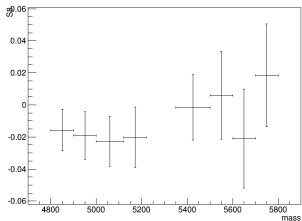
Q[2-4]_S7



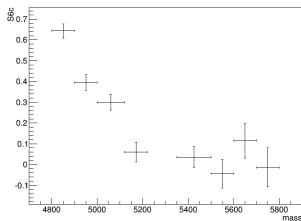
Q[2-4]_S9



Q[2-4]_S8



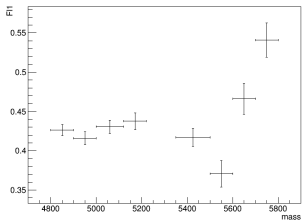
Q[2-4]_S6c



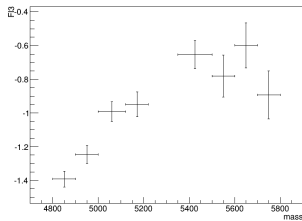


Bck moments

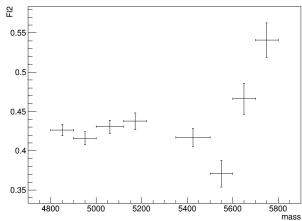
Q[4-6]_F1



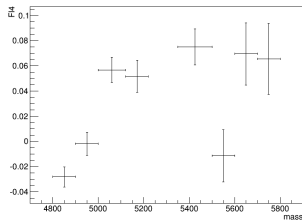
Q[4-6]_F3



Q[4-6]_F2



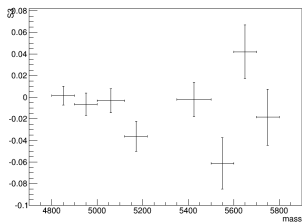
Q[4-6]_F4



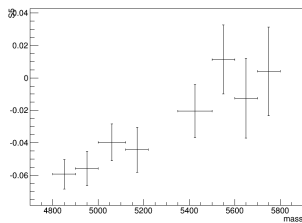


Bck moments

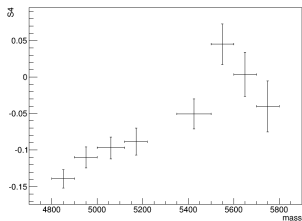
Q[4-6]_S3



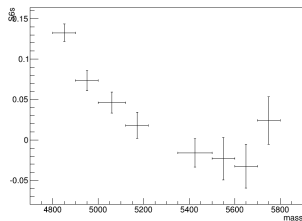
Q[4-6]_S5



Q[4-6]_S4



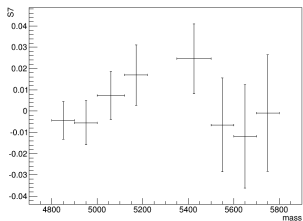
Q[4-6]_S6s



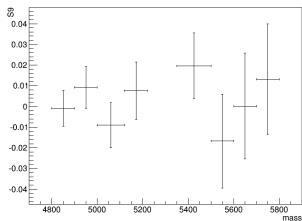


Bck moments

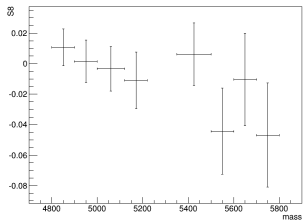
Q[4-6]_S7



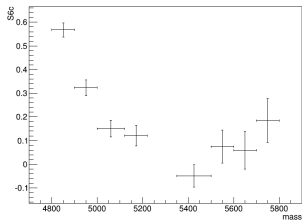
Q[4-6]_S9



Q[4-6]_S8



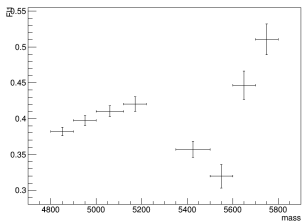
Q[4-6]_S6c



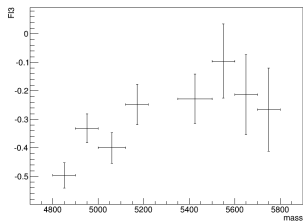


Bck moments

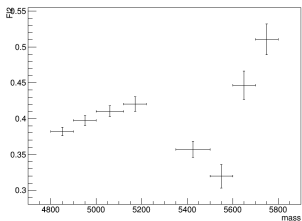
Q[6-8]_F1



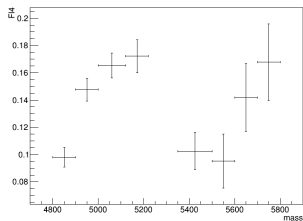
Q[6-8]_F3



Q[6-8]_F12



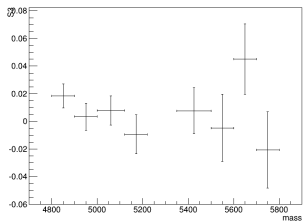
Q[6-8]_F14



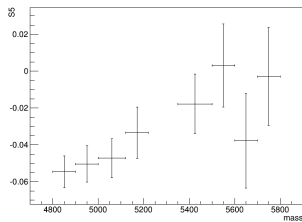


Bck moments

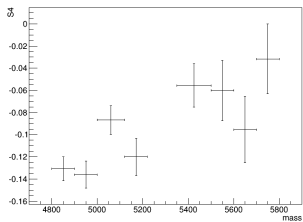
Q[6-8]_S3



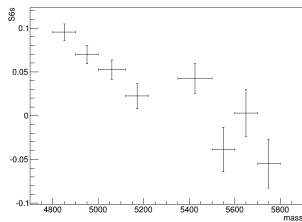
Q[6-8]_S5



Q[6-8]_S4



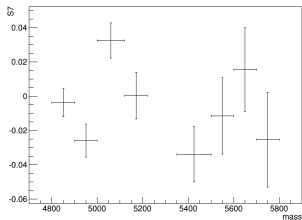
Q[6-8]_S6s



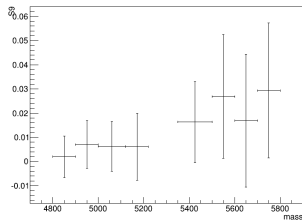


Bck moments

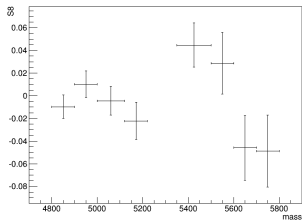
Q[6-8]_S7



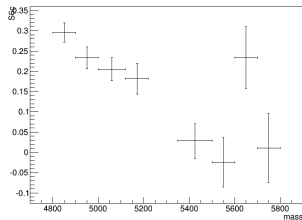
Q[6-8]_S9



Q[6-8]_S8



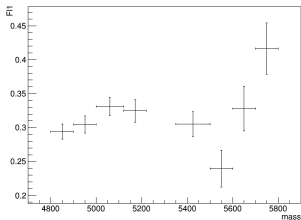
Q[6-8]_S6c



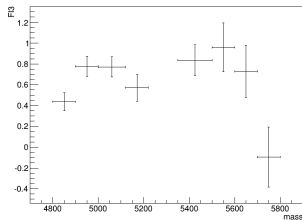


Bck moments

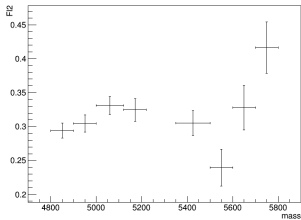
Q[11_75-12_5]_F1



