Results for profiled FC for $B^0 \to K^\star \mu\mu$

Alessio Boletti, **Stefano Lacaprara**

stefano.lacaprara@pd.infn.it

INFN Padova

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work, January 16, 2017

What's new since last week presentation at the BPAG

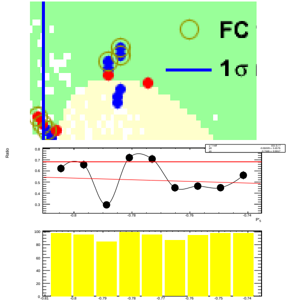
- We did some interaction with Phys Coords ("this is insane")
- interaction with ARC: "ah, good, you did sone progress, let us now when all is finished so we can look at it"
- interaction with Olaf: quite concernend with the 2d gaus fit
    - not because it can be tricky and maybe it is not the proper way to find the toy LogL minimum
    - but instead suggesting fancy way to fit a damn 2D gaus!
    - You are trying to solve the WRONG problem man!!
- no comments whatsoever about the fact that this crazy method
    - is insane
    - is not giving clear results
    - when it does, the 1 σ is the same as what we called "custom minos"
- my personal feeling that no one is really taking care to look at the big picture anymore
    - We have this insane FC bul***it to perform and that's it
    - when we will finish we'll be not a inch closer to understanding the problem, but who cares?

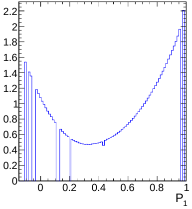
- Run a non negligible number of new GenPoint
  - babysitting is now a bit easier but not painless
- Fixed (mostly) the problem of the non converging 2d gaussian fit
  - Alessio had put a requirements for $\sigma_{P_1} < 0.9$, $\sigma_{P_5'} < 0.9$, $\rho < 0.99$,
  - no idea why
  - removing that requirement allow to recover most of the 2d gaus fit, now only $\sim 5\%$ is failing (fit status 3)
- Added a linear fit to the ratio vs $P_1(P_5')$
  - A possible way to determine the 1 σ border
  - is not helping much if the ratio trend is not clear

Debug and GenPoint

debug a number of problematic Gen Points

- eg Bin 2, region P'_5 up
- one point has ratio ~ 0.3, between ones with ~ 0.7: why?
- It is a "displaced point", namely with a P_1 not aligned with the other
- actually is happens that that is the true minimum along the profile, but it does not correpondo to the minimum of the parabola of the LogL.
- possibly a fluctuation or whatever.

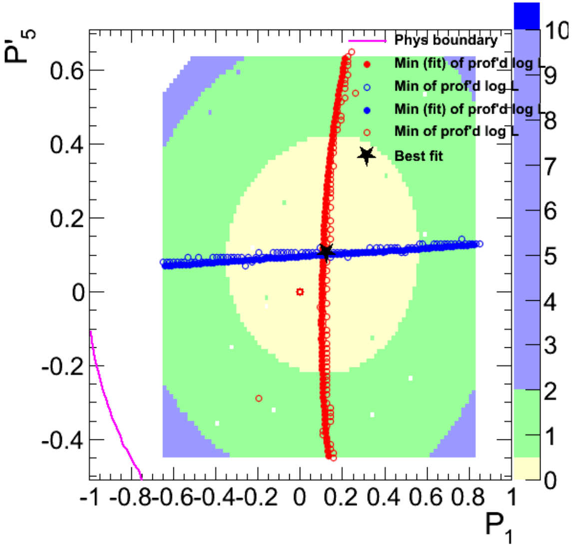




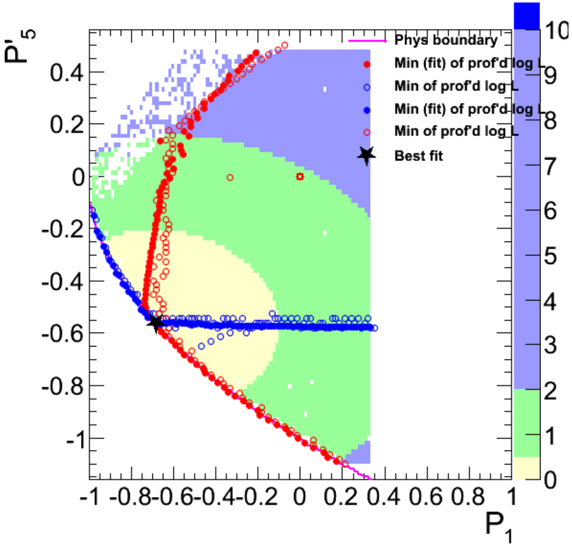
Are we using the correct Gen Point?

