Observation of a narrow pentaquark state, $P_c(4312)^+$, and of two-peak structure of the $P_c(4450)^+$

Supplementary material for CDS record of LHCb-PAPER-2019-014

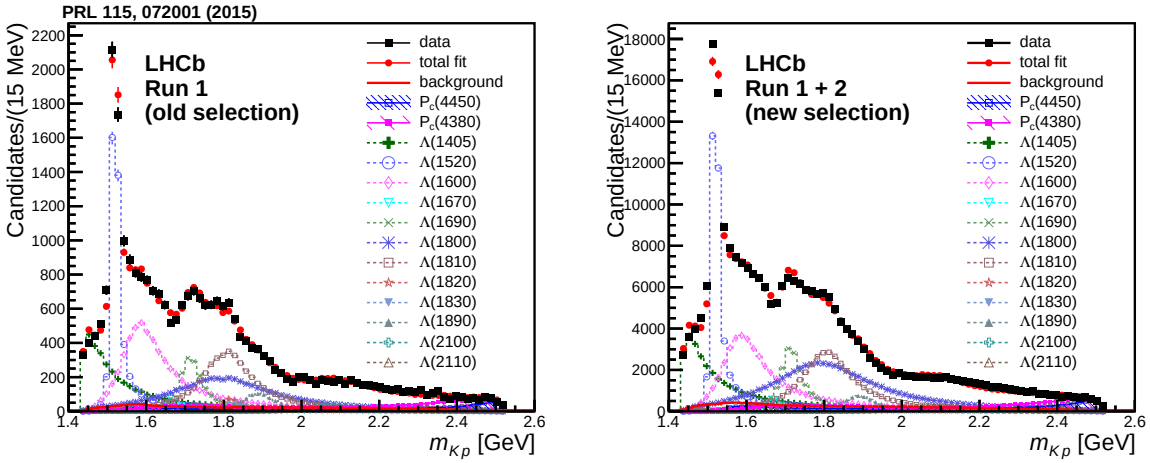

Figure CDS1: (left) Distributions of m_{Kp} in the Run 1 sample (the old selection), together with the projections of the nominal cFit ("reduced model") taken from Ref. [1]. (right) Distributions of m_{Kp} in the Run 1 + 2 sample (the new selection), together with the projections of the same amplitude model fit to it.

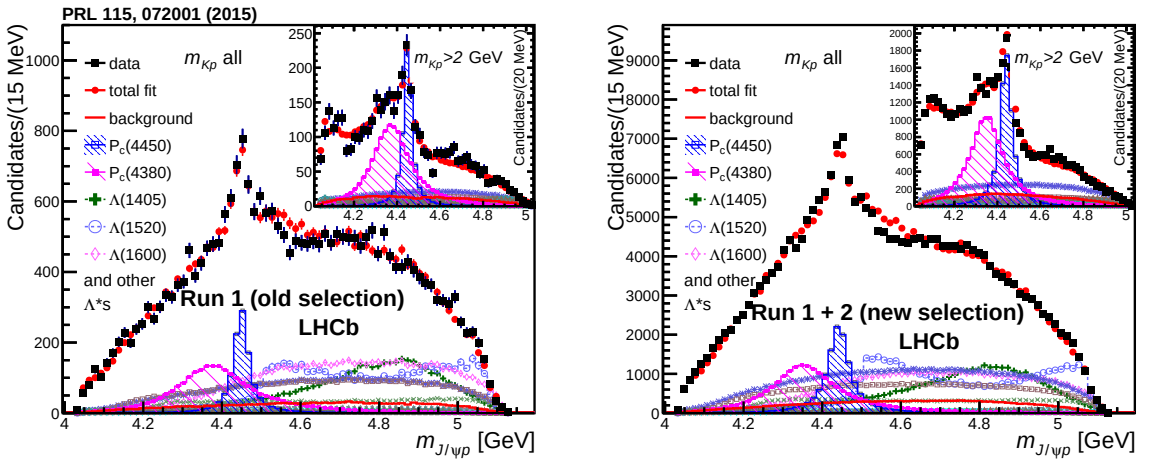

Figure CDS2: (left) Distributions of $m_{J/\psi p}$ in the Run 1 sample (the old selection), together with the projections of the nominal cFit ("reduced model") taken from Ref. [1]. (right) Distributions of $m_{J/\psi p}$ in the Run 1 + 2 sample (the new selection), together with the projections of the same amplitude model fit to it.