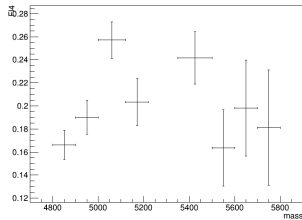
Q[11_75-12_5]_F3



Q[11_75-12_5]_F2



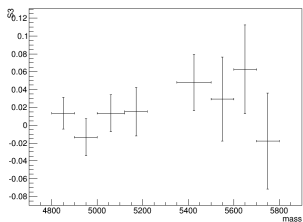
Q[11_75-12_5]_F4



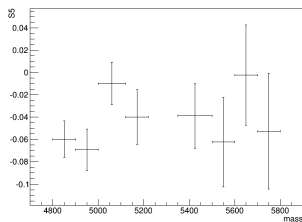


Bck moments

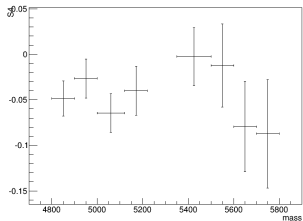
Q[11_75-12_5]_S3



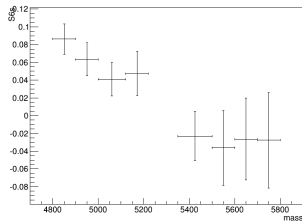
Q[11_75-12_5]_S5



Q[11_75-12_5]_S4



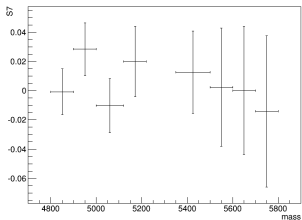
Q[11_75-12_5]_S6s



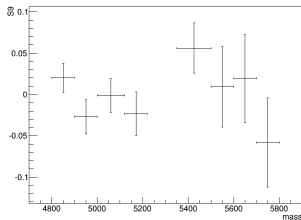


Bck moments

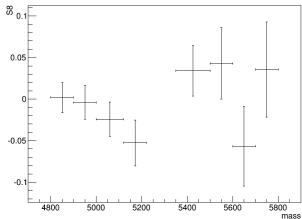
Q[11_75-12_5]_S7



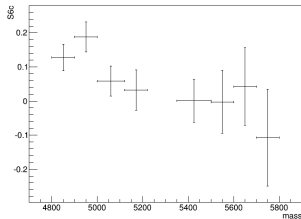
Q[11_75-12_5]_S9



Q[11_75-12_5]_S8

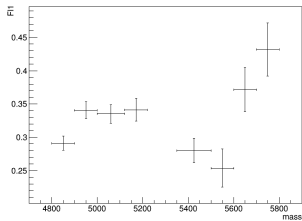


Q[11_75-12_5]_S6c

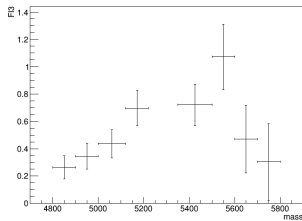


Bck moments

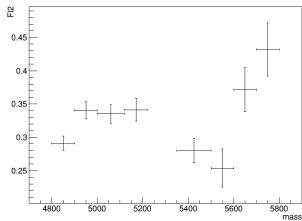
Q[11-11_75]_F1



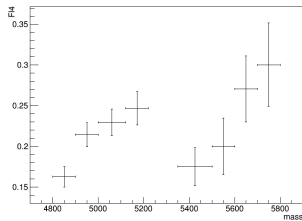
Q[11-11_75]_F3



Q[11-11_75]_F2



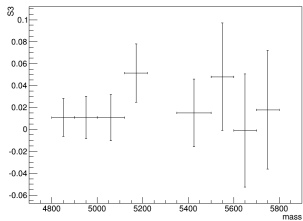
Q[11-11_75]_F4



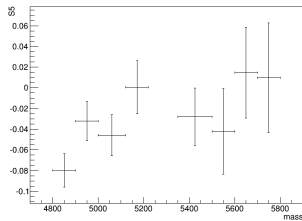


Bck moments

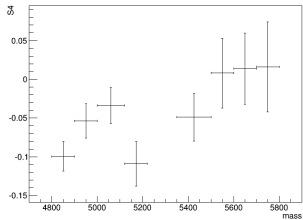
Q[11-11_75]_S3



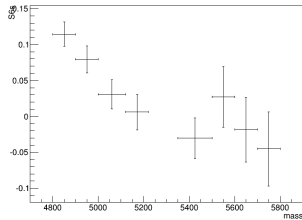
Q[11-11_75]_S5



Q[11-11_75]_S4



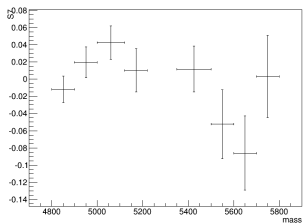
Q[11-11_75]_S6s



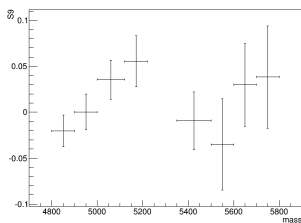


Bck moments

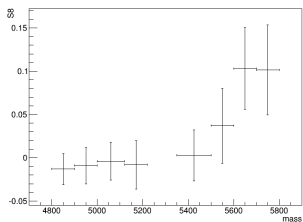
Q[11-11_75]_S7



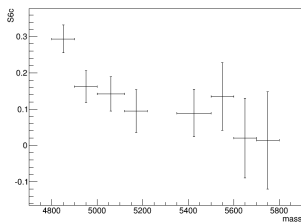
Q[11-11_75]_S9



Q[11-11_75]_S8



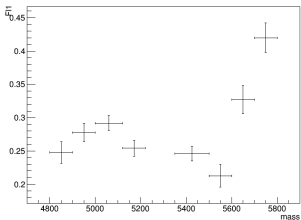
Q[11-11_75]_S6c



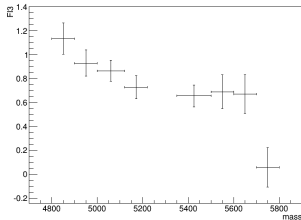


Bck moments

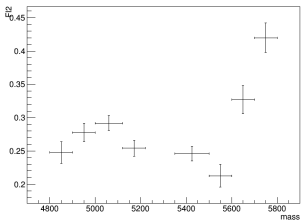
Q[15-17]_F1



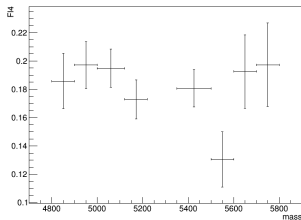
Q[15-17]_F3



Q[15-17]_F2



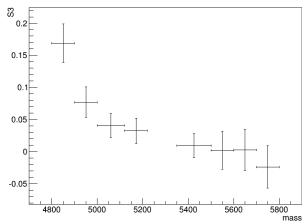
Q[15-17]_F4



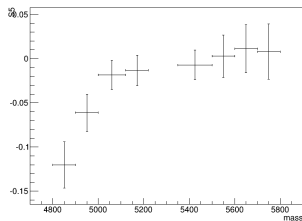


