

$$B^0 \rightarrow K^* \mu^- \mu^+$$

Update



Marcin Chrzaszcz
mchrzasz@cern.ch



University of
Zurich^{UZH}

$B^0 \rightarrow K^* \mu^- \mu^+$ meeting, CERN
January 31, 2017

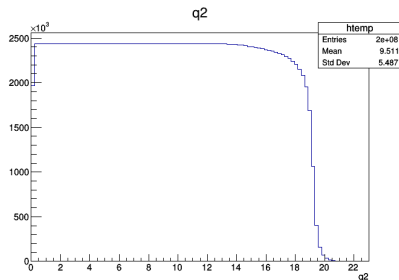
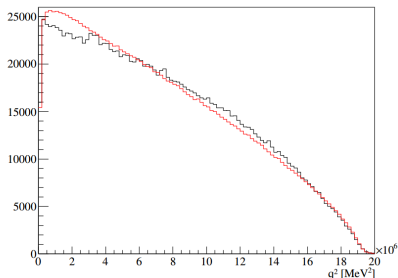
The need for MC

⇒ New analysis will need new/Run2 MC. Already in progress:

■	34950	Simulation	Active	2a	RDWG - Reconstructible Filtered - Sim09b 2016 - MU - Marcin (Kotm...)	Beam6500GeV-2016-MagUp-Nu1...	Sim09b/Tng0e6138160FReco16/T...	11114014	24,000,000	5,387,917	22
■	34947	Simulation	Active	2a	RDWG - Reconstructible Filtered - Sim09b 2016 - MD - Marcin (Kotm...)	Beam6500GeV-2016-MagDown-N...	Sim09b/Tng0e6138160FReco16/T...	11114014	24,000,000	5,402,480	22
▣	34942	Simulation	Active	2a	RDWG - Reconstructible Filtered - Sim09b 2016 - MU - Marcin (Kotm...)	Beam6500GeV-2016-MagUp-Nu1...	Sim09b/Tng0e6138160FReco16/T...		750,000	49,561	6
■	34941	Simulation	Active	2a	RDWG - Reconstructible Filtered - Sim09b 2016 - MD - Marcin (Kotm...)	Beam6500GeV-2016-MagDown-N...	Sim09b/Tng0e6138160FReco16/T...		750,000	24,566	3
▣	34935	Simulation	Active	2a	RDWG - Reconstructible Filtered - Sim09b 2016 - MU - Marcin (L.Terrin)	Beam6500GeV-2016-MagUp-Nu1...	Sim09b/Tng0e6138160FReco16/T...		300,000	49,187	16
▣	34934	Simulation	Active	2a	RDWG - Reconstructible Filtered - Sim09b 2016 - MD - Marcin (L.Terrin)	Beam6500GeV-2016-MagDown-N...	Sim09b/Tng0e6138160FReco16/T...		300,000	27,820	9
■	34933	Simulation	PPG OK	2a	RDWG - Reconstructible Filtered - Sim09b 2016 - MU - Marcin (ghmm)	Beam6500GeV-2016-MagUp-Nu1...	Sim09b/Tng0e6138160FReco16/T...	13114002	150,000	0	0
■	34932	Simulation	PPG OK	2a	RDWG - Reconstructible Filtered - Sim09b 2016 - MD - Marcin (ghmm)	Beam6500GeV-2016-MagDown-N...	Sim09b/Tng0e6138160FReco16/T...	13114002	150,000	0	0
■	34927	Simulation	Done	2a	RDWG - Reconstructible Filtered - Sim09b 2016 - MU - Marcin (Kotm)	Beam6500GeV-2016-MagUp-Nu1...	Sim09b/Tng0e6138160FReco16/T...	12113001	250,000	361,848	144
■	34923	Simulation	Done	2a	RDWG - Reconstructible Filtered - Sim09b 2016 - MD - Marcin (Kotm)	Beam6500GeV-2016-MagDown-N...	Sim09b/Tng0e6138160FReco16/T...	12113001	250,000	361,997	144