- So it seems that is we move just a bit away from the “ideal” line of profiled minimum the L is changing significantly
- and so the DLL computed for Data and Toys can be tricky
- it could also explain the non monothony of the ration vs P1/P5’
- **solution**
  - Instead of considering the absolute minimum of a profile (that is the bin with the minimum LogL), fit a parabla to the LogL distribution and take the vertex
  - the vertex x is the coordinate of the Gen Point to be generated
  - the vertex y is the LogL to be considerate for the $\Delta \log \mathcal{L}$ computation
  - Pros: these Gen Point are much more aligned that the one computed previously.
  - Cons: we (I) have to redo most of the work
  - Will try to to that for one region which is not problematic, and we will see

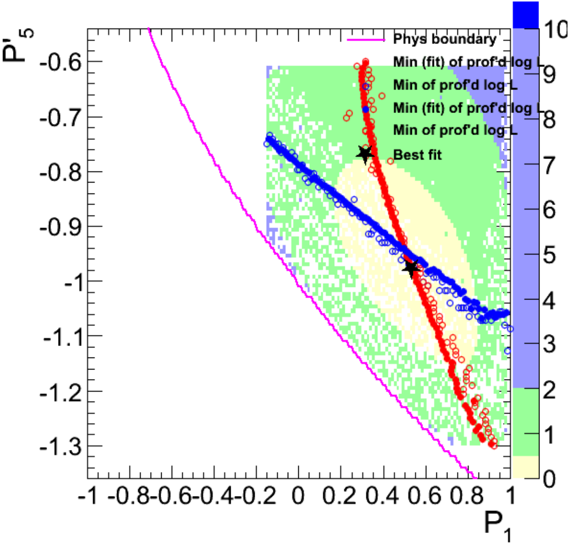
Bin 0


P'$_5$
P$_1$
0.6
0.4
0.2
0
-0.2
-0.4
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
10
9
8
7
6
5
4
3
2
1
0
Phys boundary
Min (fit) of prof'd log L
Min of prof'd log L
Min (fit) of prof'd log L
Min of prof'd log L
Best fit

Bin 1

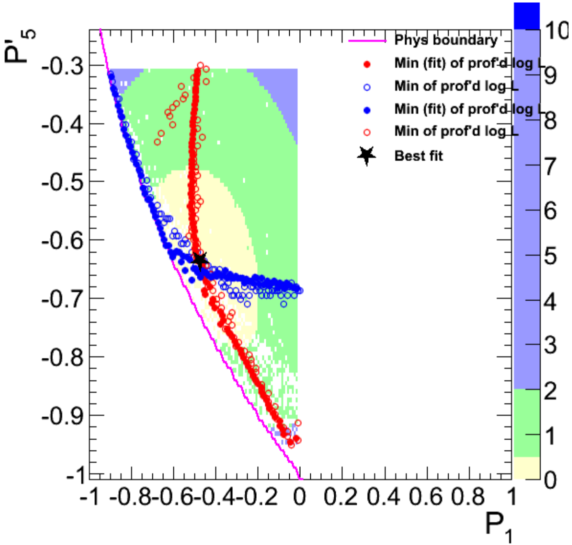

P'5
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8-0.6-0.4-0.2 0 0.2 0.4 0.6 0.8 1
P1
Phys boundary
Min (fit) of prof'd log L
Min of prof'd log L
Min (fit) of prof'd log L
Min of prof'd log L
Best fit
10
9
8
7
6
5
4
3
2
1
0