Bck moments

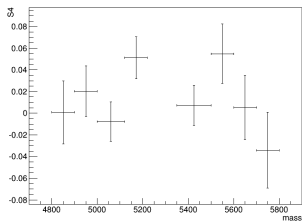
Q[15-17]_S3



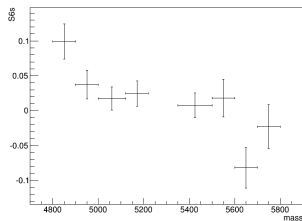
Q[15-17]_S5



Q[15-17]_S4



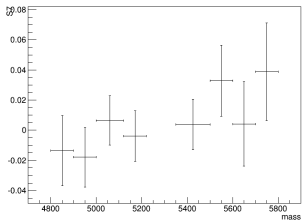
Q[15-17]_S6s



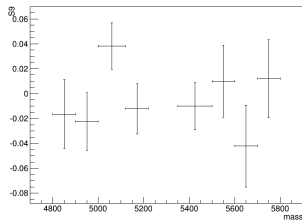


Bck moments

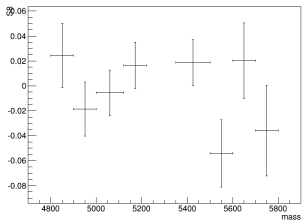
Q[15-17]_S7



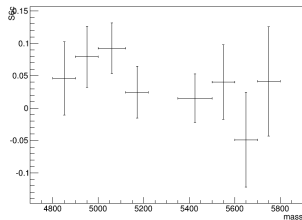
Q[15-17]_S9



Q[15-17]_S8



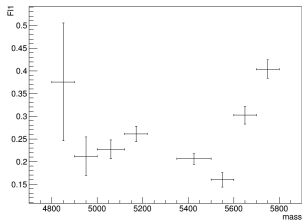
Q[15-17]_S6c



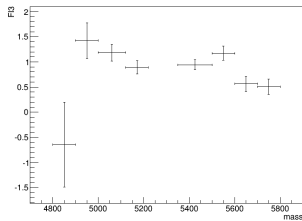


Bck moments

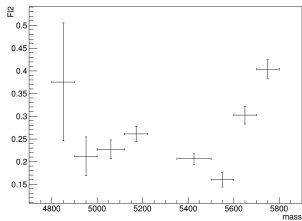
Q[17-19]_F1



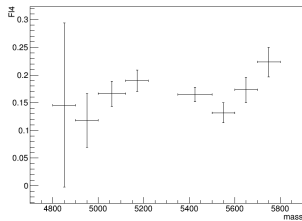
Q[17-19]_F3



Q[17-19]_F2



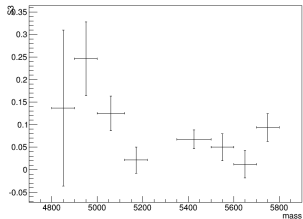
Q[17-19]_F4



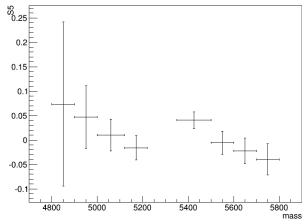


Bck moments

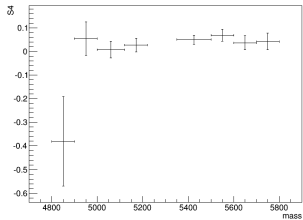
Q[17-19]_S3



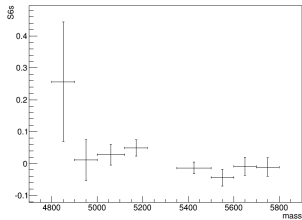
Q[17-19]_S5



Q[17-19]_S4



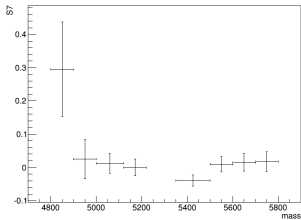
Q[17-19]_S6s



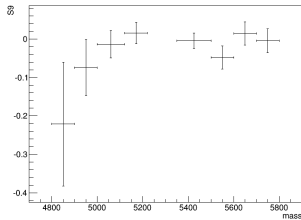


Bck moments

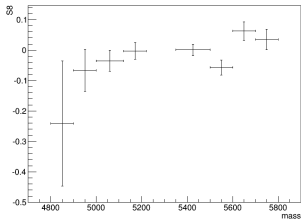
Q[17-19]_S7



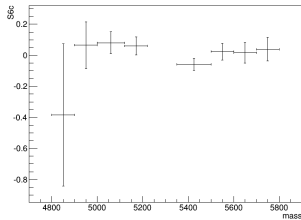
Q[17-19]_S9



Q[17-19]_S8



Q[17-19]_S6c





Conclusions

- Folding a bit better than Moments.
- For robustness of the result we want to publish both methods
 - ① Folding is gives smaller errors
 - ② MM has is less sensitive to background.
- For sure we will look better in paper if we say both methods got the same.
- Side-bands have some structure → could we missed some background?



To do

- Explore the bck that we could missed.
- We are making the situation more real life: add bck and swave pollution
- Study then the errors.
- Access the systematics from swave.
- Do the unfolding.
- Perform the stress test.

