

Supplementary material for LHCb-PAPER-2014-039

This appendix contains supplementary material that will be posted on the public cds record but will not appear in the paper.

Including the mass measurement in this analysis, LHCb has made B_c^+ mass measurements with three independent channels, $B_c^+ \rightarrow J/\psi \pi^+$, $B_c^+ \rightarrow J/\psi D_s^+$ and $B_c^+ \rightarrow J/\psi p \bar{p} \pi^+$. The results are 6273.7 ± 1.3 (stat) ± 1.6 (syst) MeV/ c^2 , 6276.3 ± 1.4 (stat) ± 0.4 (syst) MeV/ c^2 and 6274.0 ± 1.8 (stat) ± 0.4 (syst) MeV/ c^2 , respectively. The statistical and various components of the systematic uncertainties are shown in Table 1 for each measurement. The statistical uncertainty and systematic uncertainties due to mass fitting model, final state radiation (FSR) and the uncertainty of resonant daughter mass (the uncertainties of the J/ψ mass and masses of the hadrons are so small that their effects are neglected) are considered to be uncorrelated, while other systematic uncertainties are fully correlated. The uncorrelated uncertainties are used to determine the weight for each channel as $1/\sigma_i^2$, where σ_i is the uncorrelated uncertainty added in quadrature for each measurement. As a result the weighted average of the B_c^+ mass is determined to be 6274.7 ± 0.9 (stat) ± 0.8 (syst) MeV/ c^2 . In Fig. 1, the individual B_c^+ mass measurements together with their average are shown.

Table 1: B_c^+ mass results (in MeV/ c^2) measured by LHCb using three different channels.

Decay		$J/\psi \pi^+$	$J/\psi D_s^+$	$J/\psi p \bar{p} \pi^+$
Central value		6273.7	6276.28	6273.98
Statistical uncertainty		1.3	1.44	1.75
Systematic uncertainty	Mass fitting	0.3	0.05	0.10
	FSR	0.1	—	0.03
	Daughter mass	—	0.18	—
	Energy loss correction	0.1	0.05	0.05
	Momentum (p) scale	1.4	0.30	0.40
	p -scale, η -dependence	0.3	—	—
	Alignment, track slopes	0.1	—	—
	Alignment, TT-hits	0.6	—	—

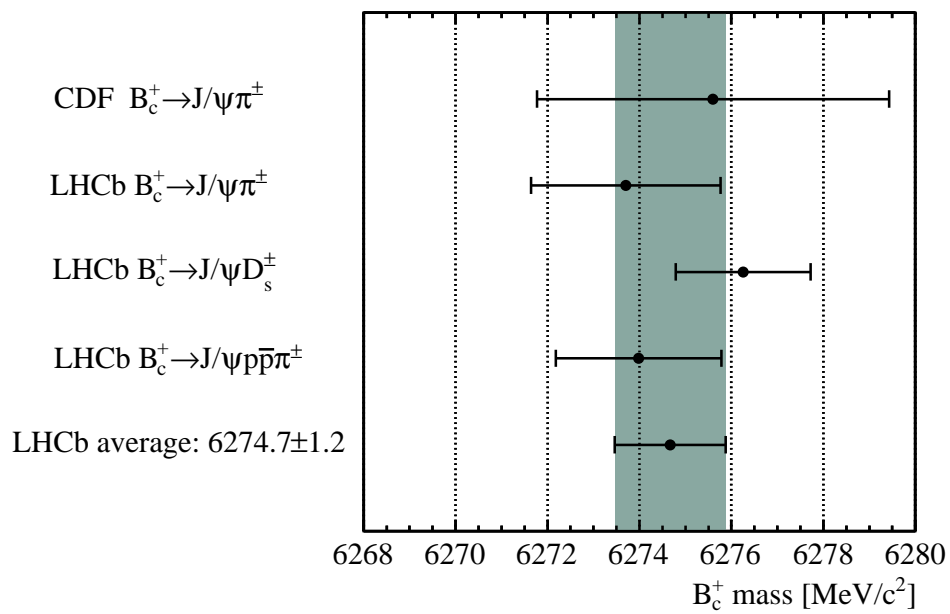


Figure 1: The B_c^+ mass results obtained by LHCb with $B_c^+ \rightarrow J/\psi \pi^\pm$, $B_c^+ \rightarrow J/\psi D_s^\pm$ and $B_c^+ \rightarrow J/\psi p \bar{p} \pi^\pm$ decays, and their weighted average together with the latest CDF result in the $B_c^+ \rightarrow J/\psi \pi^\pm$ decay. The measurement by D0 is not included.