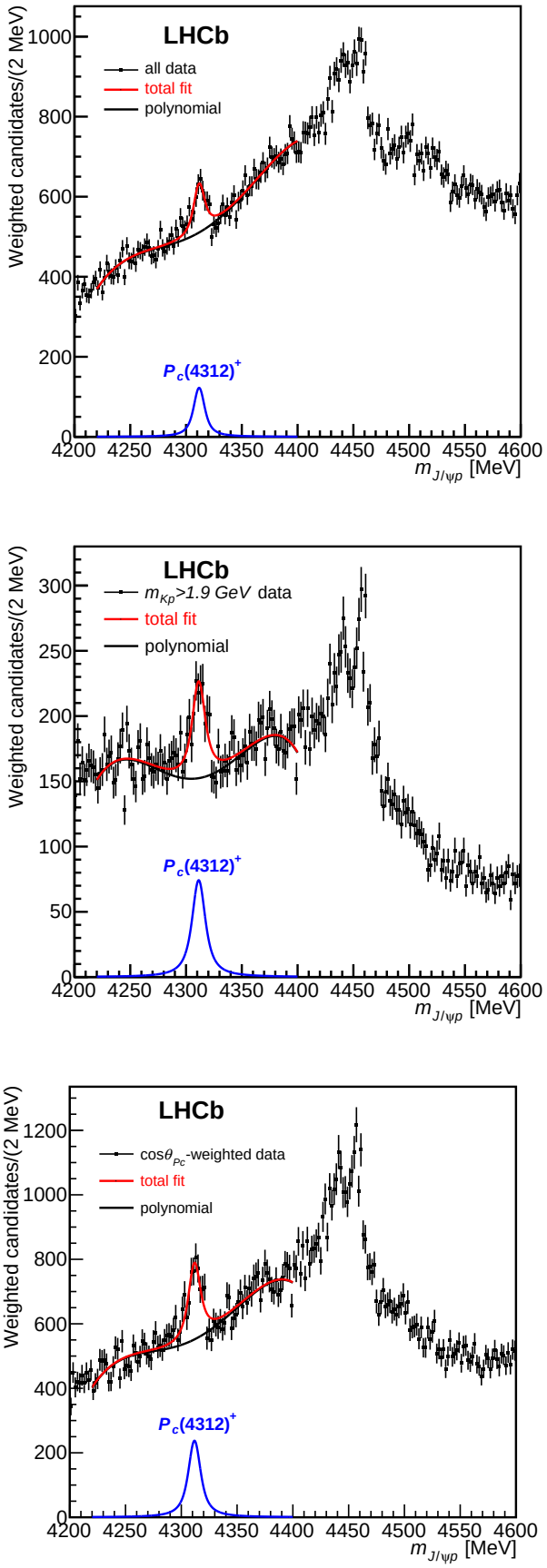

Figure CDS3: Examples of the fits to the $P_c(4312)^+$ in a narrow mass range. Fourth-order polynomial (5 free parameters) are used in these fits.

