

$\Sigma_c(2520)$ $I(J^P) = 1(\frac{3}{2}^+)$ 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

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
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2518.41 ± 0.22 OUR FIT Error includes scale factor of 1.3.

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

2530 ± 5 ± 5	6	¹ AMMOSO	93	HLBC $\nu p \rightarrow \mu^- \Sigma_c(2530)^{++}$
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¹ AMMOSO 93 sees a cluster of 6 events and estimates the background to be 1 event.

$\Sigma_c(2520)^+$ MASS

VALUE (MeV)	DOCUMENT ID
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2517.4^{+0.7}_{-0.5} OUR FIT

$\Sigma_c(2520)^0$ MASS

VALUE (MeV)	DOCUMENT ID
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2518.48 ± 0.21 OUR FIT Error includes scale factor of 1.2.

$\Sigma_c(2520)$ MASS DIFFERENCES

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

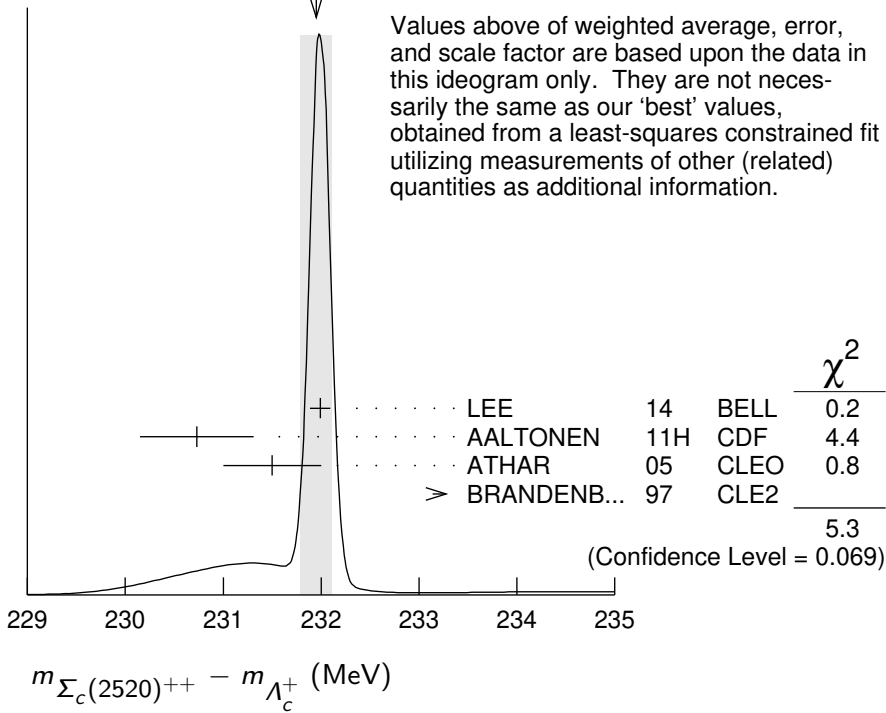
VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
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231.95 ± 0.18 OUR FIT Error includes scale factor of 1.8.

231.95 ± 0.16 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.

231.99 ± 0.10 ± 0.02	44k	LEE	14	BELL $e^+ e^-$ at $\Upsilon(4S)$
230.73 ± 0.56 ± 0.16	8.8k	AALTONEN	11H	CDF $p\bar{p}$ at 1.96 TeV
231.5 ± 0.4 ± 0.3	1.3k	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
 231.95 ± 0.16 (Error scaled by 1.6)