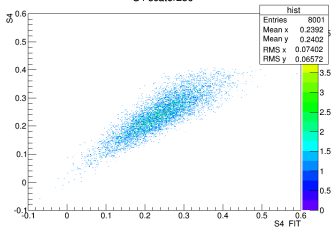


BACKUP

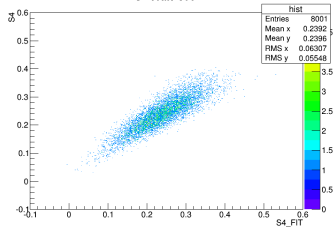


Scatter plots I

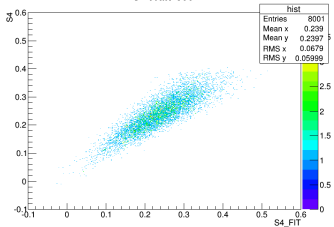
S4 scater250



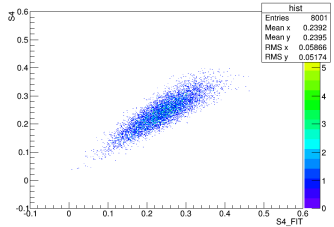
S4 scater350



S4 scater300



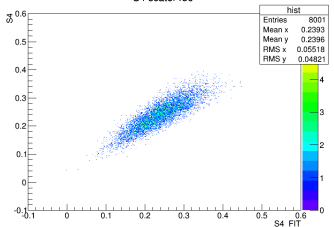
S4 scater400



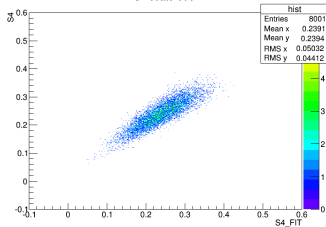


Scatter plots I

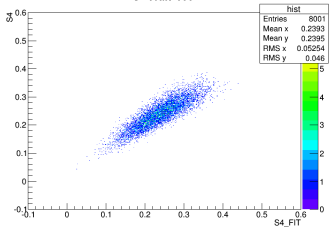
S4 scater450



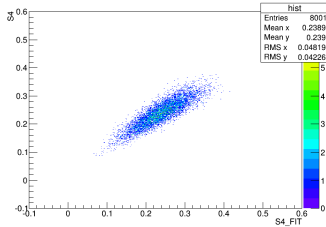
S4 scater550



S4 scater500



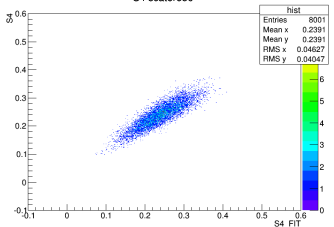
S4 scater600



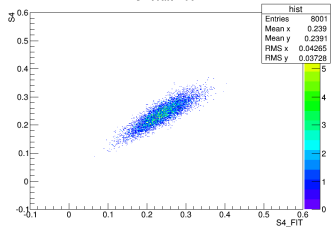


Scatter plots I

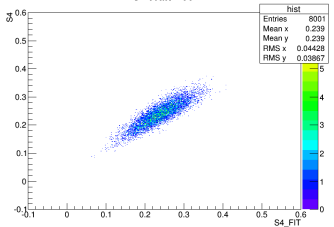
S4 scater650



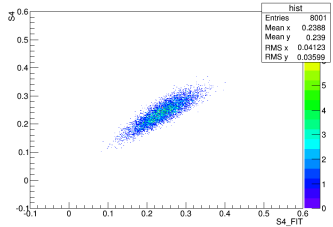
S4 scater750



S4 scater700



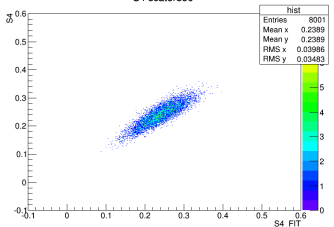
S4 scater800



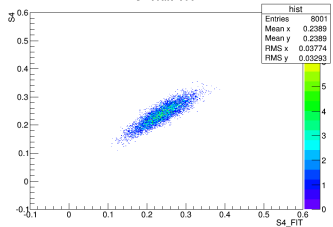


Scatter plots I

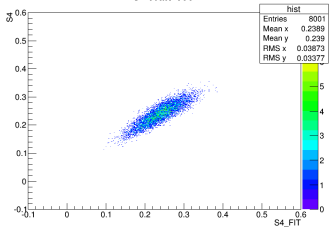
S4 scater850



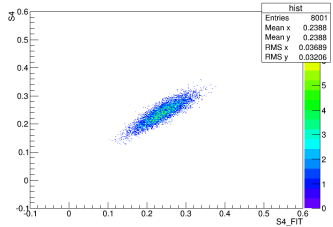
S4 scater950



S4 scater900



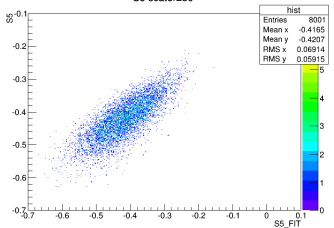
S4 scater1000



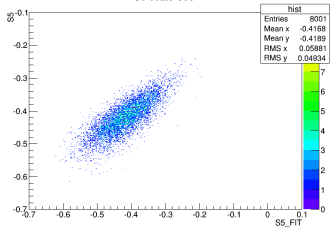


Scatter plots I

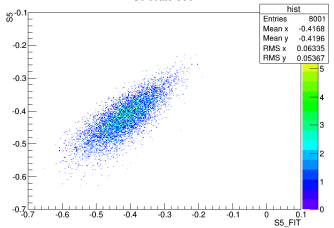
S5 scater250



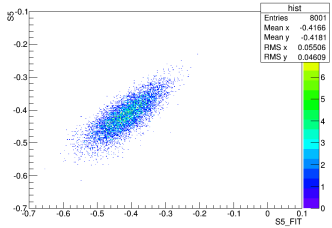
S5 scater350



S5 scater300



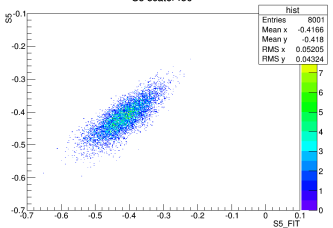
S5 scater400



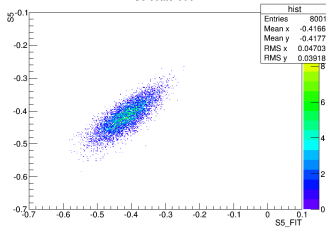


Scatter plots I

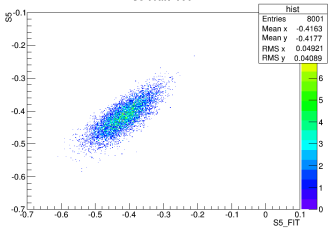
S5 scater450



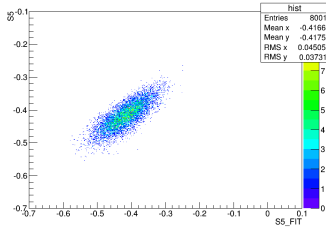
S5 scater550



S5 scater500



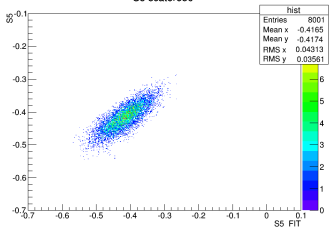
S5 scater600



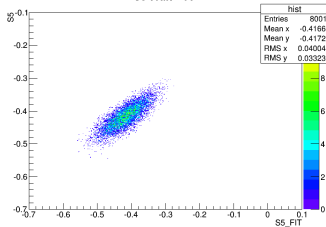


Scatter plots I

