

$P_c(4457)^+$

Status: *

was $P_c(4450)$

A resonance seen in $\Lambda_b^0 \rightarrow P_c^+ K^-$, then $P_c \rightarrow J/\psi p$, with a significance of 12 standard deviations. The $J/\psi p$ quark content is $uudc\bar{c}$, a pentaquark. See also the $P_c(4380)^+$. In the best amplitude fit, the two states have opposite parity, one having $J = 3/2$, the other $J = 5/2$.

Extraction of the pentaquark signals requires some understanding of the dominant $K^- p$ background. AAIJ 15P used a model-dependent approach. AAIJ 16AG reanalyzed the data making minimal assumptions about the $K^- p$ background, and thus confirmed the strong significance of the pentaquark signals.

 $P_c(4457)^+$ MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
$4457.3 \pm 0.6^{+4.1}_{-1.7}$	AAIJ	19W	LHCB pp at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$4449.8 \pm 1.7 \pm 2.5$	¹ AAIJ	15P	LHCB Repl. by AAIJ 19W
¹ Considering $P_c(4440)$ and $P_c(4457)$ as a single resonance.			

 $P_c(4457)^+$ WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
$6.4 \pm 2.0^{+5.7}_{-1.9}$	AAIJ	19W	LHCB pp at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$39 \pm 5 \pm 19$	¹ AAIJ	15P	LHCB Repl. by AAIJ 19W
¹ Considering $P_c(4440)$ and $P_c(4457)$ as a single resonance.			

 $P_c(4457)^+$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $J/\psi p$	seen

$P_c(4457)^+$ BRANCHING RATIOS

$\Gamma(J/\psi p)/\Gamma_{\text{total}}$				Γ_1/Γ
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
seen	¹ POPOV	21 D0	$p\bar{p}$ at 1.96 TeV	
seen	AAIJ	19W LHCb	pp at 7, 8, 13 TeV	
seen	AAIJ	15P LHCb	pp at 7, 8 TeV	

¹ Search for J/ψ inclusive production in association with a charged particle, assumed to be a proton. POPOV 21 observes a resonant signal consistent with a superposition of the $P_c(4440)^+$ and $P_c(4457)^+$, using masses and widths measured by AAIJ 19W, at significance of 3σ .

$P_c(4457)^+$ REFERENCES

POPOV	21	PAN 83 1383	A.V. Popov <i>et al.</i>	(D0 Collab.)
AAIJ	19W	PRL 122 222001	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	16AG	PRL 117 082002	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	15P	PRL 115 072001	R. Aaij <i>et al.</i>	(LHCb Collab.)