

$\Sigma_c(2520)$

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

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

$\Sigma_c(2520)^0$ MASS

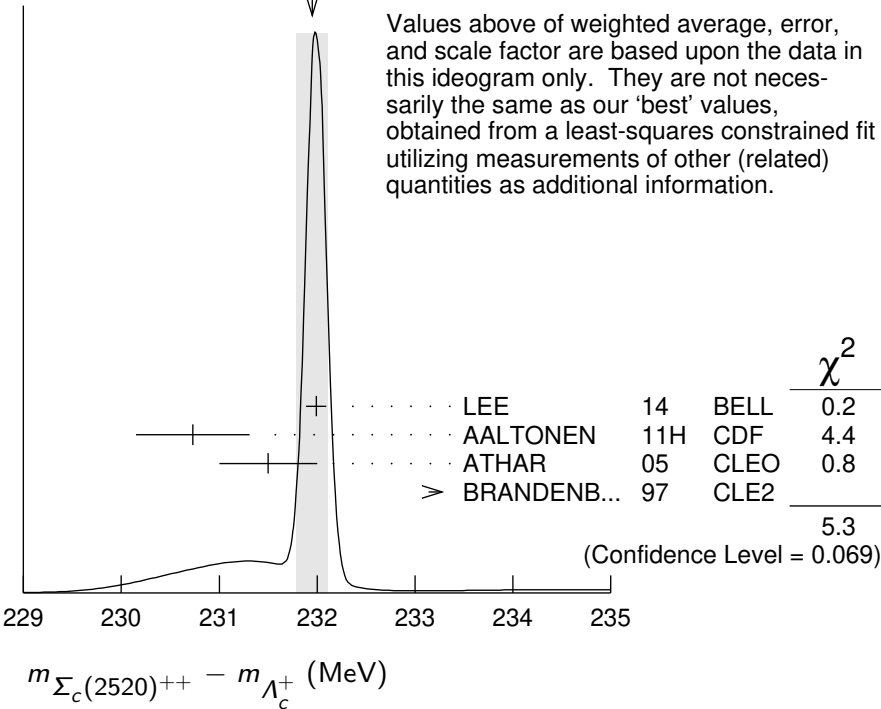
VALUE (MeV)	DOCUMENT ID
2518.48±0.21 OUR FIT	Error includes scale factor of 1.2.

$\Sigma_c(2520)$ MASS DIFFERENCES

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

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
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
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230.9^{+0.7}_{-0.5} OUR FIT

230.9^{+0.7}_{-0.5} OUR AVERAGE

230.9±0.5 ^{+0.5} _{-0.1}		YELTON	21	BELL	e^+e^- at $\Upsilon(nS)$
231.0±1.1±2.0	327	AMMAR	01	CLE2	$e^+e^- \approx \Upsilon(4S)$

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

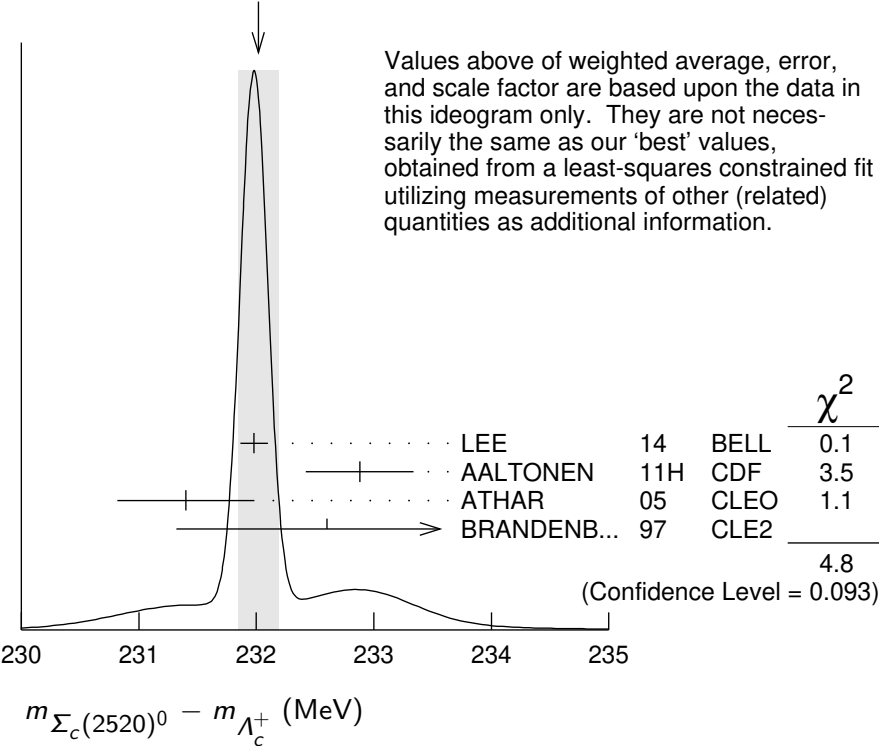
VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
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232.02±0.15 OUR FIT Error includes scale factor of 1.4.

232.02±0.17 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.

231.98±0.11±0.04	41k	LEE	14	BELL	e^+e^- at $\Upsilon(4S)$
232.88±0.43±0.16	9.0k	AALTONEN	11H	CDF	$p\bar{p}$ at 1.96 TeV
231.4 ±0.5 ±0.3	1.3k	ATHAR	05	CLEO	e^+e^- , 9.4–11.5 GeV
232.6 ±1.0 ±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±0.15±0.03	44/41k	LEE 14	BELL	e^+e^- at $\Upsilon(4S)$
• • • 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	$e^+e^- \approx \Upsilon(4S)$
² This ATHAR 05 result is redundant with measurements in earlier entries.				
³ This 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±0.25 ^{+0.18} _{-0.30}	44k	LEE 14	BELL	e^+e^- at $\Upsilon(4S)$
15.03±2.12±1.36	8.8k	AALTONEN 11H	CDF	$p\bar{p}$ at 1.96 TeV
14.4 ^{+1.6} _{-1.5} ±1.4	1.3k	ATHAR 05	CLEO	e^+e^- , 9.4–11.5 GeV
17.9 ^{+3.8} _{-3.2} ±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 $\Upsilon(nS)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<17	90	327	AMMAR	01	CLE2 $e^+e^- \approx \Upsilon(4S)$

$\Sigma_c(2520)^0$ WIDTH

VALUE (MeV)	CL%	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)
$\Gamma_1 \quad \Lambda_c^+ \pi$	$\approx 100\%$

$\Sigma_c(2520)$ 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.)
AMMOSOV	93	JETPL 58 247	V.V. Ammosov <i>et al.</i>	(SERP)
Translated from ZETFP 58 241.				