

$\Sigma_c(2520)$

$$I(J^P) = 1(\frac{3}{2}^+) \text{ Status: } ***$$

Seen in the $\Lambda_c^+ \pi^\pm$ mass spectrum. The natural assignment is that this is the $J^P = 3/2^+$ excitation of the $\Sigma_c(2455)$, the charm counterpart of the $\Sigma(1385)$, but neither J nor P has been measured.

$\Sigma_c(2520)$ MASSES

The masses are obtained from the mass-difference measurements that follow.

$\Sigma_c(2520)^{++}$ MASS

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2517.9 ± 0.6 OUR FIT				Error includes scale factor of 1.6.
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
2530 ± 5 ± 5	6	¹ AMMOSOV 93	HLBC	$\nu p \rightarrow \mu^- \Sigma_c(2530)^{++}$

¹ AMMOSOV 93 sees a cluster of 6 events and estimates the background to be 1 event.

$\Sigma_c(2520)^+$ MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>
2517.5 ± 2.3 OUR FIT	

$\Sigma_c(2520)^0$ MASS

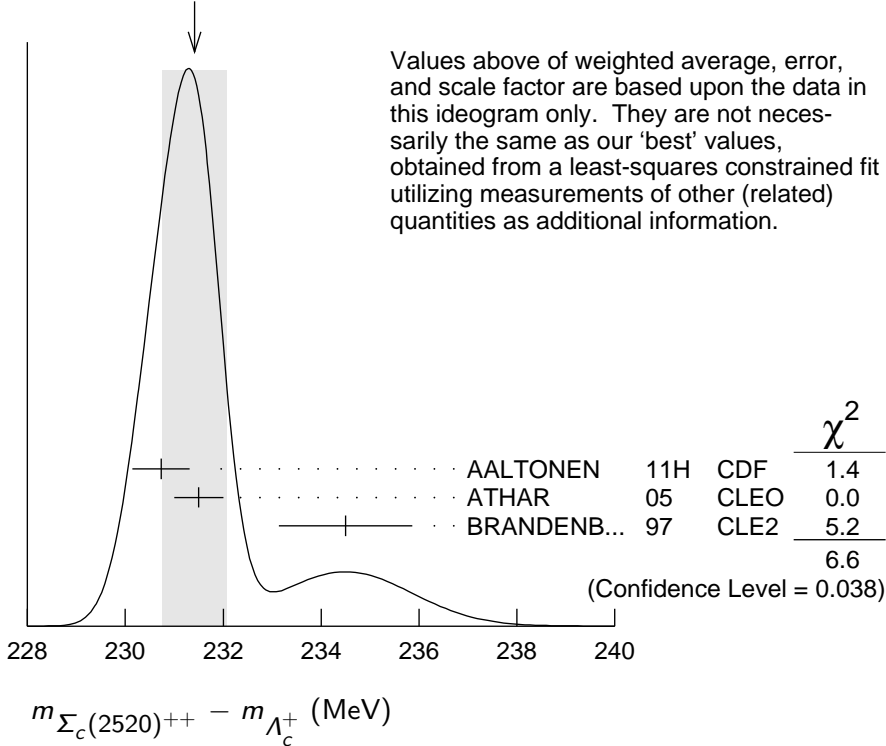
<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>
2518.8 ± 0.6 OUR FIT	Error includes scale factor of 1.5.

$\Sigma_c(2520)$ MASS DIFFERENCES

$$m_{\Sigma_c(2520)^{++}} - m_{\Lambda_c^+}$$

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
231.4 ± 0.6 OUR FIT				Error includes scale factor of 1.6.
231.4 ± 0.7 OUR AVERAGE				Error includes scale factor of 1.8. See the ideogram below.
230.73 ± 0.56 ± 0.16	8.8k	AALTONEN	11H CDF	$p\bar{p}$ at 1.96 TeV
231.5 ± 0.4 ± 0.3	1330 ± 110	ATHAR	05 CLEO	$e^+ e^-$, 9.4–11.5 GeV
234.5 ± 1.1 ± 0.8	677	BRANDENB...	97 CLE2	$e^+ e^- \approx \Upsilon(4S)$

WEIGHTED AVERAGE
 231.4 ± 0.7 (Error scaled by 1.8)