The need for MC - improvements

⇒ If you recall in Run1 we had PHSP MC:

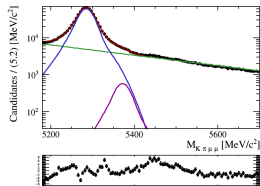


⇒ More flat makes our life easier and less dirty in terms of reweighing :)

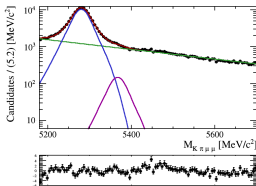
⇒ Produced 20M events so we can get the correction for small "non-flatness". (will give you links at the end).

The data

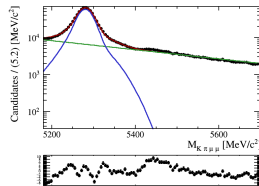
- ⇒ Reprocessed all the data with the same DV. Both 201(1,2,5,6) data sets.
- ⇒ Also reprocessed all MC for Run1. Run2 scripts are written and will be lunch as soon the production finishes
- ⇒ First look at data:



$$N_{J/\psi K^*}^{Run1} = 641446$$



$$N_{J/\psi K^*}^{2015} = 106149$$

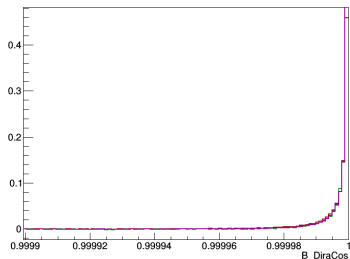


$$N_{J/\psi K^*}^{2016} = 626024$$

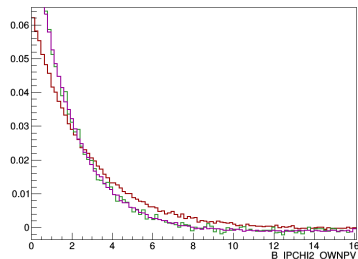
The data- comparing distributions

⇒ Over all we see a very good agreement between the year:

B_DiraCos



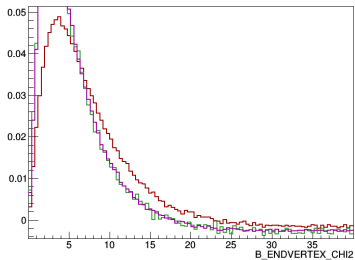
B_IPCHI2_OWNPV



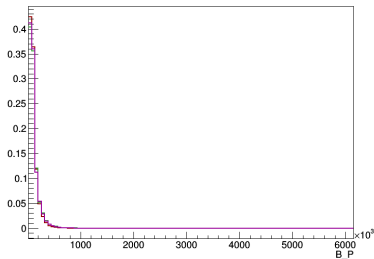
The data- comparing distributions

⇒ Over all we see a semi good agreement between the year:

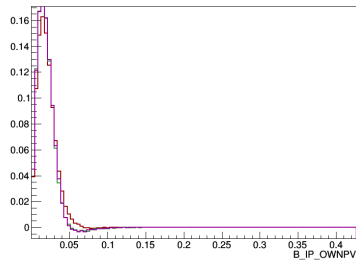
B_ENDVERTEX_CHI2



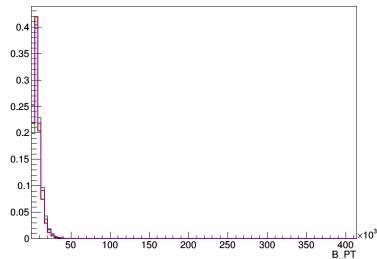
B_P



B_IP_OWNPV



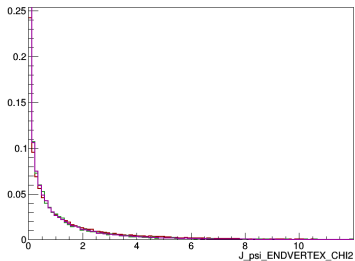
B_PT



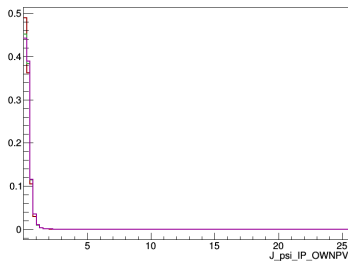
The data- comparing distributions

⇒ Over all we see a semi good agreement between the year:

