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

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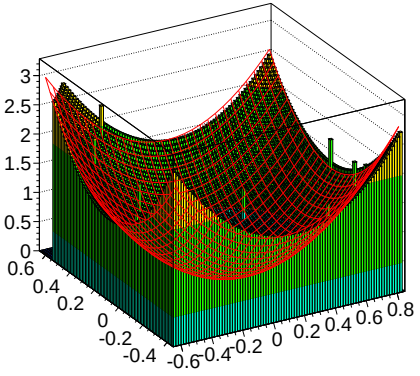
Are we using the correct Gen Point?

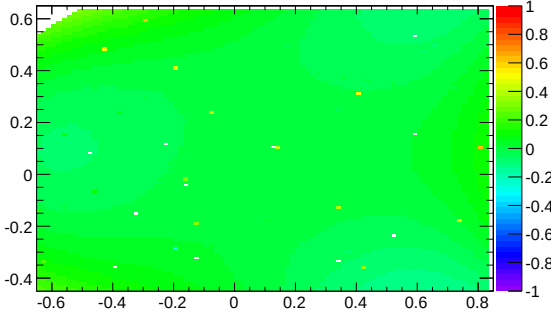
1. First approach: use the absolute minimum of the profiled DLL among the point for which we evaluated DLL for Data
   - always considering the physical boundaries;
   - sometime one point is not following the expected parabolic distribution and it is below the parabola vertex;
   - if DLL is available only for limited number of points, the min is not absolute;
2. Second approach: consider the profiled DLL, fit with a parabola and use the vertex
   - more stable and robust definition of minimum and its value DLL(Data);
   - still problem in sparse profile due to lack of points to fit;
3. Third appraoch: fit a 2D parabola

$$z = A + Bx + Cx^2 + Dy + Ey^2 + Fxy$$

to the 2d DLL distribution and get the min of the profiled parabolas
   - more robust than the previous one also for sparse profile.
   - smooth physical limit via high degree (9) pol fit to binned limit available;

Bin 0: DLL and fit ; DLL−Fit

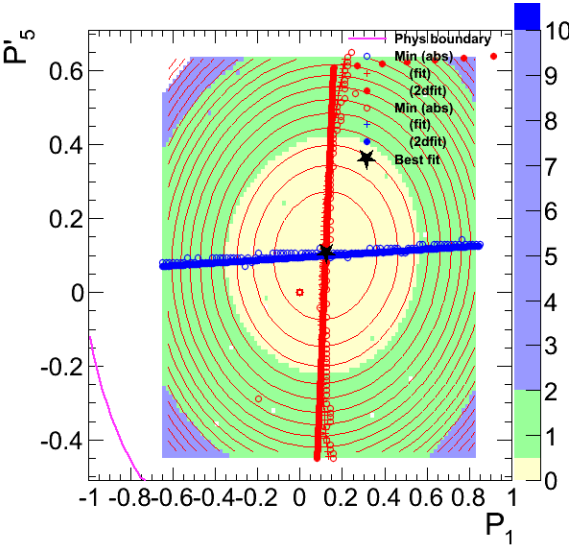




Bin 0: Profile P_1 DLL with 1D and 2D parabola fit

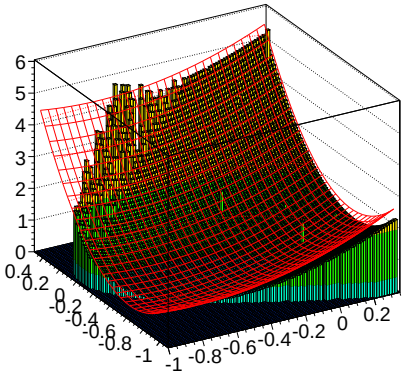
Bin 0: Profile P_5' DLL with 1D and 2D parabola fit

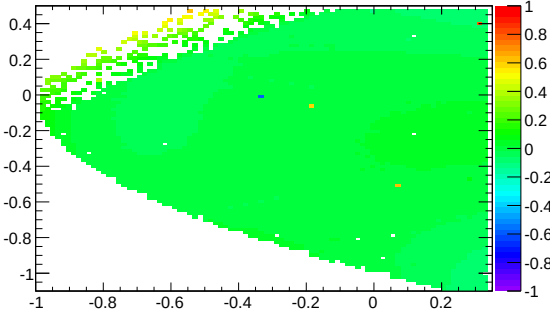
Bin 0:



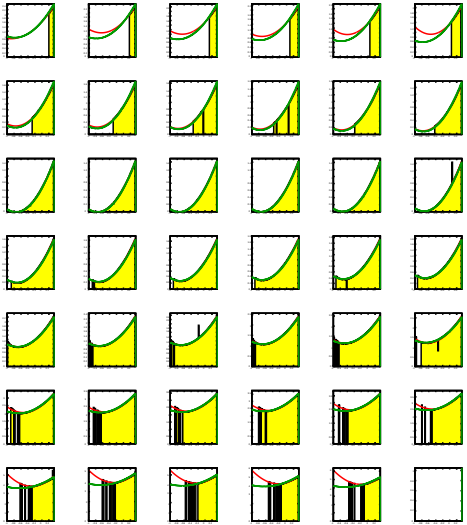
- Little correlation
- dense evaluation of DLL
- far from physical boundary
- good 2D fit
- small difference for the three methods
- the gen points done so far (1st method) are good enough

Bin 1: DLL and fit ; DLL−Fit

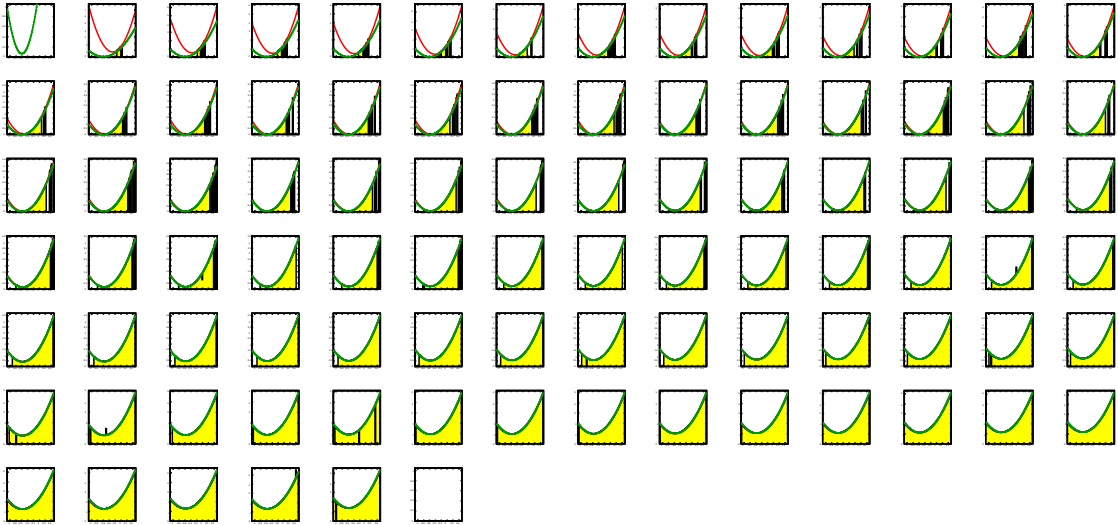




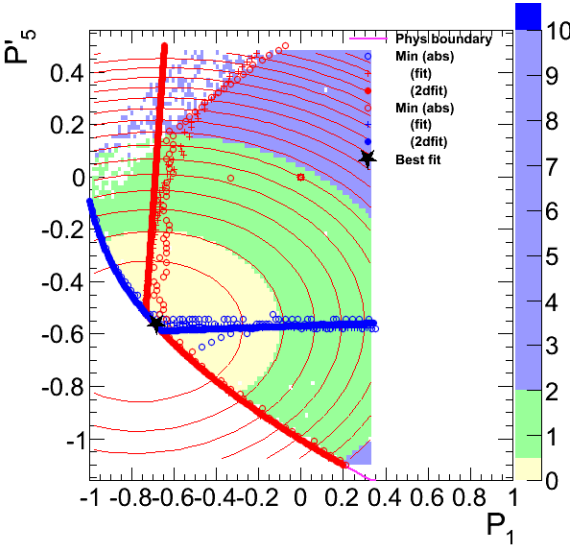
Bin 1: Profile P_1 DLL with 1D and 2D parabola fit