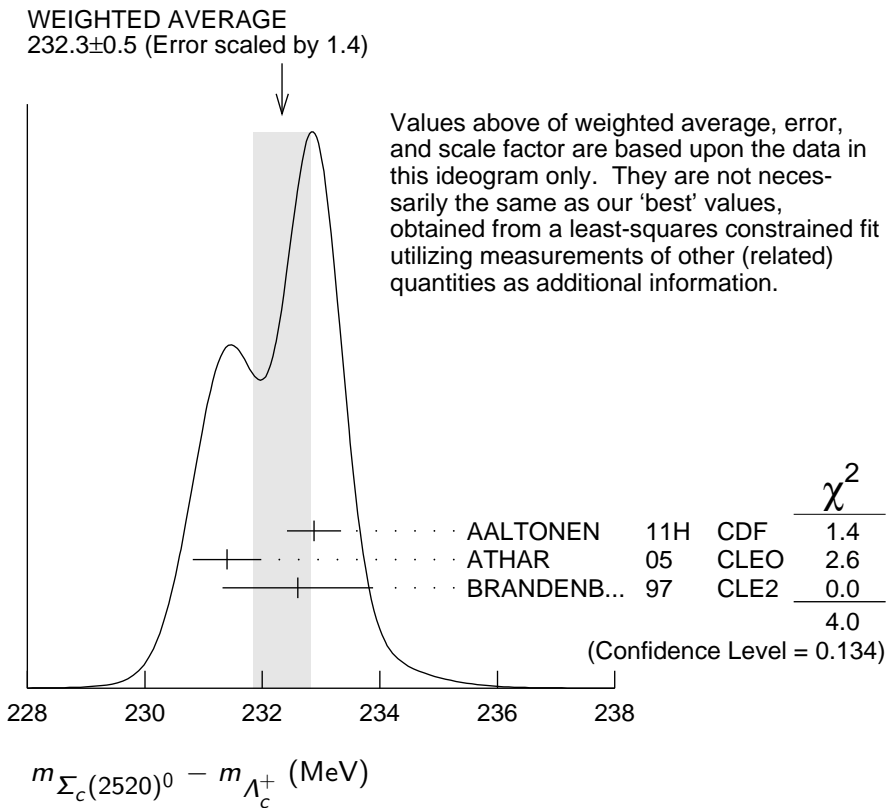


$m_{\Sigma_c(2520)^+} - m_{\Lambda_c^+}$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
231.0 ± 2.3 OUR FIT				
$231.0 \pm 1.1 \pm 2.0$	327	AMMAR	01	CLE2 $e^+e^- \approx \Upsilon(4S)$

$m_{\Sigma_c(2520)^0} - m_{\Lambda_c^+}$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
232.3 ± 0.5 OUR FIT				Error includes scale factor of 1.6.
232.3 ± 0.5 OUR AVERAGE				Error includes scale factor of 1.4. See the ideogram below.
$232.88 \pm 0.43 \pm 0.16$	9.0k	AALTONEN	11H	CDF $p\bar{p}$ at 1.96 TeV
$231.4 \pm 0.5 \pm 0.3$	1350 ± 120	ATHAR	05	CLEO e^+e^- , 9.4–11.5 GeV
$232.6 \pm 1.0 \pm 0.8$	504	BRANDENB...	97	CLE2 $e^+e^- \approx \Upsilon(4S)$



$m_{\Sigma_c(2520)^{++}} - m_{\Sigma_c(2520)^0}$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
+0.1±0.8±0.3	² ATHAR 05	CLEO	e^+e^- , 9.4–11.5 GeV
1.9±1.4±1.0	³ BRANDENB... 97	CLE2	$e^+e^- \approx \Upsilon(4S)$

²This ATHAR 05 result is redundant with measurements in earlier entries.
³This BRANDENBURG 97 result is redundant with measurements in earlier entries.

$\Sigma_c(2520)$ WIDTHS

$\Sigma_c(2520)^{++}$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
14.9 ±1.5 OUR AVERAGE				
15.03±2.12±1.36	8.8k	AALTONEN	11H CDF	$p\bar{p}$ at 1.96 TeV
14.4 $\begin{smallmatrix} +1.6 \\ -1.5 \end{smallmatrix}$ ±1.4	1330 ± 110	ATHAR	05 CLEO	e^+e^- , 9.4–11.5 GeV
17.9 $\begin{smallmatrix} +3.8 \\ -3.2 \end{smallmatrix}$ ±4.0	677	BRANDENB...	97 CLE2	$e^+e^- \approx \Upsilon(4S)$

$\Sigma_c(2520)^+$ WIDTH

VALUE (MeV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<17	90	327	AMMAR	01 CLE2	$e^+e^- \approx \Upsilon(4S)$

$\Sigma_c(2520)^0$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
14.5 ± 1.5 OUR AVERAGE				
12.51 ± 1.82 ± 1.37	9.0k	AALTONEN	11H CDF	$p\bar{p}$ at 1.96 TeV
16.6 $\begin{smallmatrix} +1.9 \\ -1.7 \end{smallmatrix}$ ± 1.4	1350 ± 120	ATHAR	05 CLEO	e^+e^- , 9.4–11.5 GeV
13.0 $\begin{smallmatrix} +3.7 \\ -3.0 \end{smallmatrix}$ ± 4.0	504	BRANDENB...	97 CLE2	$e^+e^- \approx \Upsilon(4S)$

$\Sigma_c(2520)$ DECAY MODES

$\Lambda_c^+ \pi$ is the only strong decay allowed to a Σ_c having this mass.

Mode	Fraction (Γ_i/Γ)
$\Gamma_1 \quad \Lambda_c^+ \pi$	$\approx 100\%$

$\Sigma_c(2520)$ REFERENCES

AALTONEN	11H	PR D84 012003	T. Aaltonen <i>et al.</i>	(CDF Collab.)
ATHAR	05	PR D71 051101R	S.B. Athar <i>et al.</i>	(CLEO Collab.)
AMMAR	01	PRL 86 1167	R. Ammar <i>et al.</i>	(CLEO Collab.)
BRANDENB...	97	PRL 78 2304	G. Brandenburg <i>et al.</i>	(CLEO Collab.)
AMMOISOV	93	JETPL 58 247	V.V. Ammosov <i>et al.</i>	(SERP)
Translated from ZETFP 58 241.				