Bin 2

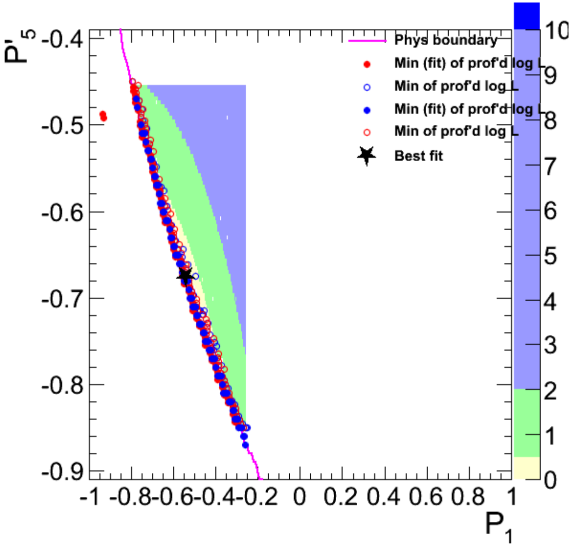


P'5
-0.6
-0.7
-0.8
-0.9
-1
-1.1
-1.2
-1.3
-1 -0.8-0.6-0.4-0.2 0 0.2 0.4 0.6 0.8 1
P1
Phys boundary
Min (fit) of prof'd log L
Min of prof'd log L
Min (fit) of prof'd log L
Min of prof'd log L
Best fit
0
1
2
3
4
5
6
7
8
9
10

Bin 3

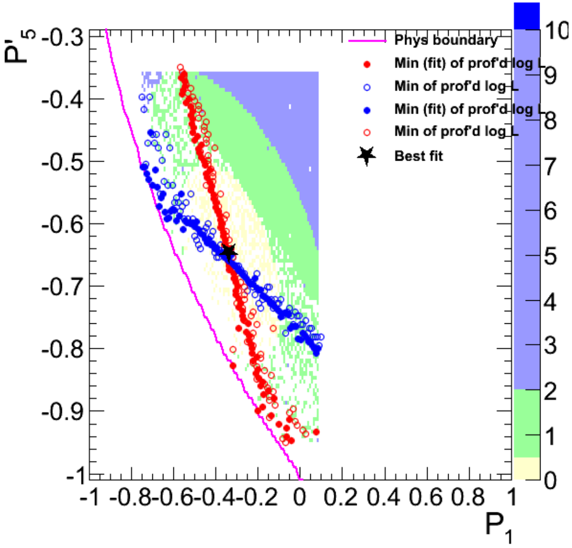

P'5
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1
-1 -0.8-0.6-0.4-0.2 0 0.2 0.4 0.6 0.8 1
P1
Phys boundary
Min (fit) of prof'd log L
Min of prof'd log L
Min (fit) of prof'd log L
Min of prof'd log L
Best fit
10
9
8
7
6
5
4
3
2
1
0

Bin 5

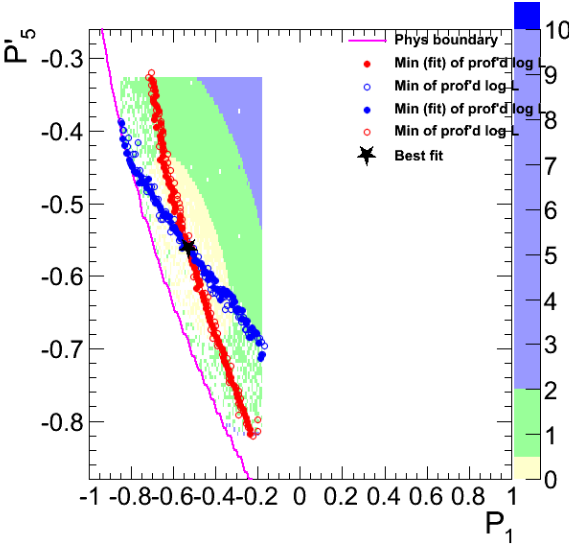


P'5
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
P1
Phys boundary
Min (fit) of prof'd log L
Min of prof'd log L
Min (fit) of prof'd log L
Min of prof'd log L
Best fit
10
9
8
7
6
5
4
3
2
1
0