Bin 1: Profile P_5' DLL with 1D and 2D parabola fit

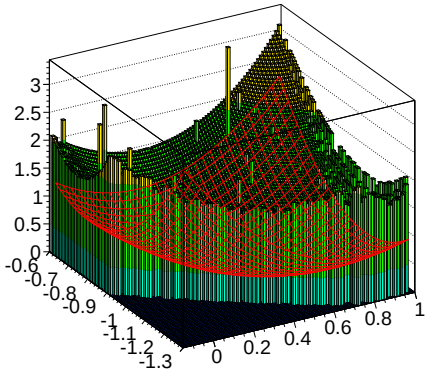


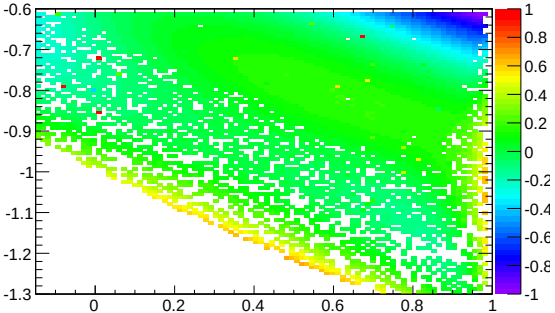
Bin 1:



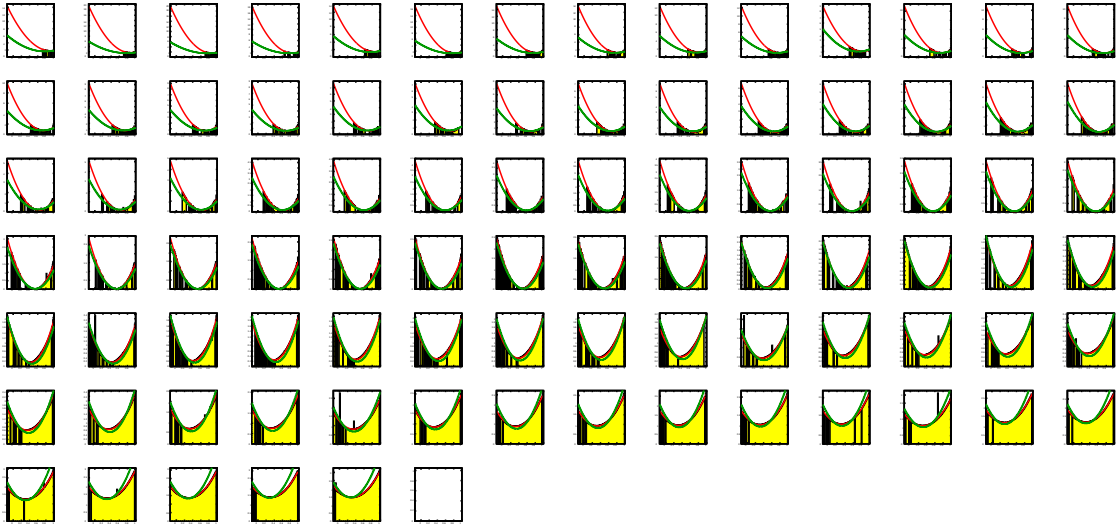
- Little correlation
- dense evaluation of DLL, but for high values of P_5'
- physical boundary very important
- good 2D fit
- significant difference for the three methods
  - 3^{rd} clearly better for sparse DLL
  - 3^{rd} similar to 2^{nd} for dense DLL
- Gen Point mostly to be redone

Bin 2: DLL and fit ; DLL−Fit

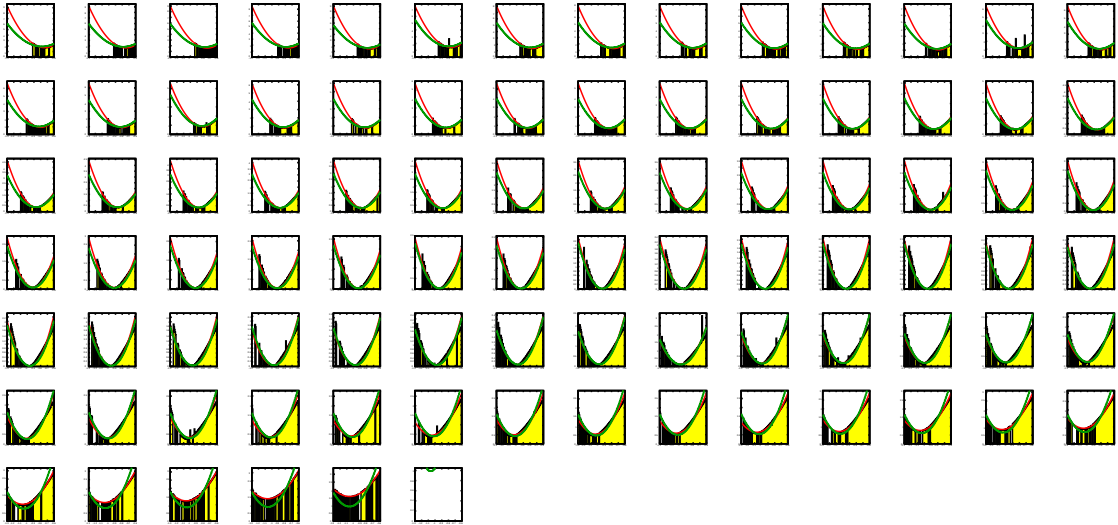




Bin 2: Profile P_1 DLL with 1D and 2D parabola fit



Bin 2: Profile P_5' DLL with 1D and 2D parabola fit



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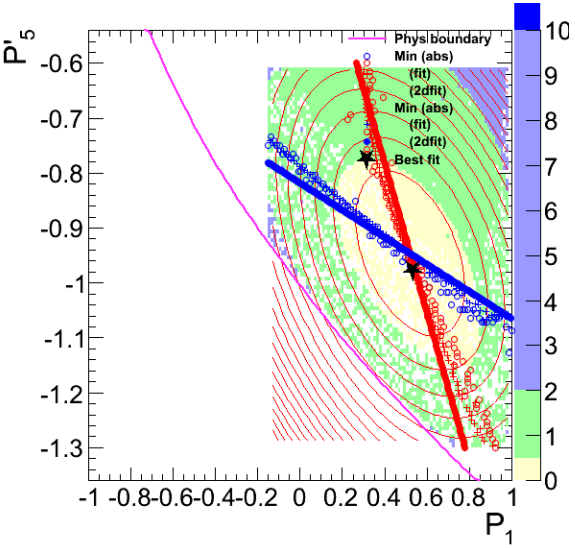
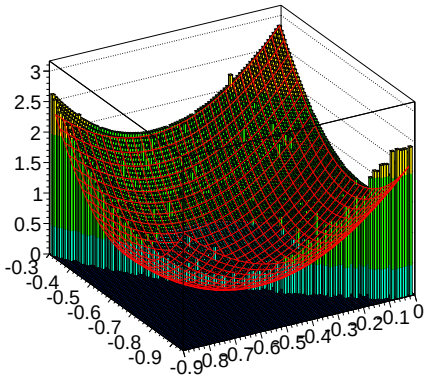
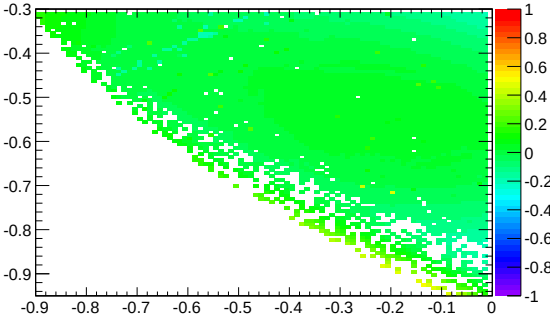