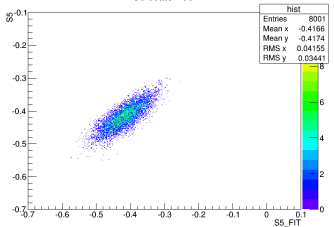
S5 scater650



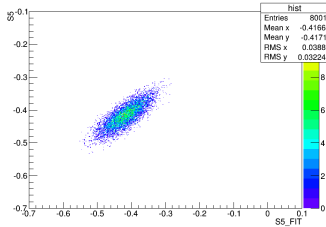
S5 scater750



S5 scater700

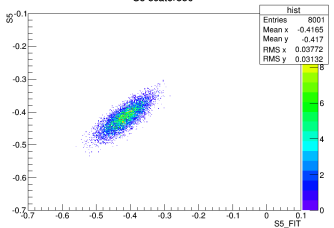


S5 scater800

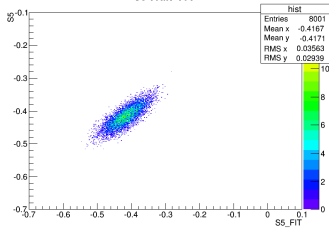


Scatter plots I

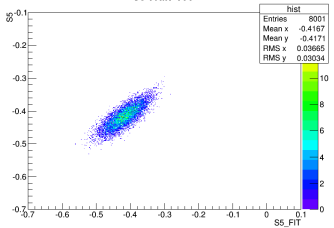
S5 scater850



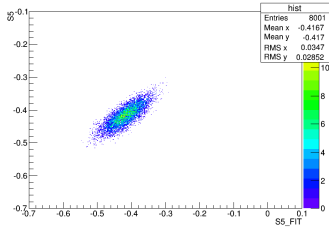
S5 scater950



S5 scater900



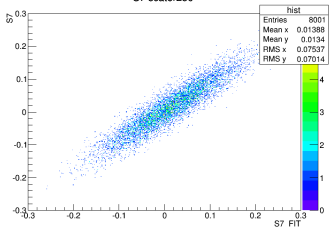
S5 scater1000



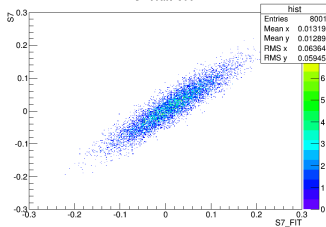


Scatter plots I

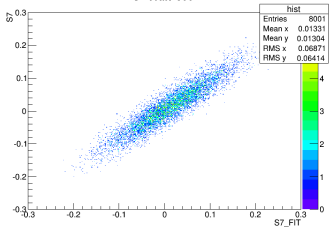
S7 scater250



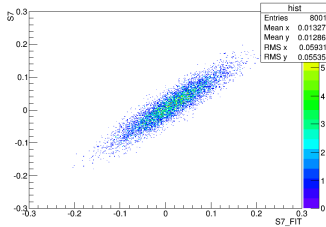
S7 scater350



S7 scater300



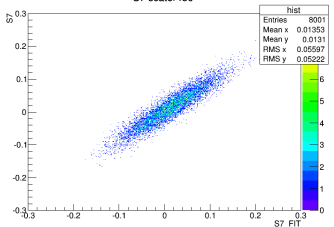
S7 scater400



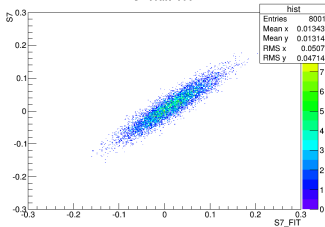


Scatter plots I

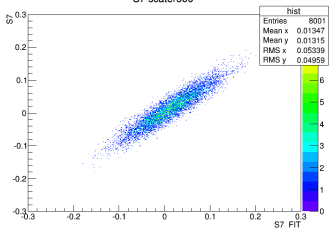
S7 scater450



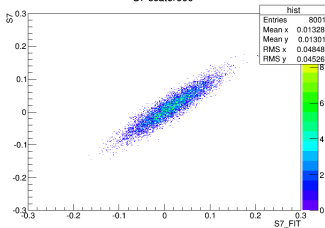
S7 scater550



S7 scater500



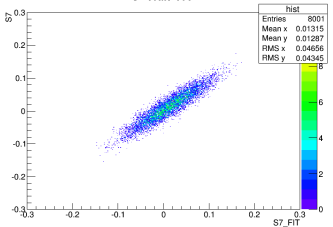
S7 scater600



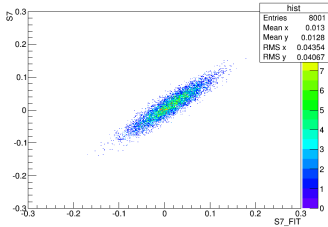


Scatter plots I

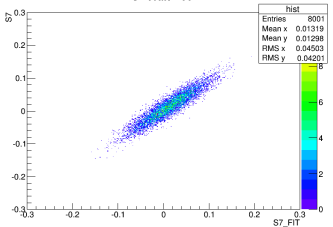
S7 scater650



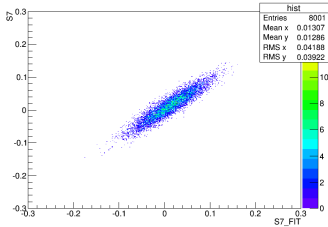
S7 scater750



S7 scater700



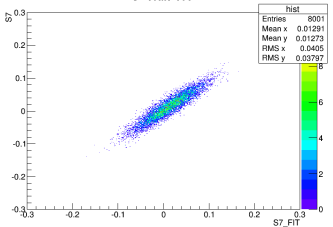
S7 scater800



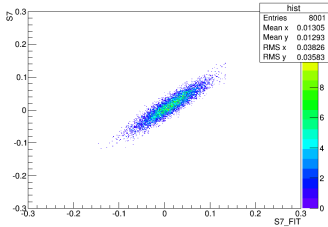


Scatter plots I

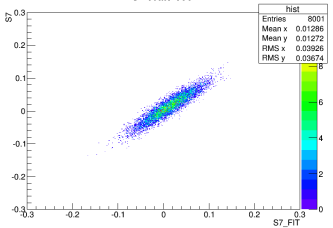
S7 scater850



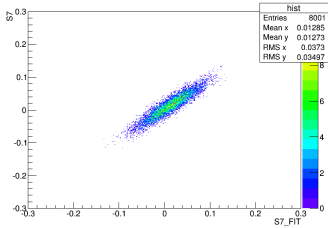
S7 scater950



S7 scater900



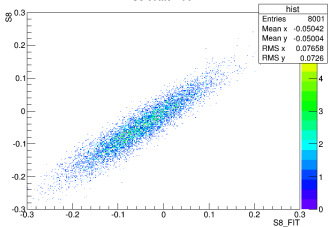
S7 scater1000



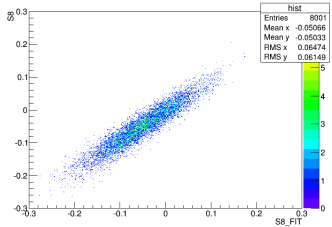


Scatter plots I

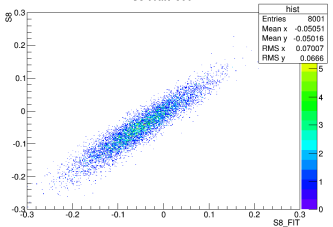
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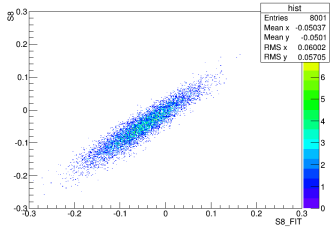
S8 scater350