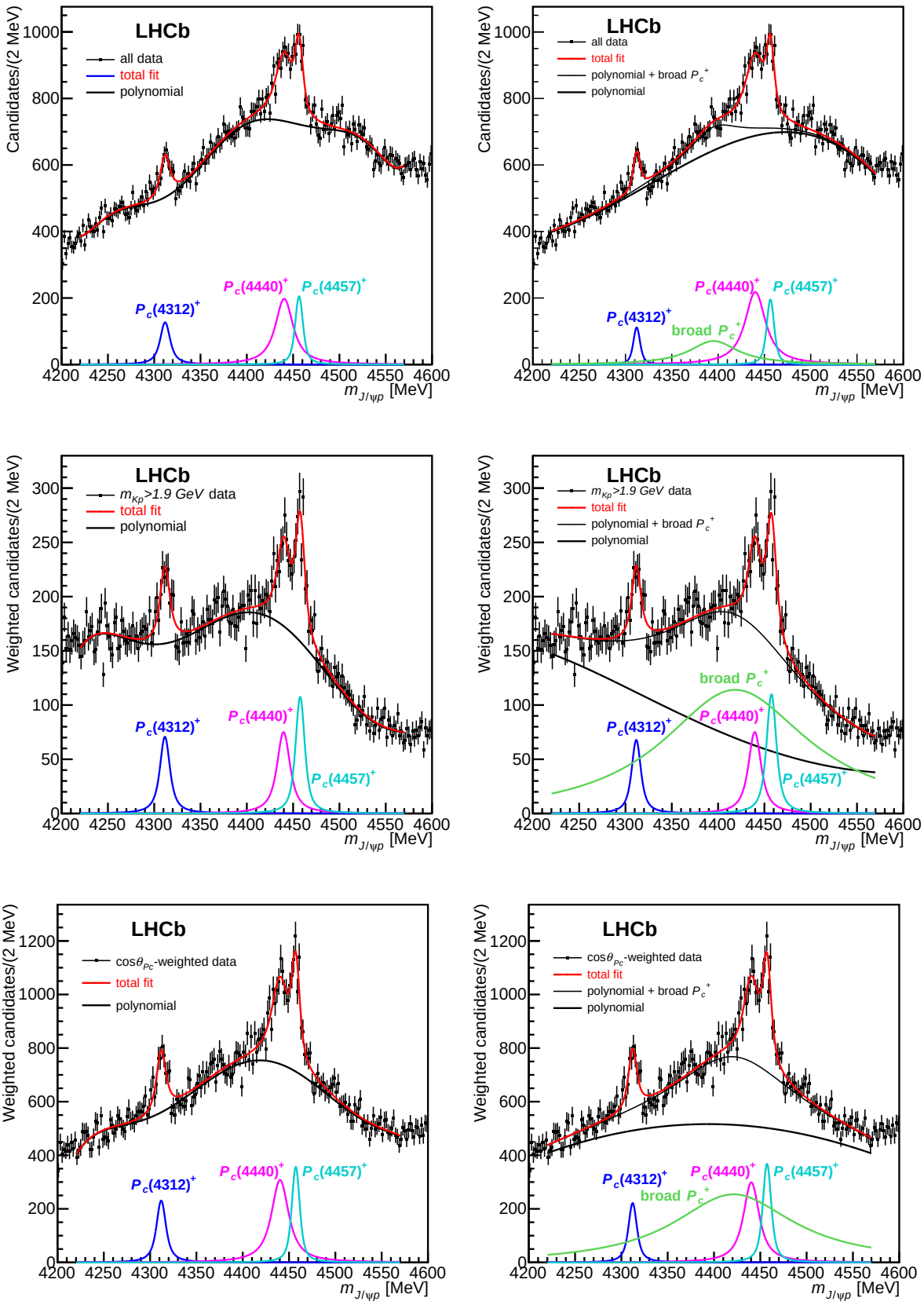

Figure CDS4: Fit displays corresponding to the different panels of Fig. **??** included here as stand-alone figures. The central values of the results correspond to the fit shown in the bottom-left corner. The orders of the polynomial used are: (left) eight, six and six (right) three, two and two, for the top, middle and bottom plots, respectively.