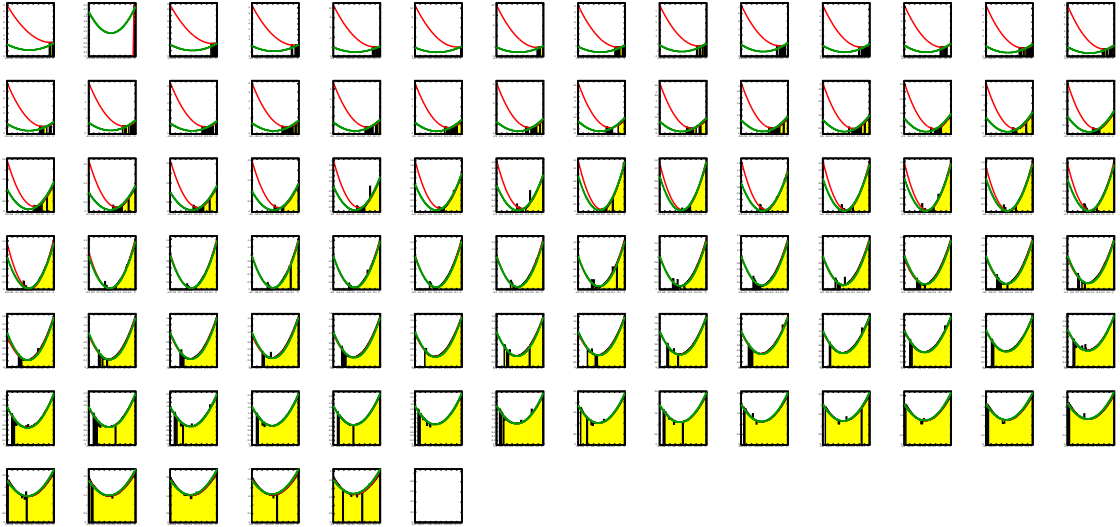
- Large correlation
- sparse evaluation of DLL left of best fit
- far from physical boundary
- 2D fit does not seems very good
- difference for the three methods
- tune the 2D fit?

Bin 3: DLL and fit ; DLL−Fit

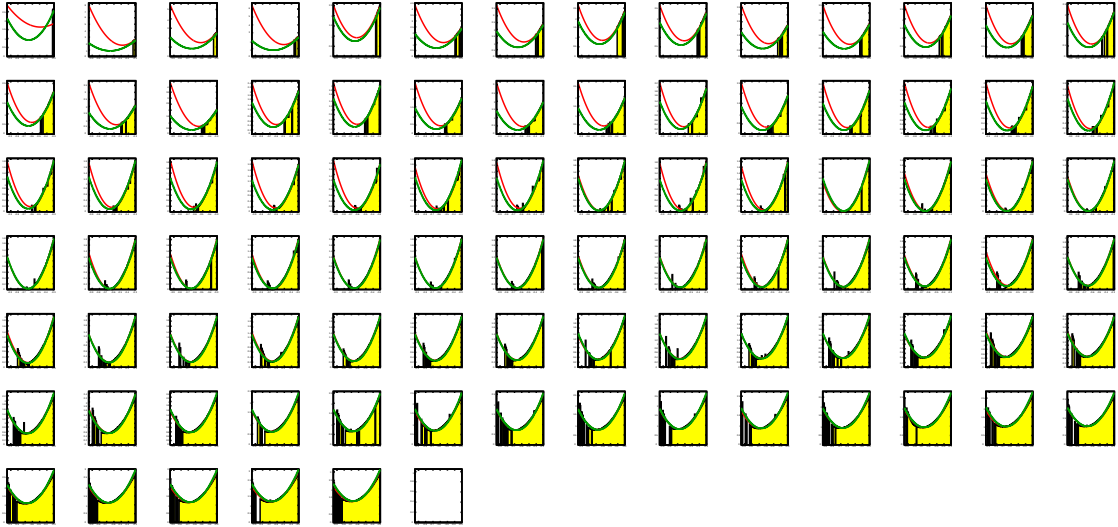




Bin 3: Profile P_1 DLL with 1D and 2D parabola fit



Bin 3: Profile P_5' DLL with 1D and 2D parabola fit



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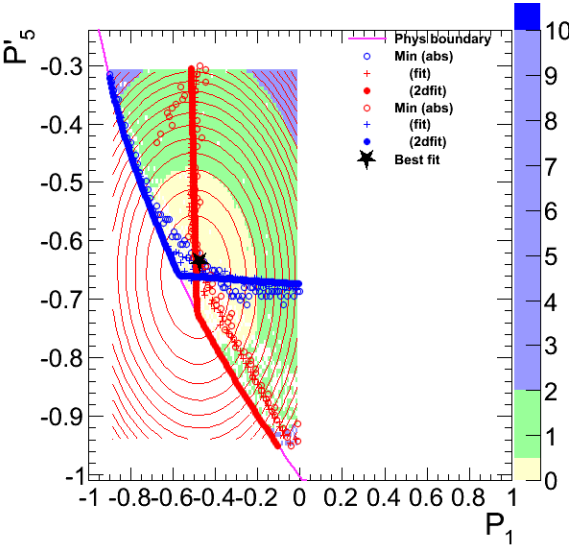
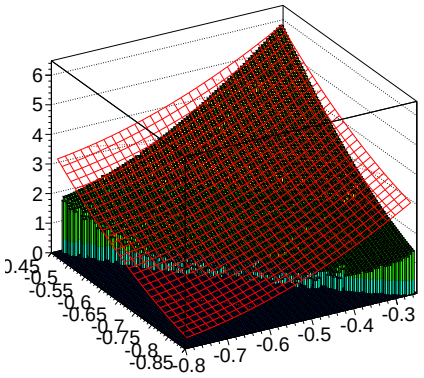
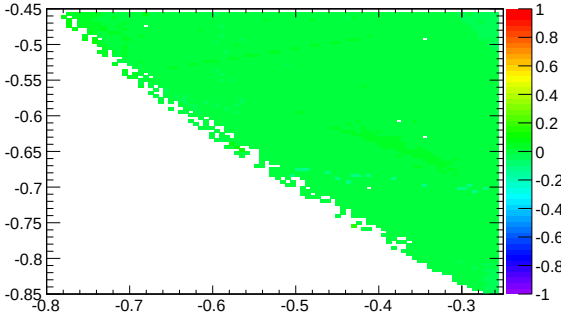


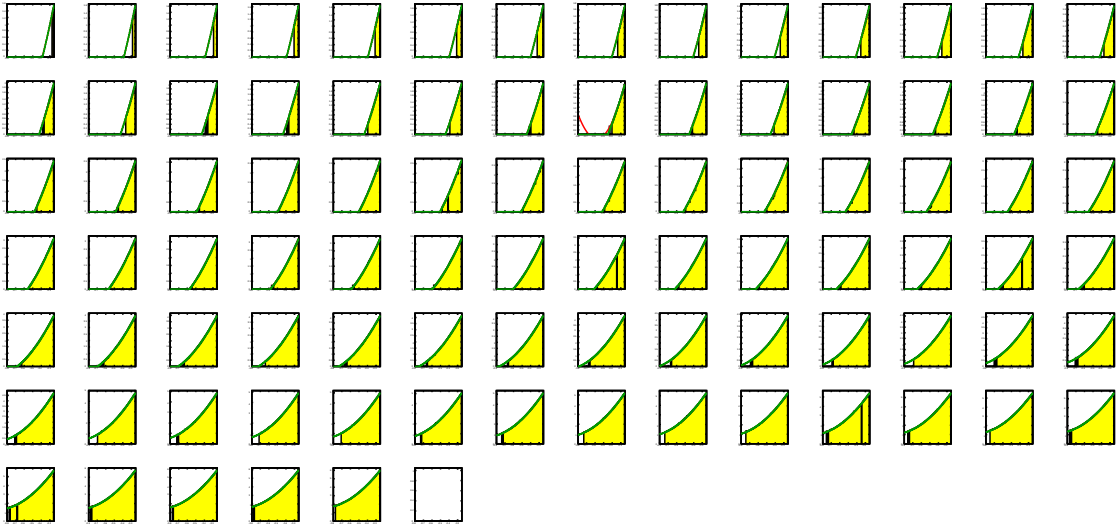
- Little correlation
- dense evaluation of DLL but below the best fit
- close from physical boundary
- good 2D fit
- significant difference for the three methods, expecially below best fit
- the gen points done so far in part usable

