$B^0 \to K^* \mu\mu$ update

Marcin Chrząszcz[1]

[1] University of Zurich

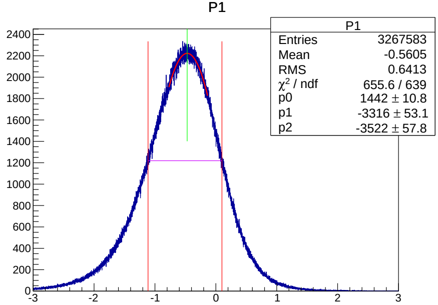
May 8, 2015

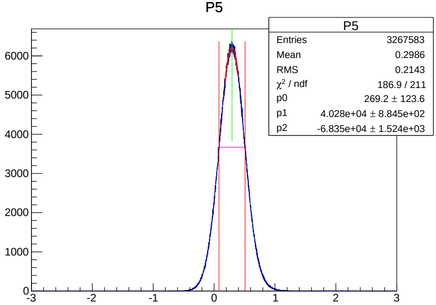
Reminder

- Last time I show you how to get the P_x distributions by simulating the bifurcated Gaussian.
- Now how to get the mean and error on this distribution.

Basics

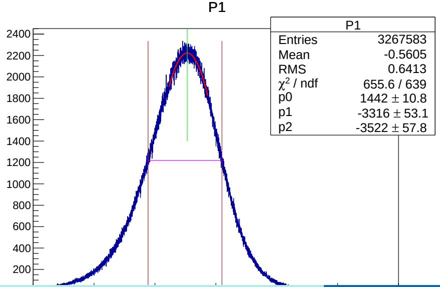
- We cannot just take the expected S_x and expected F_l and calculate: $P_x = \frac{S_x}{\sqrt{F_l(1-F_l)}}$ to get expected P_x.
- This will work only for Gaussian distributions(but not for bifurcated).
- Proposal: Fit a parabola in range $[-0.5\mathrm{RMS}, 0.5\mathrm{RMS}]$
- Get the most probable value.

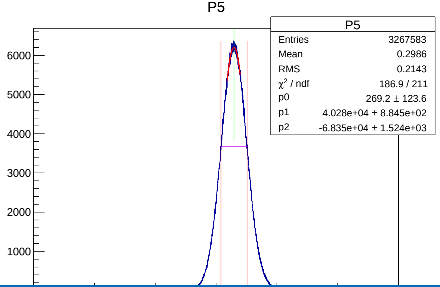




Confidence interval

- Now just need to find the 68.27% interval.
- Draw a horizontal line $y = y_{max} \times 0.9$
- Iterate among all bins and select bins with events that have $y_{i\ bin} > y$.
- Find y_{68} for which 68.27% have the property $\sum y_{i\ bin > y_{68}} = 0.6827$
- Find the two spots where the y_{68} line crosses the distribution.
- With current statistics I have $\mathcal{O}(10^{-4})$ error on the input S_x and $\mathcal{O}(10^{-3})$ on output P_x.





Systematics

- To access systematics due to unfolding procedure we use the higher($+2$) order acceptance correction function on high statistics MC.
- I noticed that some of the weights ($1/eff$) are super large (> 100) or even negative which fucks up our distributions and creates larger systematics then it should be.
- Repeated this study rejecting this events.

q^2	F_l	S_3	S_4	S_5	S_6	S_7	S_8	S_9
0	0.0022	0.005	0.0003	0.0077	0.0066	0.0080	0.0002	0.0032
1	0.0048	0.001	0.0014	0.0051	0.0088	0.0036	0.0048	0.0003
2	0.0004	0.0001	0.00013	0.0056	0.0046	0.0014	0.0003	0.0022
3	0.0002	0.0012	0.0007	0.0017	0.0001	0.0016	0.0011	0.0021
4	0.002	0.0004	0.0005	0.0015	0.0003	0.0009	0.0002	0.0010
5	0.006	0.0011	0.0007	0.0026	0.0014	0.0016	0.0015	0.0004
6	0.008	0.0019	0.0008	0.0024	0.0029	0.0033	0.0019	0.0000
7	0.0062	0.0015	0.0002	0.0011	0.0036	0.0028	0.0016	0.0005
8	0.0035	0.0037	0.0017	0.0046	0.0037	0.0005	0.0040	0.0040
9	0.005	0.0001	0.0004	0.0010	0.0009	0.0050	0.0043	0.0033
10	0.0011	0.0044	0.002	0.0060	0.0059	0.0101	0.0000	0.0012
11	0.0021	0.0018	0.0001	0.0020	0.0004	0.0052	0.0082	0.0059

The end

- If we all agree with thouse procedure would like to put them in the note
- Keep on working on other systematics.