

$X(4430)^\pm$

$$I(J^P) = ?(1^+)$$

OMITTED FROM SUMMARY TABLE

Spin and parity assignment $J^P = 1^+$ is favored over 0^- , 1^- , 2^- , and 2^+ at the levels of 3.4σ , 3.7σ , 4.7σ , and 5.1σ , respectively, according to the four-dimensional amplitude analysis of CHILIKIN 13. Seen by CHOI 08 in $B \rightarrow K \pi^+ \psi(2S)$ decays and confirmed by reanalysis of the same data sample in MIZUK 09. Not seen by AUBERT 09AA.

$X(4430)^\pm$ MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$4485 \pm 22 \begin{smallmatrix} +28 \\ -11 \end{smallmatrix}$	¹ CHILIKIN	13	BELL $B^0 \rightarrow \psi(2S) K^+ \pi^-$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$4443 \begin{smallmatrix} +15 +19 \\ -12 -13 \end{smallmatrix}$	² MIZUK	09	BELL $B \rightarrow K \pi^+ \psi(2S)$
$4433 \pm 4 \pm 2$	³ CHOI	08	BELL $B \rightarrow K \pi^+ \psi(2S)$

¹ From a four-dimensional amplitude analysis.

² From a Dalitz plot analysis. Superseded by CHILIKIN 13.

³ Superseded by MIZUK 09 and CHILIKIN 13.

$X(4430)^\pm$ WIDTH

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$200 \begin{smallmatrix} +41 +26 \\ -46 -35 \end{smallmatrix}$	⁴ CHILIKIN	13	BELL $B^0 \rightarrow \psi(2S) K^+ \pi^-$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$107 \begin{smallmatrix} +86 +74 \\ -43 -56 \end{smallmatrix}$	⁵ MIZUK	09	BELL $B \rightarrow K \pi^+ \psi(2S)$
$45 \begin{smallmatrix} +18 +30 \\ -13 -13 \end{smallmatrix}$	⁶ CHOI	08	BELL $B \rightarrow K \pi^+ \psi(2S)$

⁴ From a four-dimensional amplitude analysis.

⁵ From a Dalitz plot analysis. Superseded by CHILIKIN 13.

⁶ Superseded by MIZUK 09 and CHILIKIN 13.

$X(4430)^\pm$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
$\Gamma_1 \quad \pi^+ \psi(2S)$	seen
$\Gamma_2 \quad \pi^+ J/\psi$	not seen

$X(4430)^\pm$ BRANCHING RATIOS

$\Gamma(\pi^+ \psi(2S))/\Gamma_{\text{total}}$ Γ_1/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
seen	⁷ CHILIKIN 13	BELL	$B^0 \rightarrow \psi(2S) K^+ \pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
not seen	⁸ AUBERT	09AA BABR	$B \rightarrow K \pi^+ \psi(2S)$
seen	⁹ MIZUK	09 BELL	$B \rightarrow K \pi^+ \psi(2S)$

⁷ From a four-dimensional amplitude analysis. Measured a product of branching fractions $B(B^0 \rightarrow X(4430)^- K^+) \times B(X(4430)^- \rightarrow \psi(2S) \pi^-) = (6.0^{+1.7+2.5}_{-2.0-1.4}) \times 10^{-5}$.

⁸ AUBERT 09AA quotes $B(B^+ \rightarrow \bar{K}^0 X(4430)^+) \times B(X(4430)^+ \rightarrow \pi^+ \psi(2S)) < 4.7 \times 10^{-5}$ and $B(\bar{B}^0 \rightarrow K^- X(4430)^+) \times B(X(4430)^+ \rightarrow \pi^+ \psi(2S)) < 3.1 \times 10^{-5}$ at 95% CL.

⁹ Measured a product of branching fractions $B(\bar{B}^0 \rightarrow K^- X(4430)^+) \times B(X(4430)^+ \rightarrow \pi^+ \psi(2S)) = (3.2^{+1.8+5.3}_{-0.9-1.6}) \times 10^{-5}$. Superseded by CHILIKIN 13.

$\Gamma(\pi^+ J/\psi)/\Gamma_{\text{total}}$ Γ_2/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
not seen	¹⁰ AUBERT	09AA BABR	$B \rightarrow K \pi^+ J/\psi$

¹⁰ AUBERT 09AA quotes $B(B^+ \rightarrow \bar{K}^0 X(4430)^+) \times B(X(4430)^+ \rightarrow \pi^+ J/\psi) < 1.5 \times 10^{-5}$ and $B(\bar{B}^0 \rightarrow K^- X(4430)^+) \times B(X(4430)^+ \rightarrow \pi^+ J/\psi) < 0.4 \times 10^{-5}$ at 95% CL.

$X(4430)^\pm$ REFERENCES

CHILIKIN	13	PR D88 074026	K. Chilikin <i>et al.</i>	(BELLE Collab.)
AUBERT	09AA	PR D79 112001	B. Aubert <i>et al.</i>	(BABAR Collab.)
MIZUK	09	PR D80 031104	R. Mizuk <i>et al.</i>	(BELLE Collab.)
CHOI	08	PRL 100 142001	S.-K. Choi <i>et al.</i>	(BELLE Collab.)