Bin 5: DLL and fit ; DLL−Fit

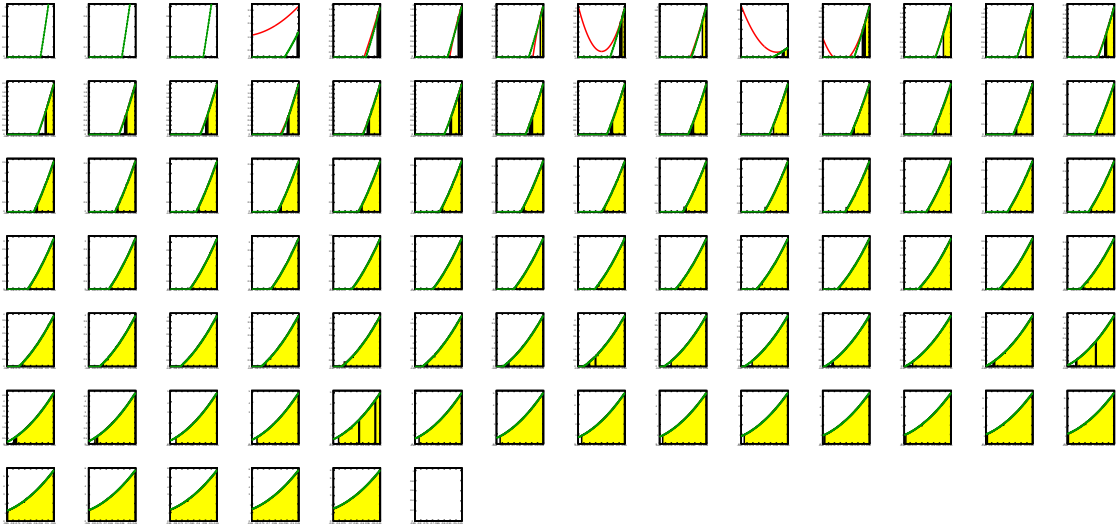




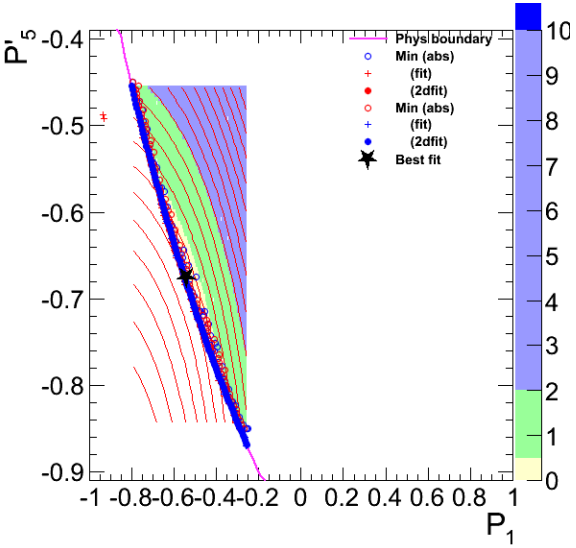
Bin 5: Profile P_1 DLL with 1D and 2D parabola fit



Bin 5: Profile P_5' DLL with 1D and 2D parabola fit

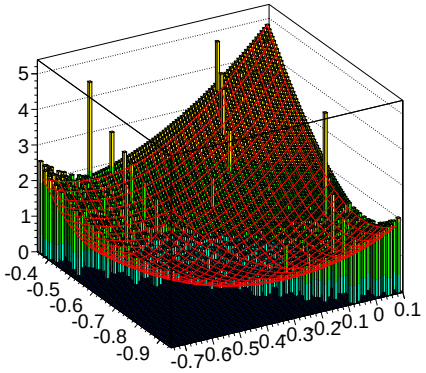


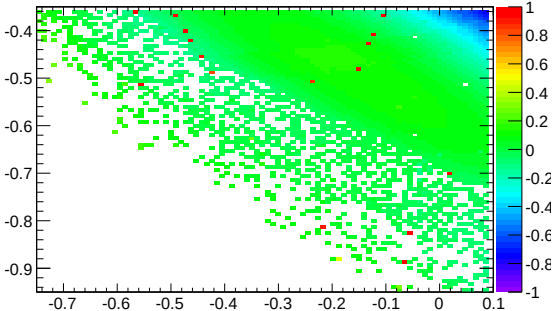
Bin 5:



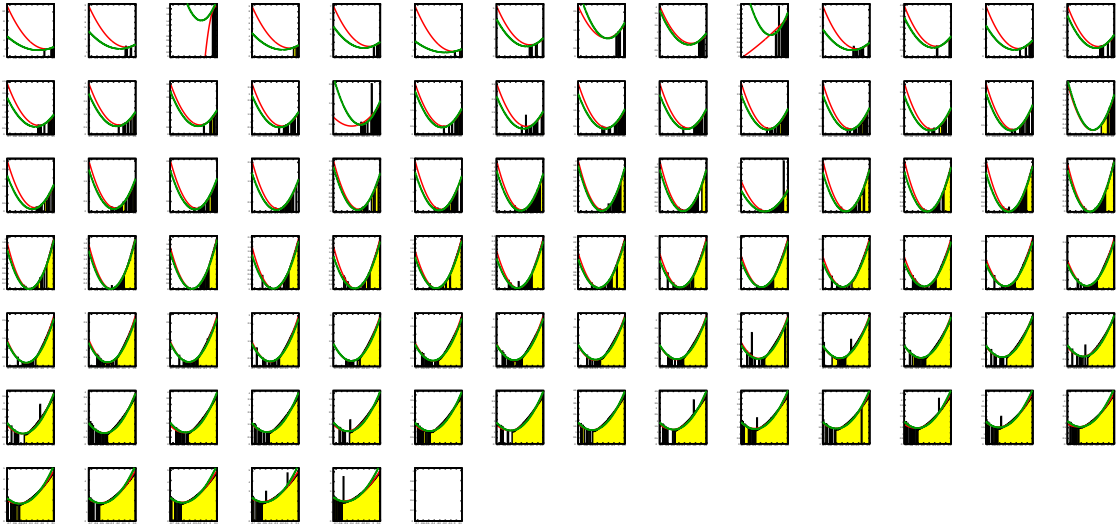
- Little correlation
- dense evaluation of DLL
- very close to physical bounds
- smoothening of the limit critical
- good 2D fit, but hard to judge
- small difference for the three methods, given that we have to move along the phys bounds
- the gen points done so far are mostly good