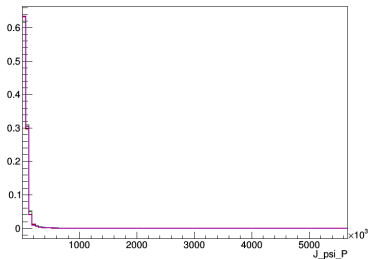
J_psi_ENDVERTEX_CHI2



J_psi_IP_OWNPV



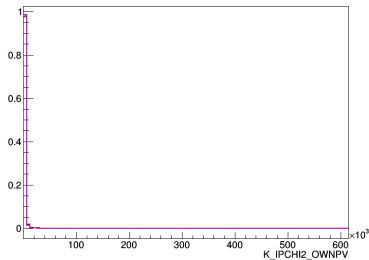
J_psi_P



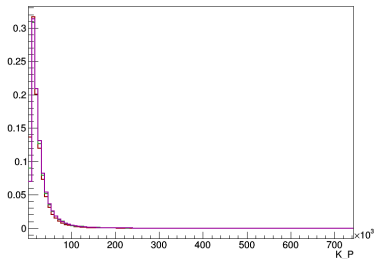
The data- comparing distributions

⇒ Over all we see a semi good agreement between the year:

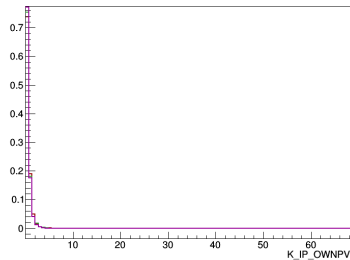
K_IPCHI2_OWNPV



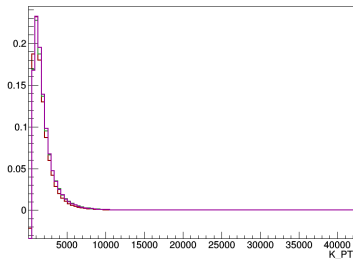
K_P



K_IP_OWNPV



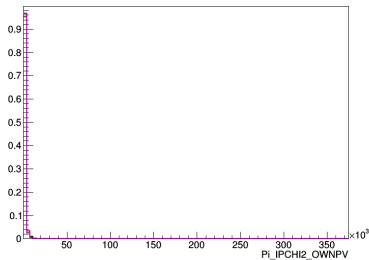
K_PT



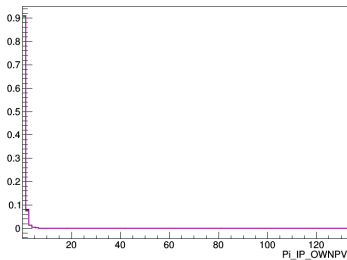
The data- comparing distributions

⇒ Over all we see a semi good agreement between the year:

