\(X(5568)^\pm\)

\[I(J^P) = ?(??)\]

OMITTED FROM SUMMARY TABLE

Seen as a peak in the \(B_s \pi^\pm\) mass spectrum with a significance of more than 3\(\sigma\) by ABAZOV 16E and ABAZOV 18A in inclusive \(p\bar{p}\) collisions at 1.96 TeV. Not seen by AAIJ 16AI, AABOUD 18L, AALTONEN 18A, and SIRUNYAN 18J. Needs confirmation.

\[
\begin{array}{lllll}
\text{VALUE (MeV)} & \text{EVTS} & \text{DOCUMENT ID} & \text{TECN} & \text{COMMENT} \\
5566.9^{+3.2+0.6}_{-3.1-1.2} & 278 & 1 \text{ABAZOV} & 18A & p\bar{p} \rightarrow B_s^0 \pi^\pm X \\
\end{array}
\]

1. We do not use the following data for averages, fits, limits, etc. • • •

\[
\begin{array}{lllll}
\text{VALUE (MeV)} & \text{EVTS} & \text{DOCUMENT ID} & \text{TECN} & \text{COMMENT} \\
5567.8\pm2.9^{+0.9}_{-1.9} & 133 & 2 \text{ABAZOV} & 16E & p\bar{p} \rightarrow B_s^0 \pi^\pm X \\
\end{array}
\]

1 From the combined analysis of \(B_s^0 \rightarrow J/\psi \phi\) and \(B_s^0 \rightarrow D_s^{\pm} \mu \mp X\) decays.

2 Assumes \(X(5568)^\pm \rightarrow B_s \pi^\pm\) decay. If \(X(5568)^\pm \rightarrow B_s^{*+} \pi^\pm\) decay is assumed, the mass shifts upward by 49 MeV.

\[
\begin{array}{lllll}
\text{VALUE (MeV)} & \text{EVTS} & \text{DOCUMENT ID} & \text{TECN} & \text{COMMENT} \\
18.6^{+7.9+3.5}_{-6.1-3.8} & 278 & 1 \text{ABAZOV} & 18A & p\bar{p} \rightarrow B_s \pi^\pm X \\
\end{array}
\]

• • • We do not use the following data for averages, fits, limits, etc. • • •

\[
\begin{array}{lllll}
\text{VALUE (MeV)} & \text{EVTS} & \text{DOCUMENT ID} & \text{TECN} & \text{COMMENT} \\
21.9\pm6.4^{+5.0}_{-2.5} & 133 & \text{ABAZOV} & 16E & p\bar{p} \rightarrow B_s \pi^\pm X \\
\end{array}
\]

1 From the combined analysis of \(B_s^0 \rightarrow J/\psi \phi\) and \(B_s^0 \rightarrow D_s^{\pm} \mu \mp X\) decays.

\[
\begin{array}{cc}
\text{Mode} & \text{Fraction (}\Gamma_i/\Gamma\text{)} \\
\Gamma_1 & B_s \pi^\pm \\
\text{seen} & 1 \\
\end{array}
\]

\[
\begin{array}{lllll}
\text{VALUE (MeV)} & \text{EVTS} & \text{DOCUMENT ID} & \text{TECN} & \text{COMMENT} \\
\text{seen} & 145 & 1 \text{ABAZOV} & 18A & p\bar{p} \rightarrow B_s^0 \pi^\pm X \\
\text{seen} & 133 & 2 \text{ABAZOV} & 16E & p\bar{p} \rightarrow B_s^0 \pi^\pm X \\
\end{array}
\]
We do not use the following data for averages, fits, limits, etc.

1. Not seen

- **AABOUD 18L ATLAS** $\rho \rho \rightarrow B_{s}^{0} \pi^{\pm} X$
- **AALTONEN 18A CDF** $p \bar{p} \rightarrow B_{s}^{0} \pi^{\pm} X$
- **SIRUNYAN 18J CMS** $p p \rightarrow B_{s}^{0} \pi^{\pm} X$
- **AAIJ 16AI LHCb** $p p \rightarrow B_{s}^{0} \pi^{\pm} X$

With $B_{s}$ mesons reconstructed in decays to $D_{s}^{\pm} \mu^{\mp} X$.

2. Seen in $p \bar{p}$ collisions at 1.96 TeV at a rate of $(8.6 \pm 1.9 \pm 1.4\%)$ relative to inclusive $B_{s}$ production in the kinematic region $10 < p_{T}(B_{s}) < 30$ GeV/c, with $B_{s}$ mesons reconstructed in decays to $J/\psi \phi$. An alternative possibility, $X(5568)^{\pm} \rightarrow B_{s}^{*} \pi^{\pm}$ with a missing $\gamma$, could not be ruled out.

3. Not seen in 24.4 fb$^{-1}$ of $p p$ collision data at $\sqrt{s} = 7$ and 8 TeV with $B_{s}$ mesons reconstructed in decays to $J/\psi \phi$. An upper limit on the production rate times branching fraction for $X(5568)^{\pm} \rightarrow B_{s} \pi^{\pm}$ relative to inclusive $B_{s}$ production is less than 1.5% at $p_{T}(B_{s}) > 10$ GeV/c and less than 1.6% at $p_{T}(B_{s}) > 15$ GeV/c at 95% CL.

4. Not seen in 9.6 fb$^{-1}$ of $p \bar{p}$ collision data at $\sqrt{s} = 1.96$ TeV with $B_{s}$ mesons reconstructed in decays to $J/\psi \phi$. An upper limit on the production rate times branching fraction for $X(5568)^{\pm} \rightarrow B_{s} \pi^{\pm}$ relative to inclusive $B_{s}$ production is less than 6.7% at 95% CL.

5. Not seen in 19.7 fb$^{-1}$ of $p p$ collision data at $\sqrt{s} = 8$ TeV with $B_{s}$ mesons reconstructed in decays to $J/\psi \phi$. An upper limit on the production rate times branching fraction for $X(5568)^{\pm} \rightarrow B_{s} \pi^{\pm}$ relative to inclusive $B_{s}$ production is less than 1.1% at $p_{T}(B_{s}) > 10$ GeV/c and less than 1.0% at $p_{T}(B_{s}) > 15$ GeV/c at 95% CL.

6. Not seen in 3 fb$^{-1}$ of $p p$ collision data at $\sqrt{s} = 7$ and 8 TeV in a scan over the $X(5568)$ mass and width, with $B_{s}$ mesons reconstructed in decays to $D_{s}^{\pm} \pi^{\pm}$ or $J/\psi \phi$. An upper limit on the production rate times branching fraction for $X(5568)^{\pm} \rightarrow B_{s} \pi^{\pm}$ relative to inclusive $B_{s}$ production is less than 2.1% at $p_{T}(B_{s}) > 10$ GeV/c at 90% CL.

X(5568)$^{\pm}$ REFERENCES

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<tr>
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