Bin 7: DLL and fit ; DLL−Fit

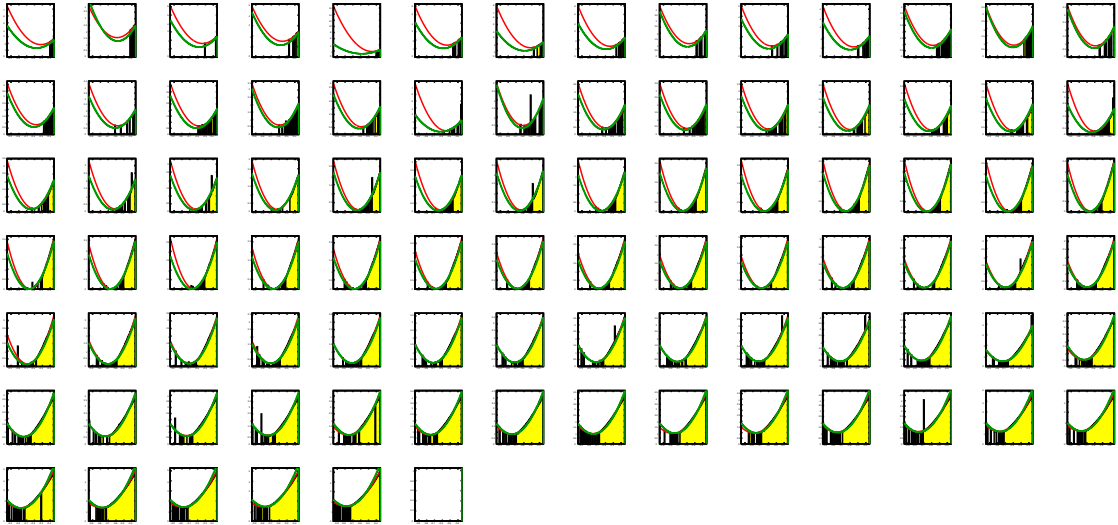




Bin 7: Profile P_1 DLL with 1D and 2D parabola fit



Bin 7: Profile P_5' DLL with 1D and 2D parabola fit



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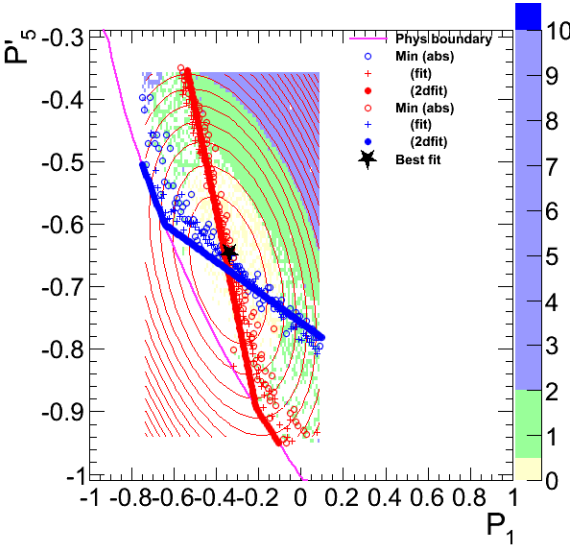
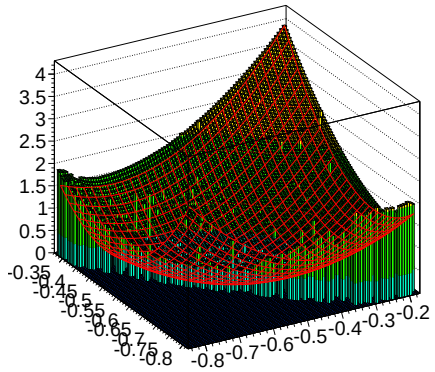
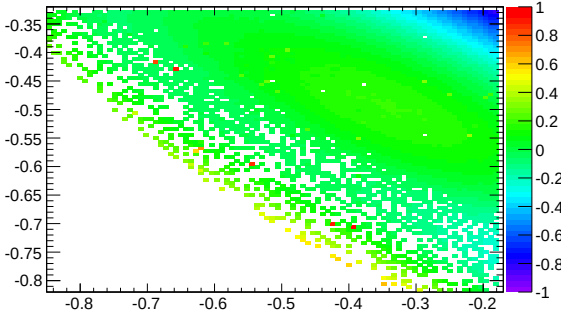


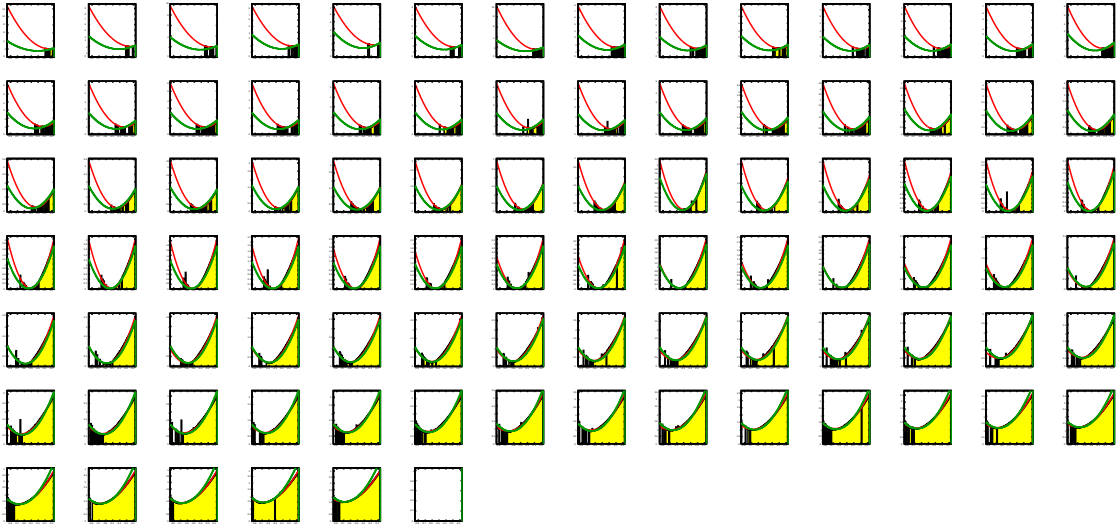
- correlation
- sparse (somewhere very sparse) evaluation of DLL
- not so close to physical bounds
- good 2D fit
- 3^{rd} methods a clear winner for sparse region
- most point to be redone

Bin 8: DLL and fit ; DLL−Fit

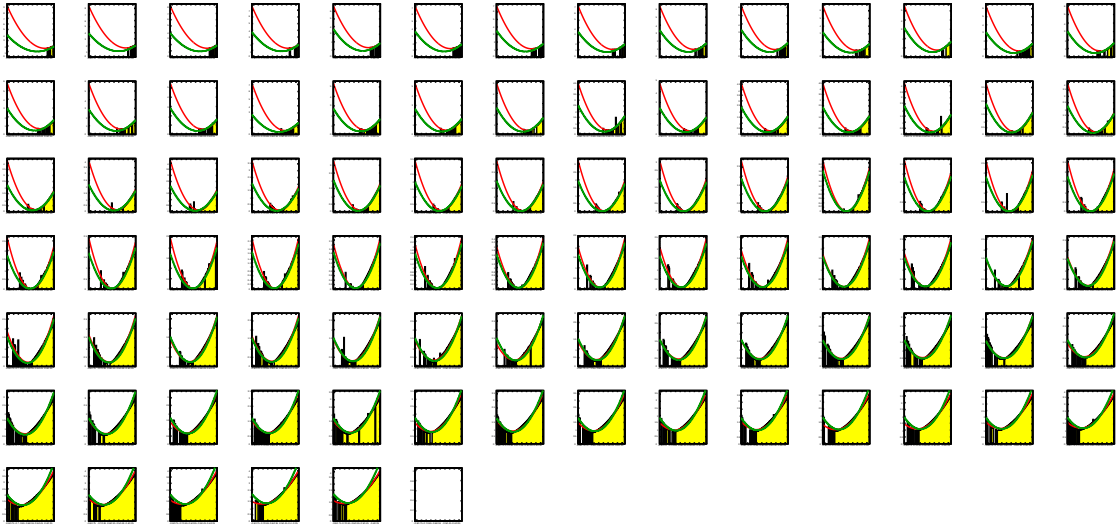




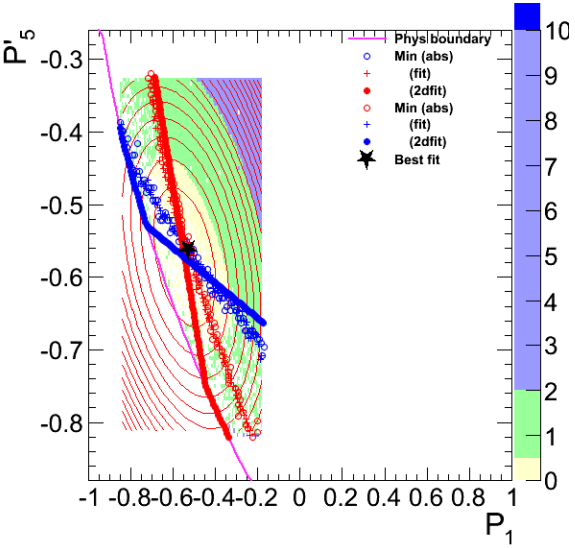
Bin 8: Profile P_1 DLL with 1D and 2D parabola fit