S8 scater300



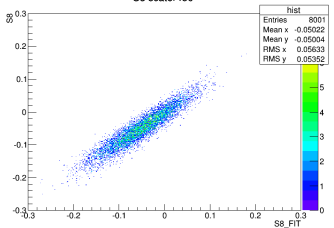
S8 scater400



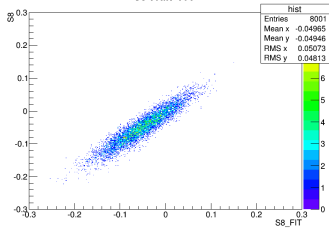


Scatter plots I

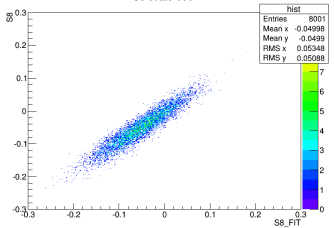
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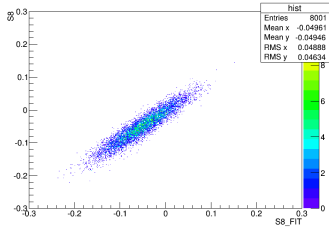
S8 scater550



S8 scater500



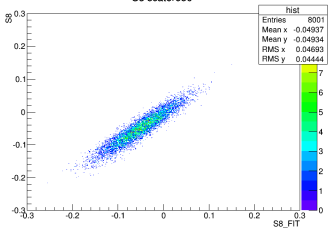
S8 scater600



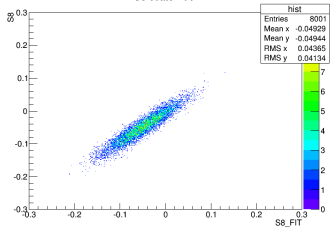


Scatter plots I

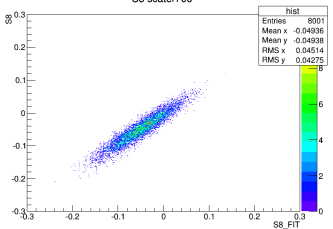
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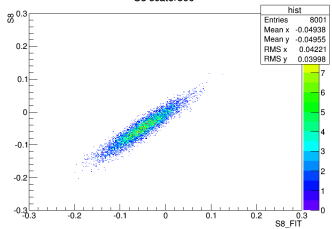
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S8 scater700



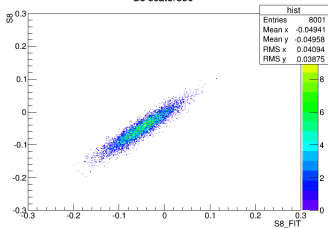
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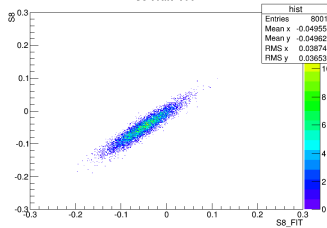


Scatter plots I

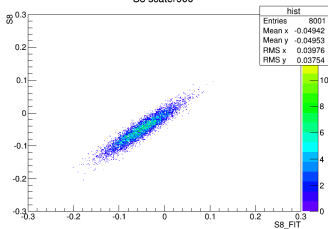
S8 scater850



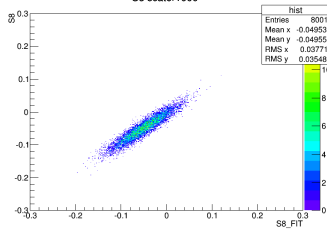
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S8 scater900