Bin 7

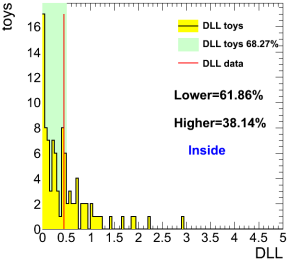

P'5
P1
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1
-1 -0.8-0.6-0.4-0.2 0 0.2 0.4 0.6 0.8 1
0 1 2 3 4 5 6 7 8 9 10
Phys boundary
Min (fit) of prof'd log L
Min of prof'd log L
Min (fit) of prof'd log L
Min of prof'd log L
Best fit

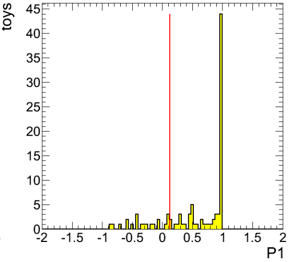
Bin 8

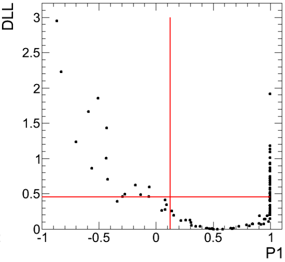

P'_5
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
P_1
Phys boundary
Min (fit) of prof'd log L
Min of prof'd log L
Min (fit) of prof'd log L
Min of prof'd log L
Best fit
10
9
8
7
6
5
4
3
2
1
0

DLL vs P1 for one GenPoint

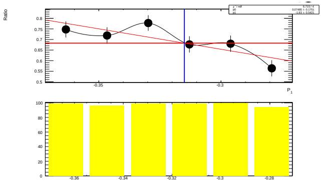
- Following Mauro's idea: look at P_1 distribution for toys, instead of DLL
- build a 68% region for P_1 and see if P_1 for data is inside that region or not
- problem with P_1 physical boundary
- DLL vs P_1 is parabolic (as expected?), so comparing DLL is the same as comparing P1 ranges (but easier)