Bin 8: Profile P_5' DLL with 1D and 2D parabola fit

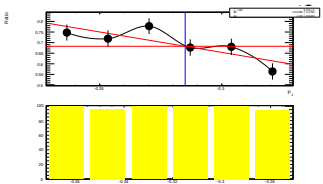


Bin 8:



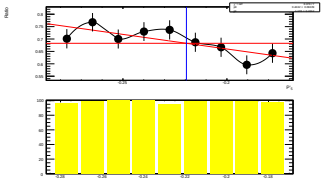
- correlation
- sparse (somewhere very sparse) evaluation of DLL
- not so close to physical bounds
- fair 2D fit
- 3^{rd} methods quite different from 1 and 2
- most point to be redone

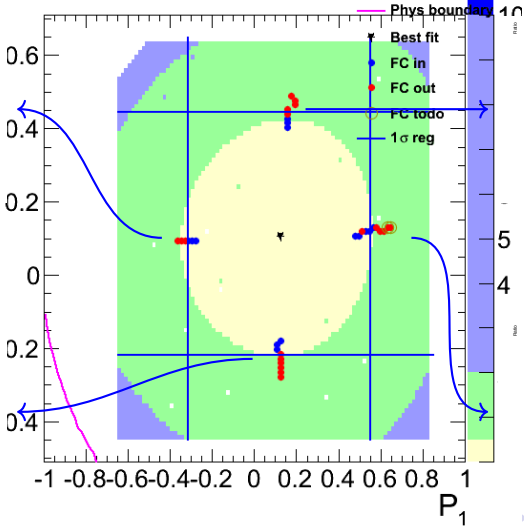
Bin 0

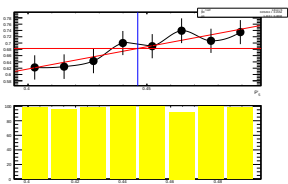


Done

Done

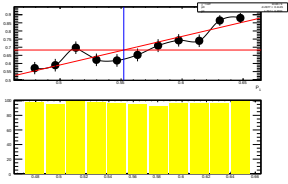




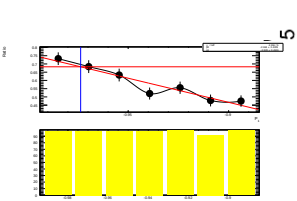


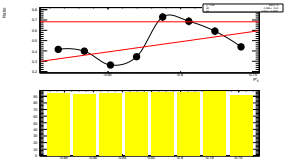
Done

Done



Bin 1 Old (GP is the profile abs minimum)





Done

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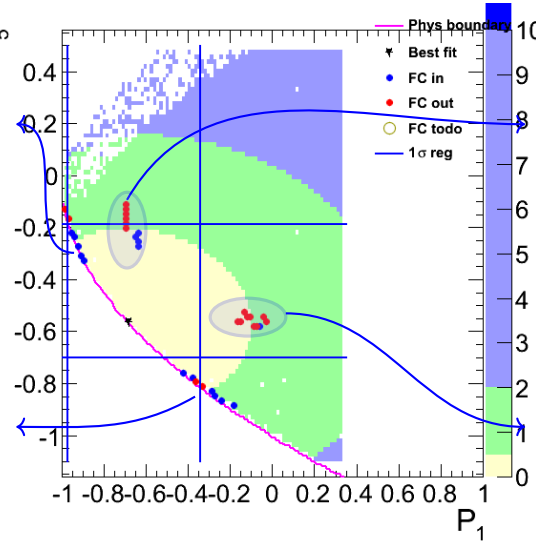
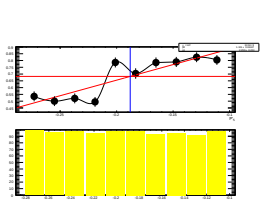
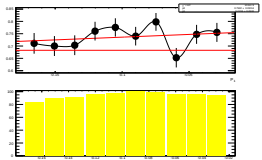


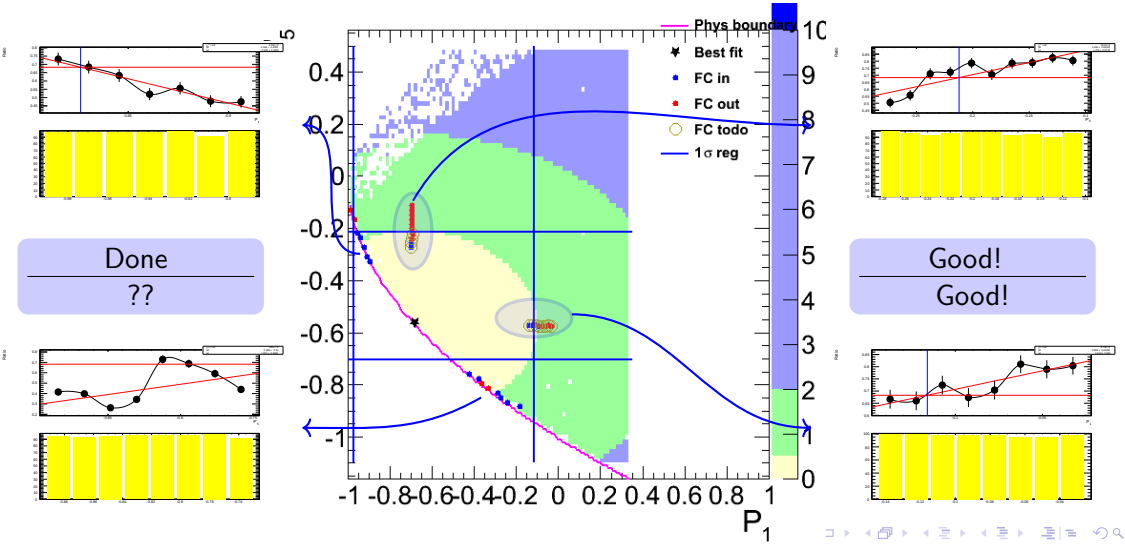




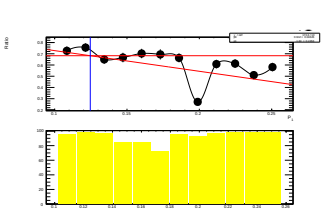
Done ??

More GP: fluctuations?

Bin 1 New (GP is vertex of a fitted parabola on profile)

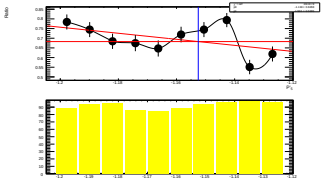


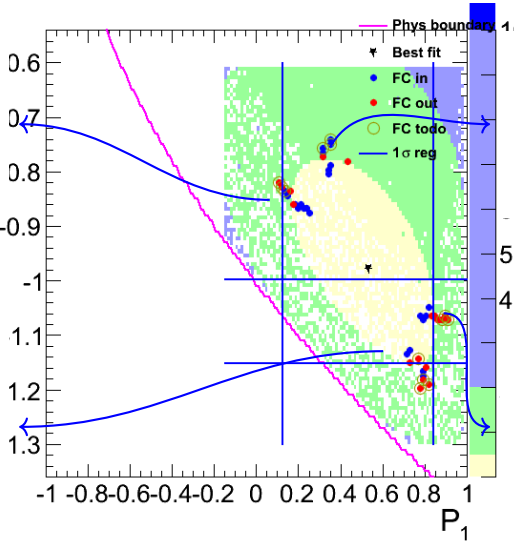
Bin 2 (OLD Abs minimum)

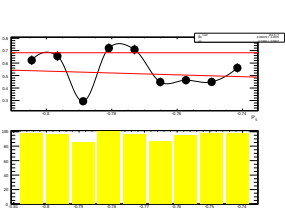


More GP

more GP

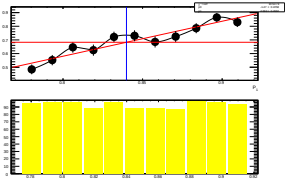




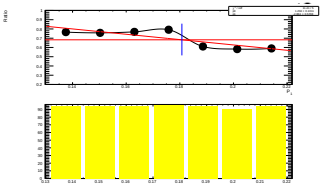


More GP: fluctuations?