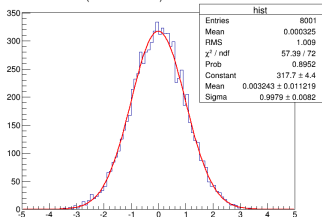


S8 scater1000

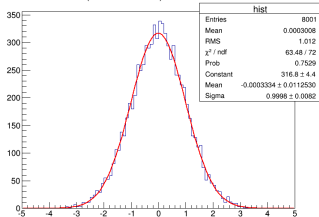


Pull distributions I

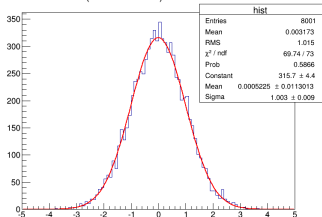
(S4- 0.239167)/ 0.0733477



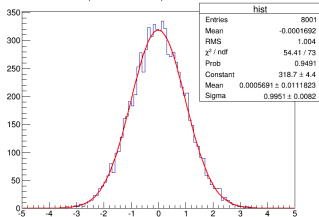
(S4- 0.239219)/ 0.0623327



(S4- 0.238836)/ 0.0669204

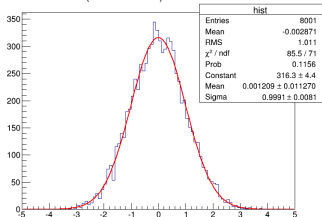


(S4- 0.239198)/ 0.0584481

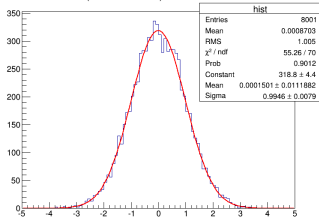


Pull distributions I

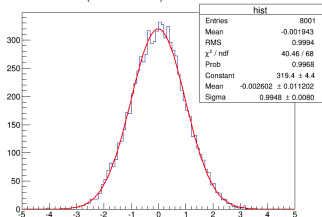
(S4- 0.239417) / 0.0545964



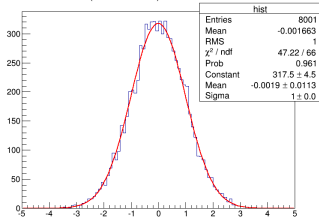
(S4- 0.239067) / 0.0500708



(S4- 0.239357) / 0.0525743

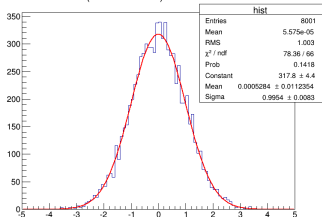


(S4- 0.23899) / 0.0481745

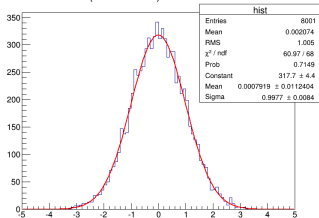


Pull distributions

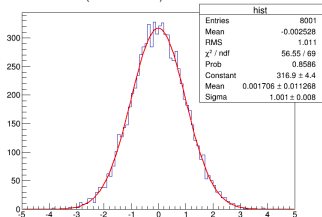
(S4- 0.239052) / 0.0461452



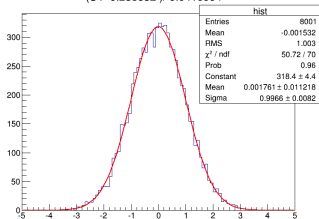
(S4- 0.23894) / 0.0424394



(S4- 0.239084) / 0.0438128

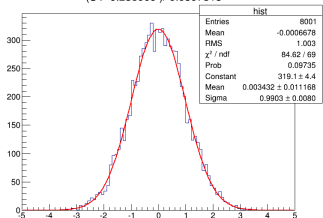


(S4- 0.238852) / 0.0410994

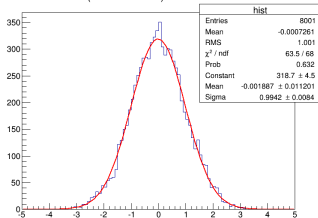


Pull distributions I

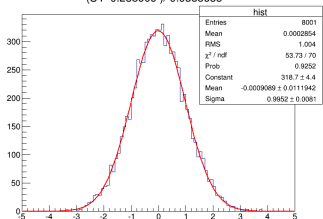
(S4- 0.238909) / 0.0397315



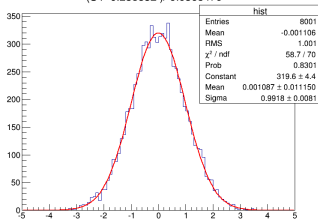
(S4- 0.238932) / 0.0377031



(S4- 0.238909) / 0.0385633

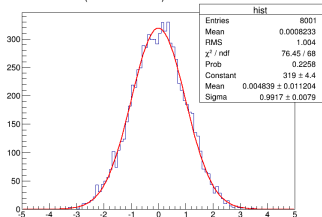


(S4- 0.238852) / 0.0368479

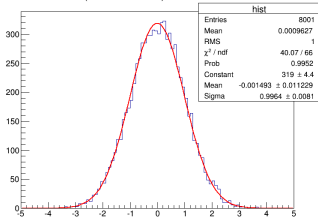


Pull distributions I

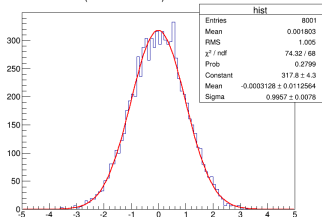
(S5 -0.416675) / 0.0518357



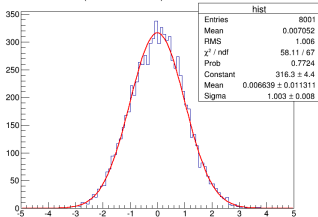
(S5 -0.416647) / 0.0470331



(S5 -0.416429) / 0.0489736

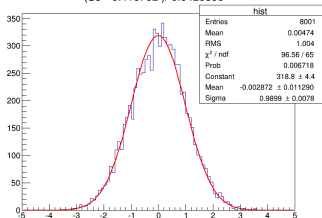


(S5 -0.416959) / 0.0447708

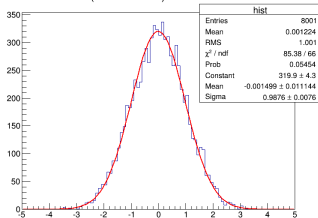


Pull distributions

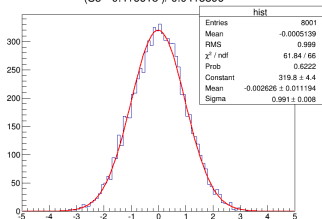
(S5 -0.416702) / 0.0429598



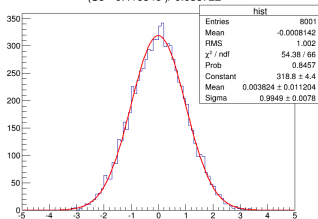
(S5 -0.41667) / 0.040018



(S5 -0.416618) / 0.0415896

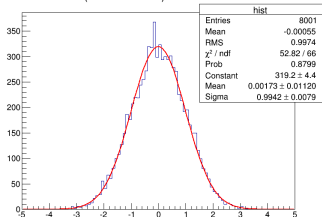


(S5 -0.416548) / 0.038722

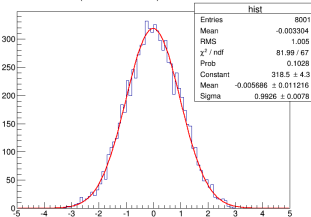


Pull distributions I

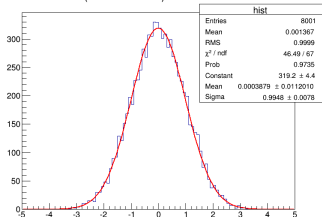
(S5 -0.416494) / 0.0378226



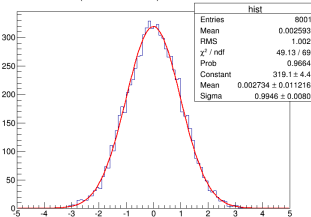
(S5 -0.416591) / 0.0354652



(S5 -0.416769) / 0.0366554

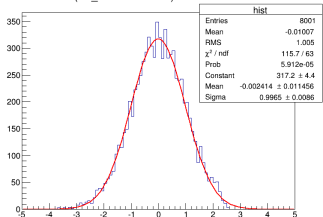


(S5 -0.416815) / 0.0346469