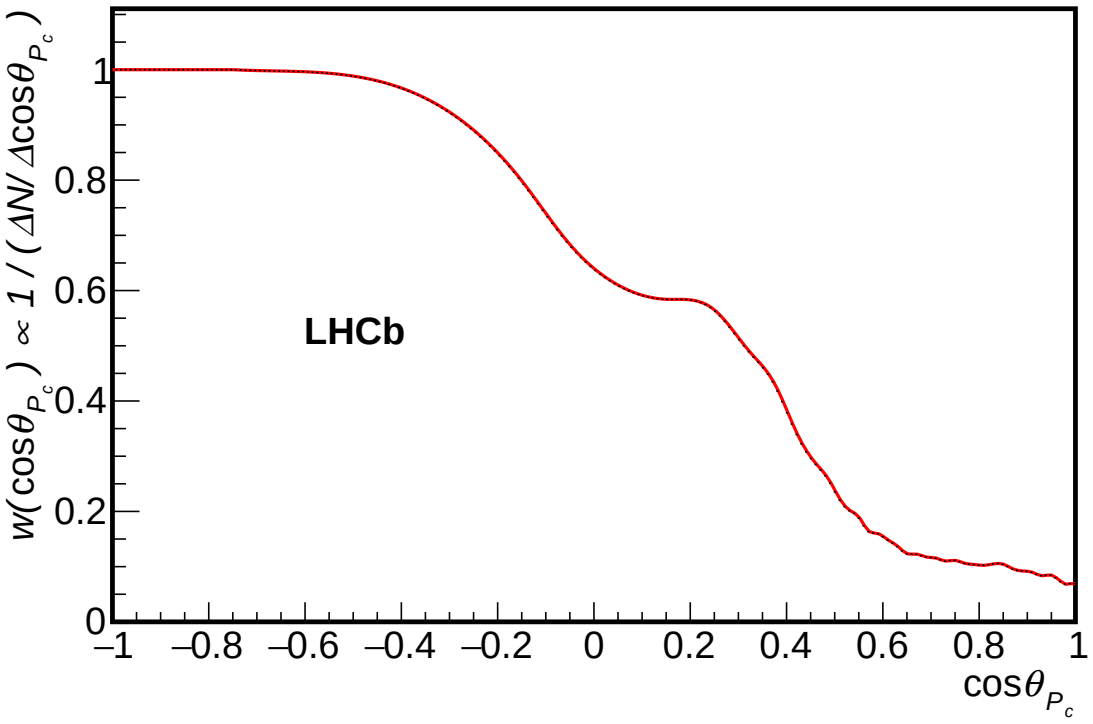

Figure CDS5: Weight function $w(\cos\theta_{Pc})$.

	$P_c(4312)^+$			$P_c(4440)^+$			$P_c(4457)^+$		
	A	m	Γ	A	m	Γ	A	m	Γ
A	1.465e+05								
m	-9.192e-02	5.439e-07							
Γ	8.424e-01	-7.379e-07	6.997e-06						
A	-1.432e+05	3.632e-02	-7.166e-01	9.129e+05					
m	-2.979e-02	-1.254e-08	-1.704e-07	4.837e-01	1.203e-06				
Γ	-5.728e-01	1.416e-07	-2.838e-06	4.094e+00	2.009e-06	2.183e-05			
A	2.302e+04	2.189e-03	1.095e-01	-2.779e+05	-3.770e-01	-1.192e+00	2.171e+05		
m	-1.864e-02	8.855e-09	-1.185e-07	2.240e-01	2.269e-07	8.227e-07	-1.062e-01	2.926e-07	
Γ	3.851e-02	4.756e-08	1.577e-07	-7.990e-01	-1.279e-06	-3.002e-06	7.539e-01	-3.701e-07	3.539e-06

Table CDS1: The statistical covariance matrix for the P_c^+ fit parameters for the default fit to the data. Peak amplitudes (A) are in the units of weighted events, whereas the masses (m) and natural widths (Γ) are in GeV.

References

[1] LHCb collaboration, R. Aaij *et al.*, *Observation of $J/\psi p$ resonances consistent with pentaquark states in $\Lambda_b^0 \to J/\psi p K^-$ decays*, Phys. Rev. Lett. **115** (2015) 072001, arXiv:1507.03414.