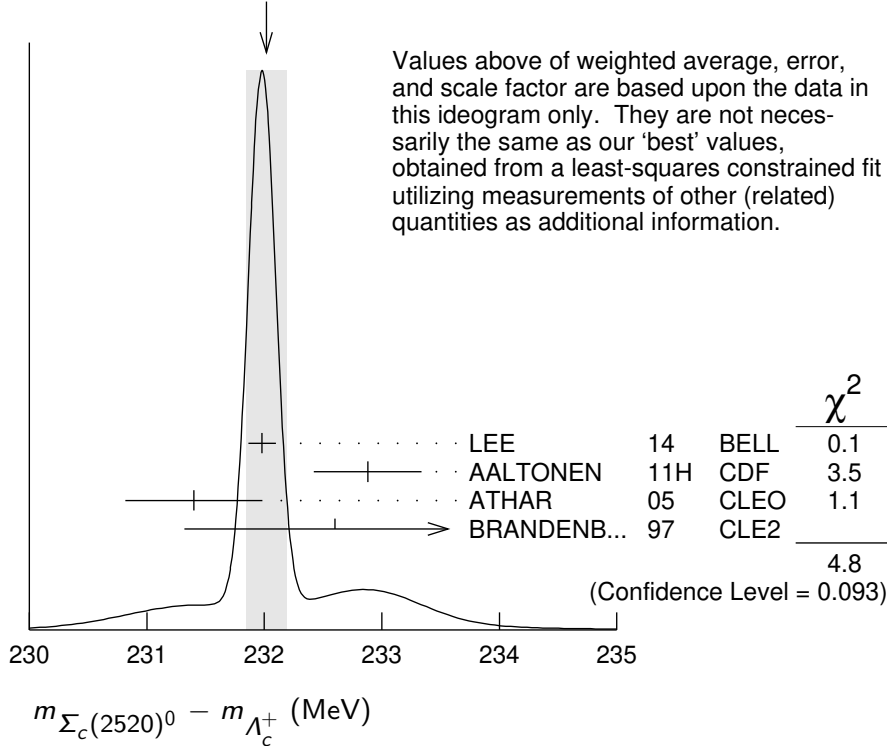
$m_{\Sigma_c(2520)^+} - m_{\Lambda_c^+}$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
$230.9^{+0.7}_{-0.5}$				OUR FIT
$230.9^{+0.7}_{-0.5}$				OUR AVERAGE
$230.9 \pm 0.5^{+0.5}_{-0.1}$		YELTON	21	BELL e^+e^- at $\Upsilon(nS)$
$231.0 \pm 1.1 \pm 2.0$	327	AMMAR	01	CLE2 $e^+e^- \approx \Upsilon(4S)$

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

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
232.02 ± 0.15				OUR FIT Error includes scale factor of 1.4.
232.02 ± 0.17				OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.
$231.98 \pm 0.11 \pm 0.04$	41k	LEE	14	BELL e^+e^- at $\Upsilon(4S)$
$232.88 \pm 0.43 \pm 0.16$	9.0k	AALTONEN	11H	CDF $p\bar{p}$ at 1.96 TeV
$231.4 \pm 0.5 \pm 0.3$	1.3k	ATHAR	05	CLEO e^+e^- , 9.4–11.5 GeV
$232.6 \pm 1.0 \pm 0.8$	504	BRANDENB...	97	CLE2 $e^+e^- \approx \Upsilon(4S)$

WEIGHTED AVERAGE
 232.02 ± 0.17 (Error scaled by 1.5)



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

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
$0.01 \pm 0.15 \pm 0.03$	44/41k	LEE	14	BELL e^+e^- at $\Upsilon(4S)$
0.1 \pm 0.8 \pm 0.3		² ATHAR	05	CLEO e^+e^- , 9.4–11.5 GeV
1.9 \pm 1.4 \pm 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
$14.78^{+0.30}_{-0.40}$ OUR AVERAGE				
14.77 \pm 0.25 $^{+0.18}_{-0.30}$	44k	LEE	14	BELL e^+e^- at $\Upsilon(4S)$
15.03 \pm 2.12 \pm 1.36	8.8k	AALTONEN	11H	CDF $p\bar{p}$ at 1.96 TeV
14.4 $^{+1.6}_{-1.5} \pm 1.4$	1.3k	ATHAR	05	CLEO e^+e^- , 9.4–11.5 GeV
17.9 $^{+3.8}_{-3.2} \pm 4.0$	677	BRANDENB...	97	CLE2 $e^+e^- \approx \Upsilon(4S)$

$\Sigma_c(2520)^+$ WIDTH

VALUE (MeV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$17.2^{+2.3+3.1}_{-2.1-0.7}$			YELTON	21	BELL e^+e^- at $\Upsilon(nS)$

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<17	90	327	AMMAR	01	CLE2 $e^+e^- \approx \Upsilon(4S)$
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 $\Sigma_c(2520)^0$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
15.3 $^{+0.4}_{-0.5}$ OUR AVERAGE				

$15.41 \pm 0.41^{+0.20}_{-0.32}$	41k	LEE	14	BELL e^+e^- at $\Upsilon(4S)$
$12.51 \pm 1.82 \pm 1.37$	9.0k	AALTONEN	11H	CDF $p\bar{p}$ at 1.96 TeV
$16.6^{+1.9}_{-1.7} \pm 1.4$	1.3k	ATHAR	05	CLEO e^+e^- , 9.4–11.5 GeV
$13.0^{+3.7}_{-3.0} \pm 4.0$	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)
$\Gamma_1 \Lambda_c^+ \pi$	$\approx 100\%$

 $\Sigma_c(2520)$ REFERENCES

YELTON	21	PR D104 052003	J. Yelton <i>et al.</i>	(BELLE Collab.)
LEE	14	PR D89 091102	S.-H. Lee <i>et al.</i>	(BELLE Collab.)
AALTONEN	11H	PR D84 012003	T. Aaltonen <i>et al.</i>	(CDF Collab.)
ATHAR	05	PR D71 051101	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.				