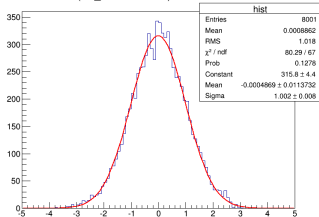


Pull distributions I

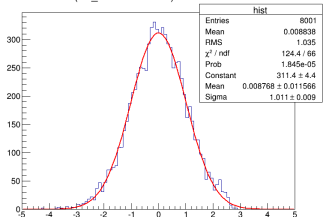
(S4_FIT - 0.240887) / 0.0654193



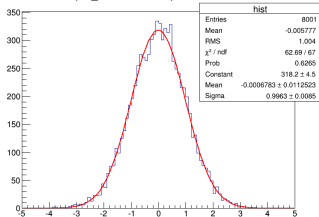
(S4_FIT - 0.23951) / 0.0545072



(S4_FIT - 0.239155) / 0.0579368

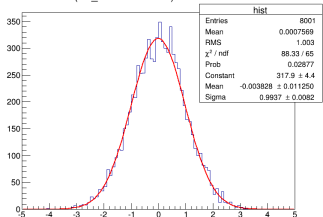


(S4_FIT - 0.239768) / 0.0515473

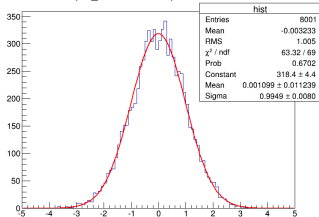


Pull distributions I

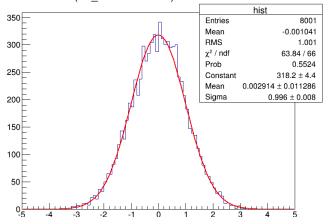
(S4_FIT- 0.239534) / 0.0480677



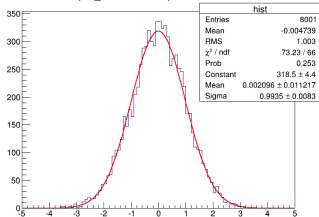
(S4_FIT- 0.239499) / 0.0438849



(S4_FIT- 0.239544) / 0.0459513

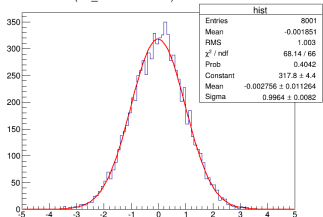


(S4_FIT- 0.23923) / 0.0421548

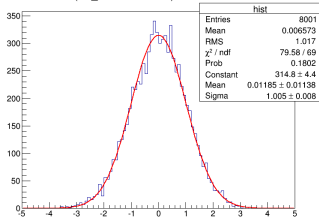


Pull distributions I

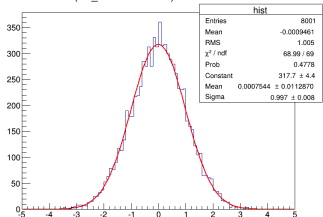
(S4_FIT - 0.239185) / 0.0403462



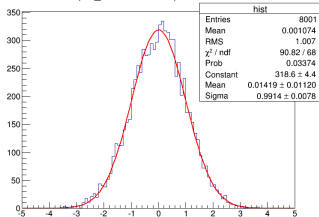
(S4_FIT - 0.238868) / 0.0366644



(S4_FIT - 0.239057) / 0.0384884

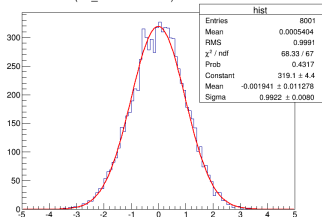


(S4_FIT - 0.238919) / 0.035742

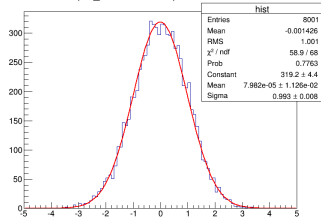


Pull distributions I

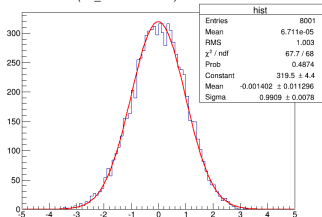
(S4_FIT - 0.238927) / 0.0348584



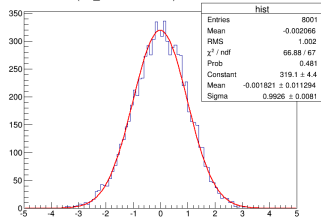
(S4_FIT - 0.238961) / 0.0329088



(S4_FIT - 0.238975) / 0.033678

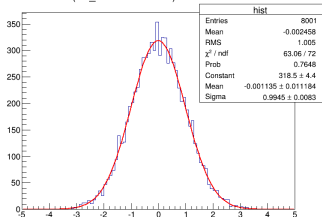


(S4_FIT - 0.238908) / 0.0319932

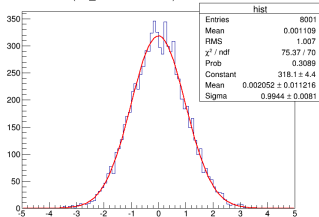


Pull distributions I

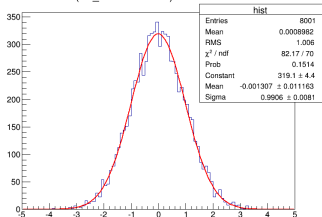
(S5_FIT -0.417887) / 0.0430298



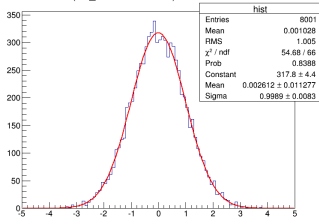
(S5_FIT -0.417741) / 0.0389238



(S5_FIT -0.41771) / 0.0406342

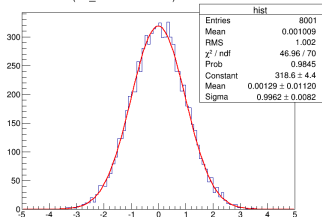


(S5_FIT -0.417545) / 0.0371365

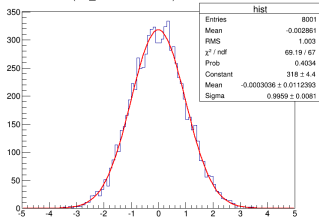


Pull distributions I

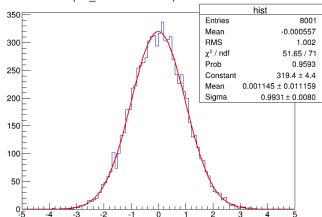
(S5_FIT - -0.417447) / 0.0355227



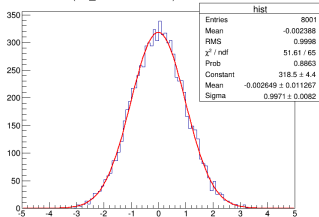
(S5_FIT - -0.417153) / 0.0331365



(S5_FIT - -0.417334) / 0.0343586

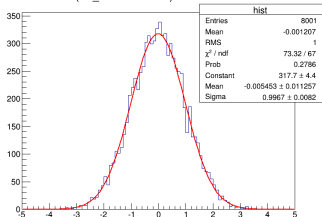


(S5_FIT - -0.417068) / 0.0322448

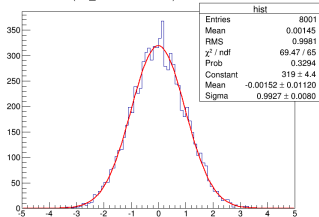


Pull distributions I

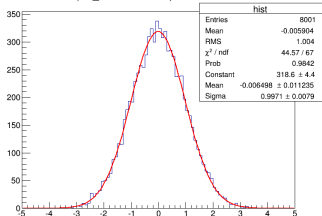
(S5_FIT -0.41697) / 0.0313196



(S5_FIT -0.417116) / 0.0294419



(S5_FIT -0.41691) / 0.0302262



(S5_FIT -0.417115) / 0.0285375

