

$\Sigma_c(2520)$

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

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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	

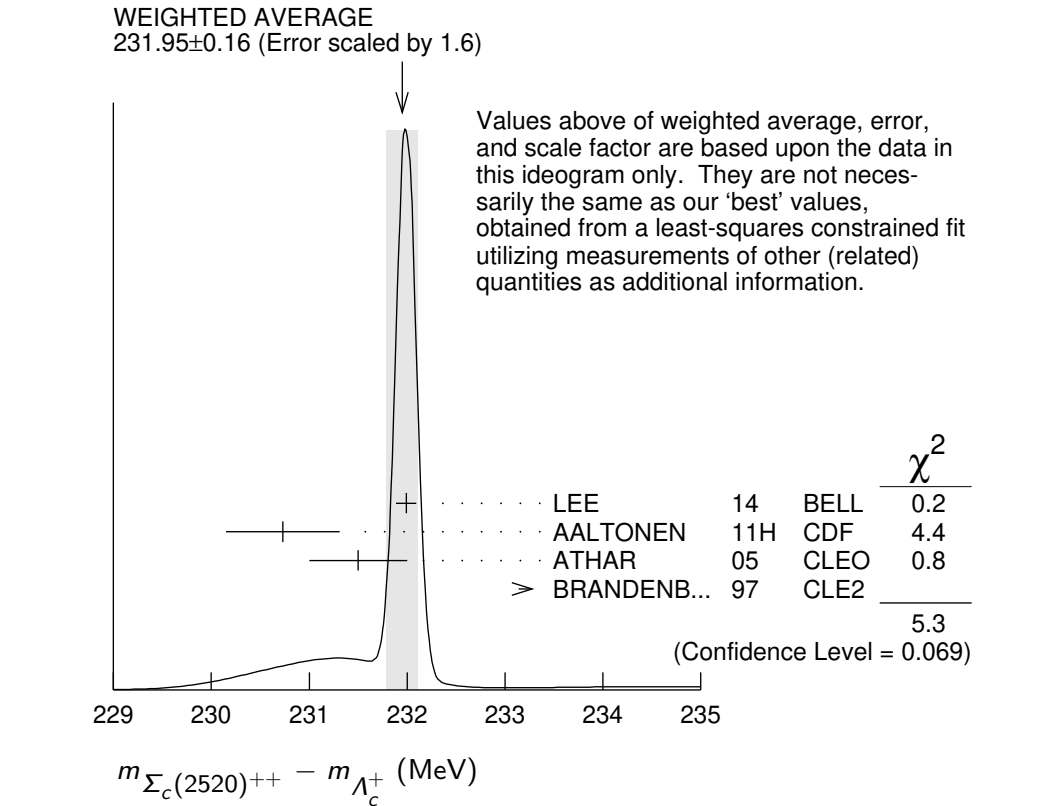
$\Sigma_c(2520)^0$ MASS

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

$\Sigma_c(2520)$ MASS DIFFERENCES

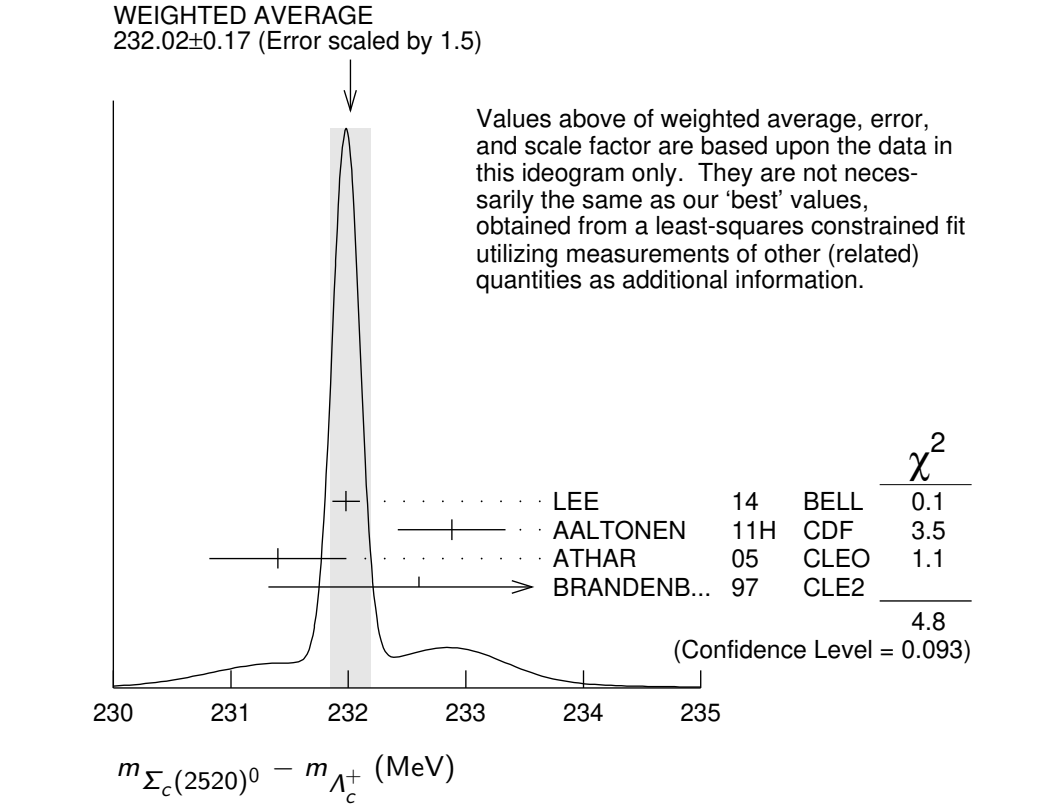
$m_{\Sigma_c(2520)^{++}} - m_{\Lambda_c^+}$

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 $e^+e^- \approx \Upsilon(4S)$



$m_{\Sigma_c(2520)^+} - m_{\Lambda_c^+}$					
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±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	
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	$e^+e^- \approx \Upsilon(4S)$



$m_{\Sigma_c(2520)^{++}} - m_{\Sigma_c(2520)^0}$					
VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT	
$0.01 \pm 0.15 \pm 0.03$	44/41k	LEE	14	BELL	e^+e^- at $\Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.1 \pm 0.8 \pm 0.3$		² ATHAR	05	CLEO	e^+e^- , 9.4–11.5 GeV
$1.9 \pm 1.4 \pm 1.0$		³ BRANDENB...	97	CLE2	$e^+e^- \approx \Upsilon(4S)$
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					
<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
$14.78^{+0.30}_{-0.40}$	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					
<u>VALUE (MeV)</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$17.2^{+2.3+3.1}_{-2.1-0.7}$			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 $e^+e^- \approx \gamma(4S)$

$\Sigma_c(2520)^0$ WIDTH

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

$15.41 \pm 0.41^{+0.20}_{-0.32}$	41k	LEE	14	BELL	e^+e^- at $\gamma(4S)$
$12.51 \pm 1.82 \pm 1.37$	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	$e^+e^- \approx \gamma(4S)$

$\Sigma_c(2520)$ 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.				