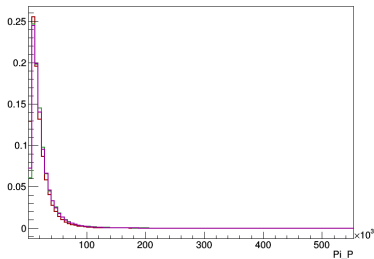
Pi_IPCHI2_OWNPV



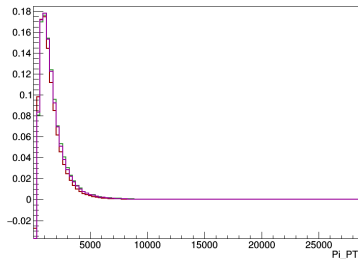
Pi_IP_OWNPV



Pi_P



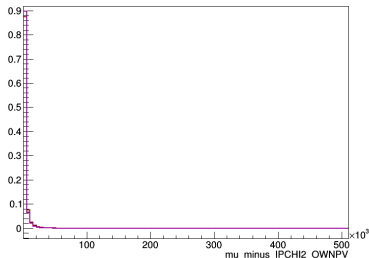
Pi_PT



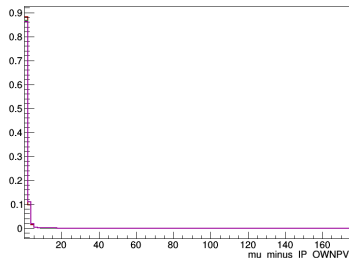
The data- comparing distributions

⇒ Over all we see a semi good agreement between the year:

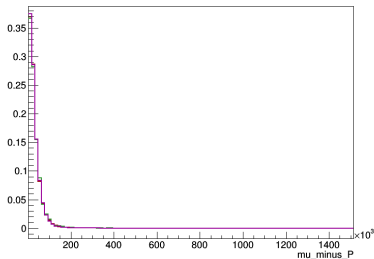
mu_minus_IPCHI2_OWNPV



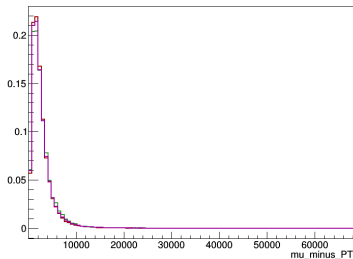
mu_minus_IP_OWNPV



mu_minus_P



mu_minus_PT



Selection

⇒ Now we had the pre selection developed for Run1!

⇒ Known VETOS:

- Swaps with $B \rightarrow K^* J/\psi$
- Λ_b
- Random pion in $B \rightarrow K\mu\mu$.
- $B_s^0 \rightarrow \phi\mu\mu$.

⇒ The same triggers as Run1. Need MC to check it for Run2. Have script read to calculate everything so next week we will have numbers.

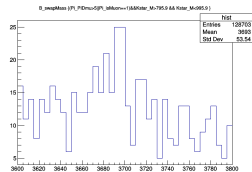
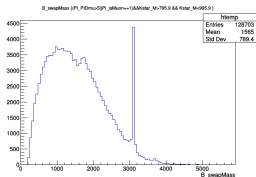
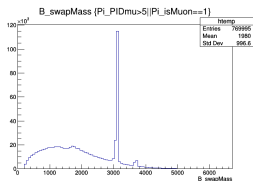
Selection

⇒ We have missed one cut unfortunately.

⇒ Normally we have the swap for J/ψ :

"!((B0_swapMass>3036) and (B0_swapMass<3156) and (Pi_PIDmu>5||Pi_isMuon==1)) and !((B0_kmuswapMass>3036) and (B0_kmuswapMass<3156) or (K_PIDmu>5||K_isMuon==1))"

⇒ We forgot about the $\psi(2S)$:



⇒ Impact for the Pwave analysis minimal but let's veto just to be sure :)

⇒ The $m_{K\pi}$ preselection cut increased to 1530 MeV to cover the future moments analysis.

Ongoing

- ⇒ Downloaded all the needed PIDCalib samples for re sampling. First re sampled distributions should be ready next week.
- ⇒ EOS TOYS generated. Need to calculate the integrated observables.
- ⇒ BDT strategies: Keep variables as they are and don't spend too much time on this. Run2 needs separate BDT: small studies planned MC vs DATA training.

What we have

⇒ All ntuples are on eos:

/eos/lhcb/user/m/mchrzasz/KstarMuMu

- data w/o selection
- data after selection
- TOY MC: EOS + FlatQ2
- Run1 MC
- Run MC(will be copied once it's ready)
- PIDCalib samples.