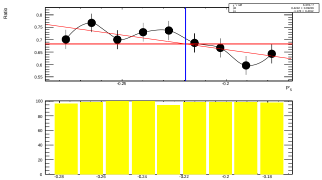


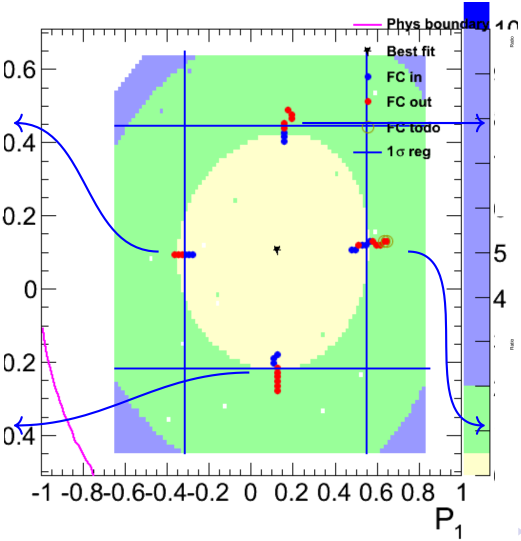
Bin 0

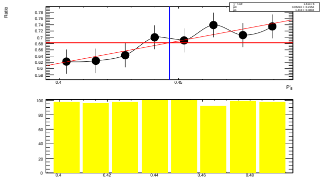


Done

Done

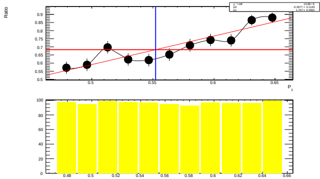




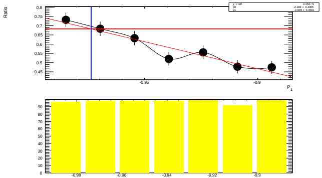


Done

Done



Bin 1



Done

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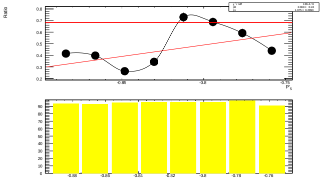
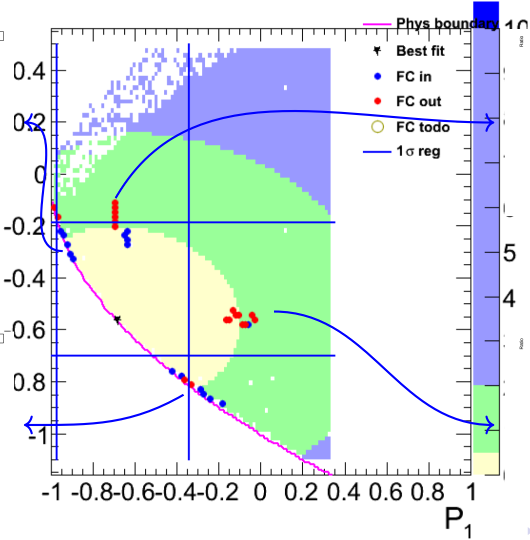
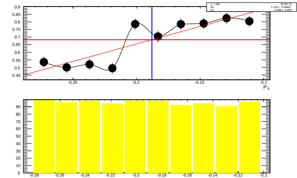
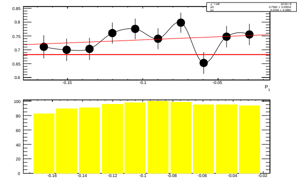




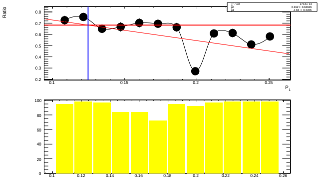


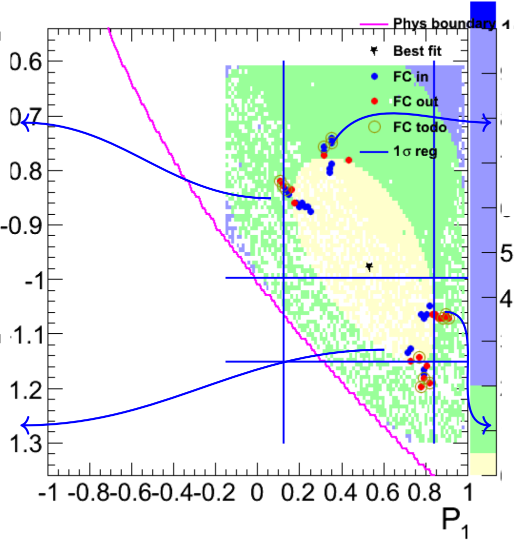
Done ??

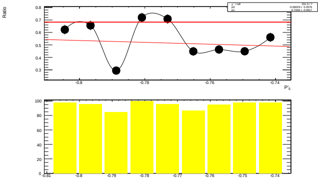
More GP: fluctuations?



Bin 2







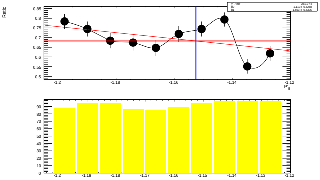
More GP

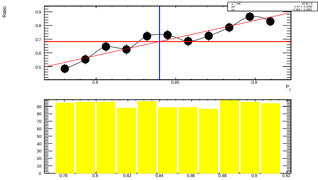
more GP

More GP:

fluctuations?