Done

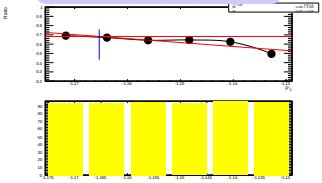


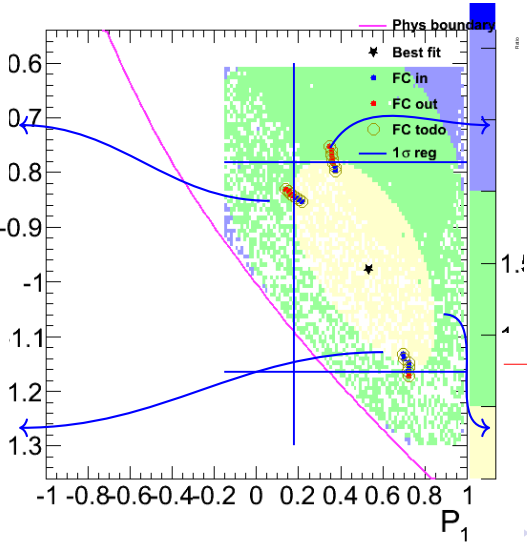
Bin 2 (Fit Parabola)

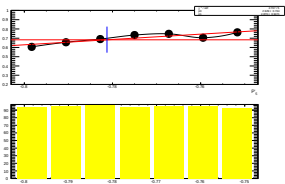


Good

good (one more GP)



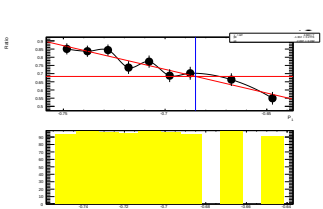




Good

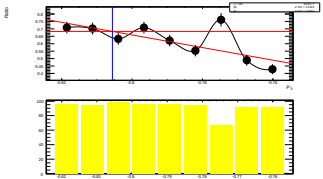
Done

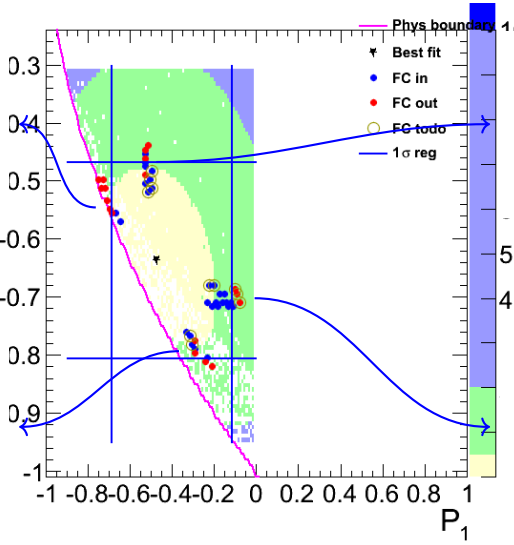
Bin 3 (OLD)

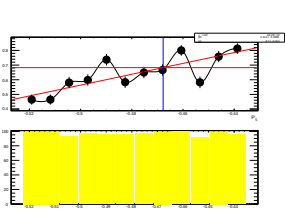


Done

done

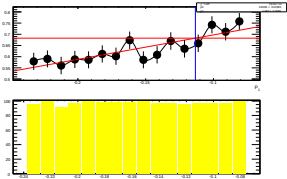






done

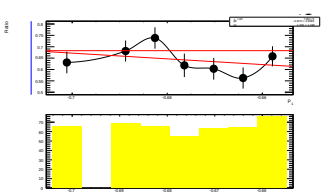
Done



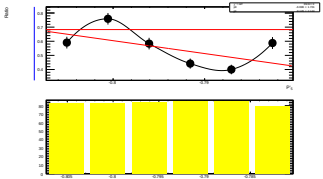
Bin 3 (NEW Fit2d Parabola)

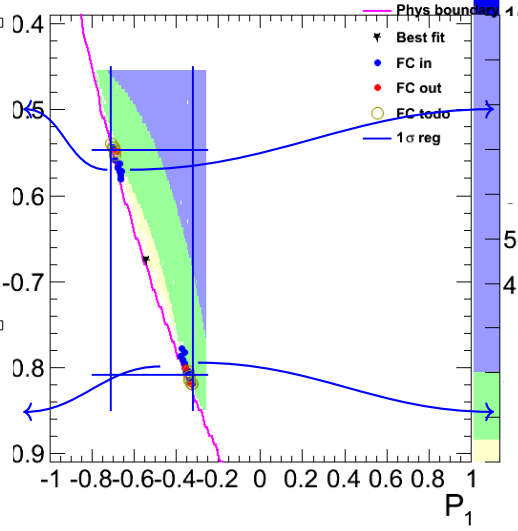
- already good enough
- maybe can be run with low priority

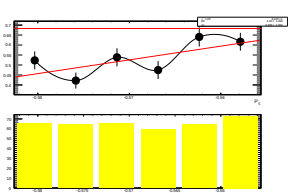
Bin 5 (OLD Abs minimum)



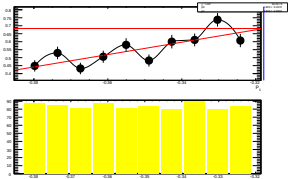
more GP
more GP



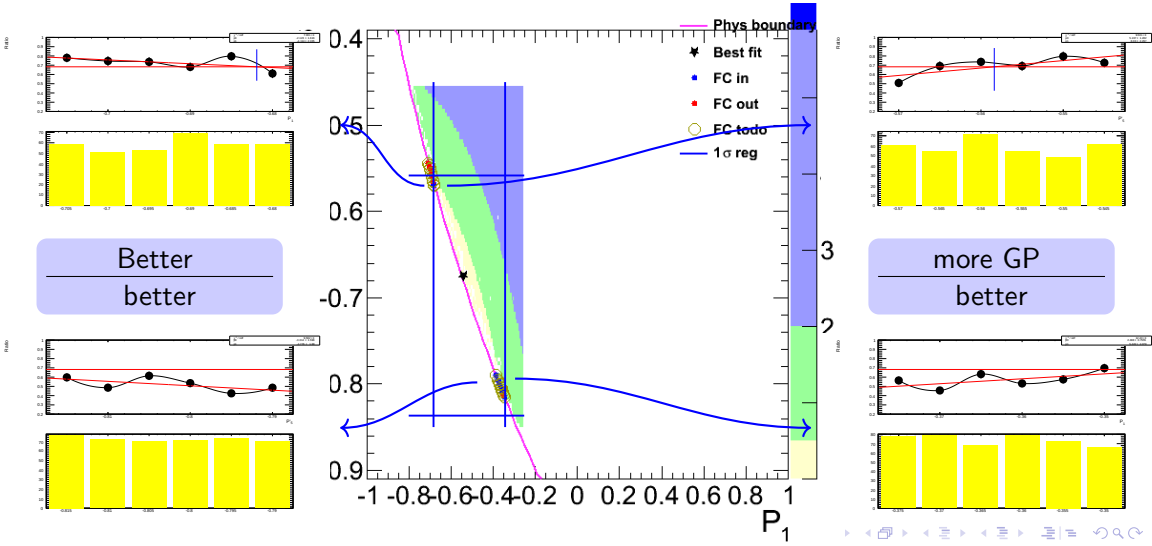




more GP
more GP



Bin 5 (Fit2D parabola)