Done





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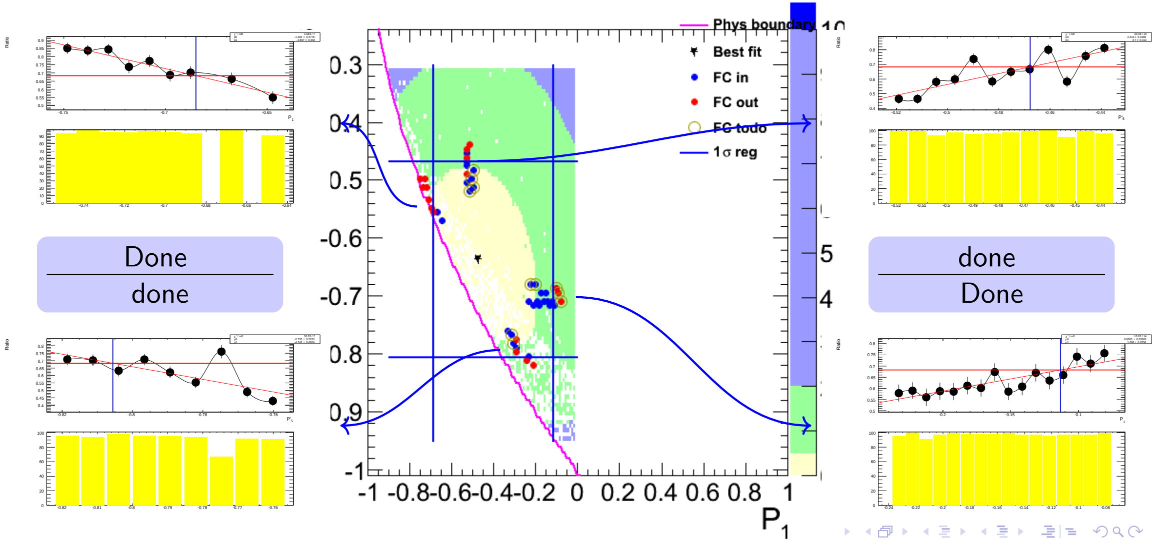