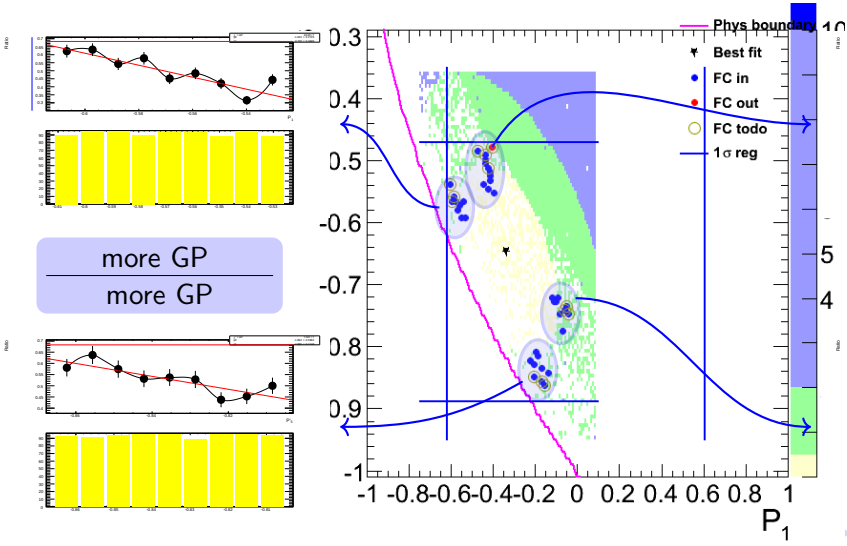
Better

better

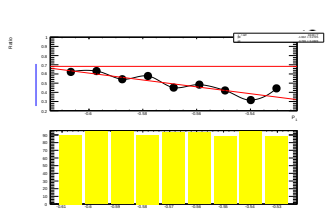
more GP

better

Bin 7 OLD (Abs minimum)

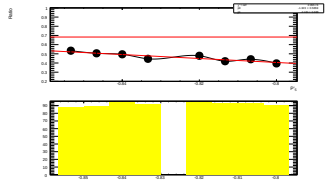


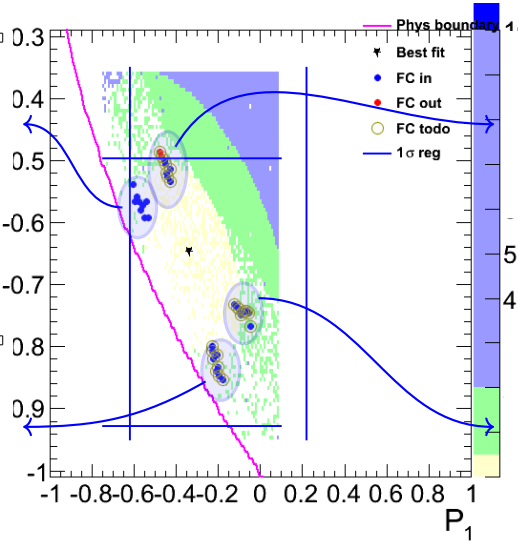
Bin 7 (Fit parabola)

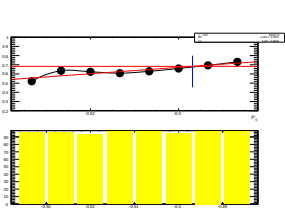


more GP

more GP ??







Good

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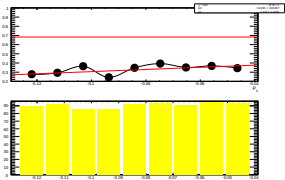
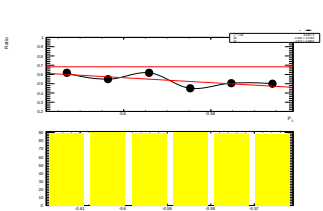
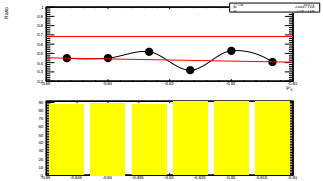


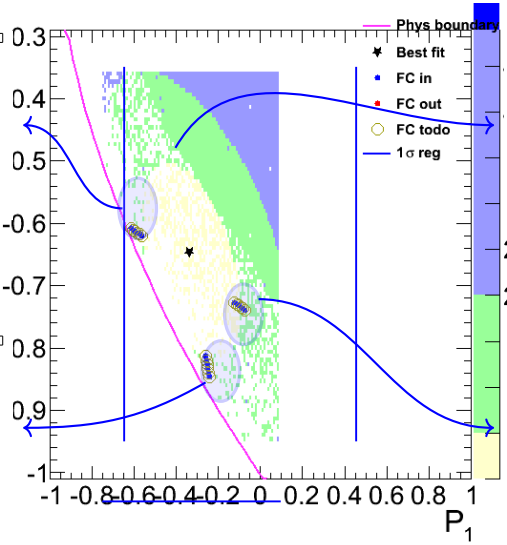
Bin 7 NEW (Fit2D parabola)



more GP

more GP ??





Good

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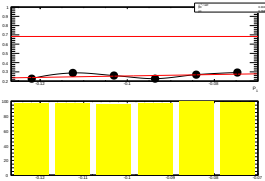
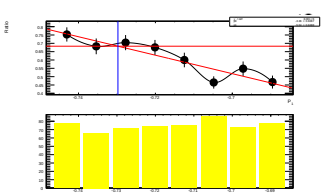


Bin 8 (OLD abs minimum)



Good

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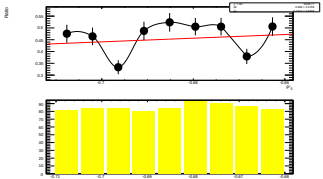

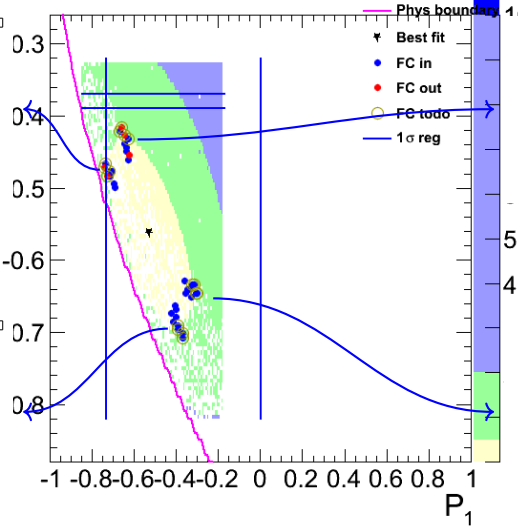

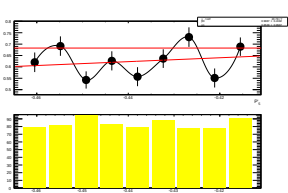

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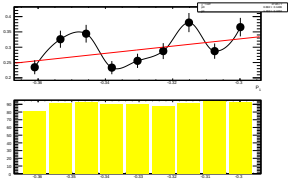
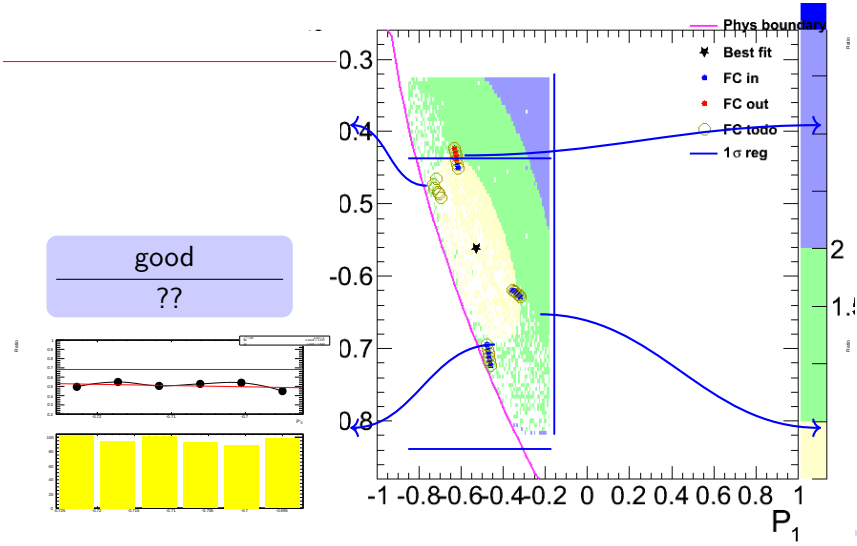


Bin 8 (NEW Fit2D Parabola)



good

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Good

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Additional stuff

Additional or backup slides

Bibliography I