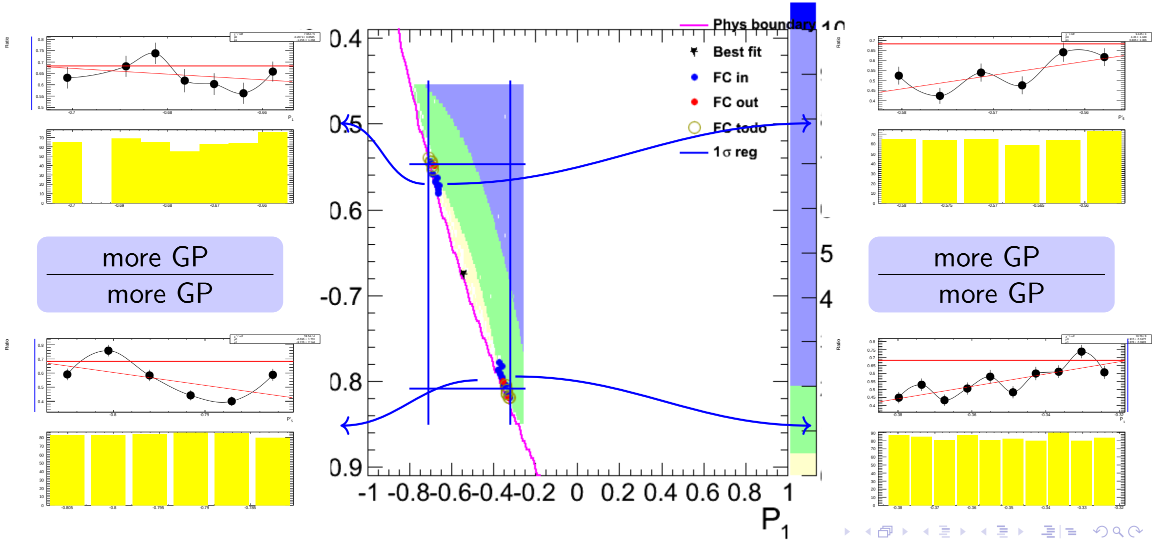
Done

done

done

Done

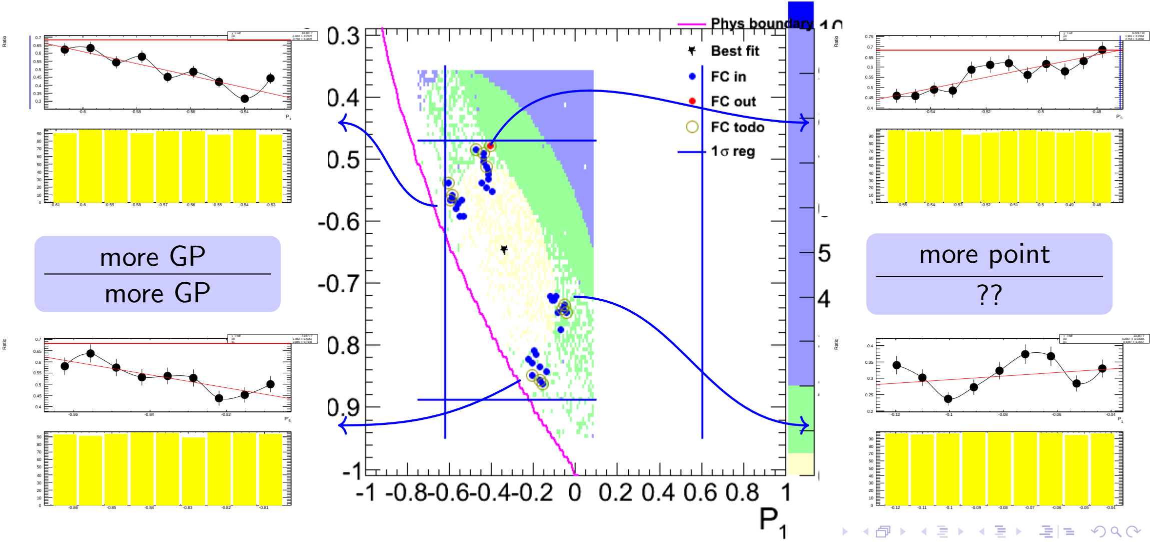
Bin 5



$$\frac{\text{more GP}}{\text{more GP}}$$

$$\frac{\text{more GP}}{\text{more GP}}$$

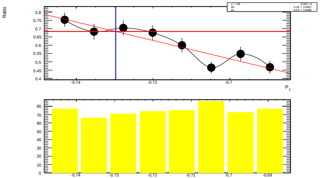
Bin 7



more GP
more GP

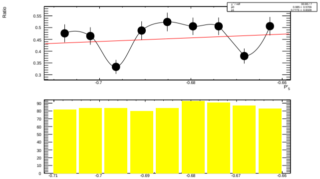
more point
??

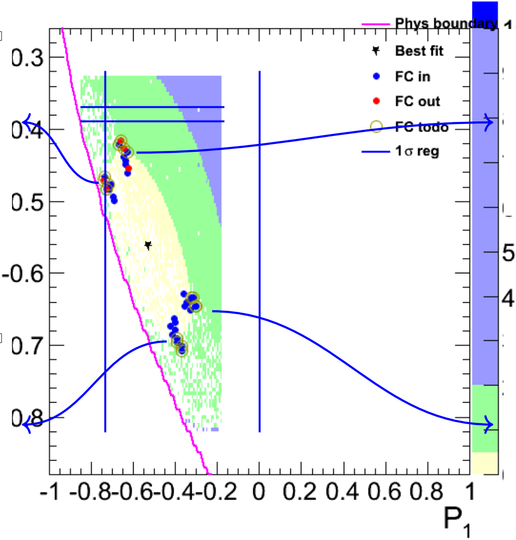
Bin 8

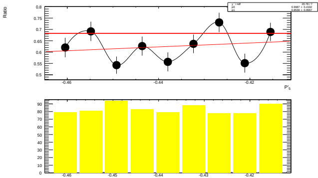


almost OK

more GP ∼flat

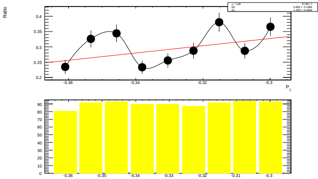






more GP

strange



Additional stuff

Additional or backup slides

Bibliography I