$\Sigma_c(2520)$

$I(J^P) = 1(\frac{3}{2}^+)$ 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
$2518.41^{+0.21}_{-0.19}$ OUR FIT		Error includes scale factor of 1.1.		
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2530 ±5 ±5	6	[1] AMMOSOV 93	HLBC	$\nu p \to \mu^- \Sigma_c(2530)^{++}$

[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
2517.5±2.3 OUR FIT	

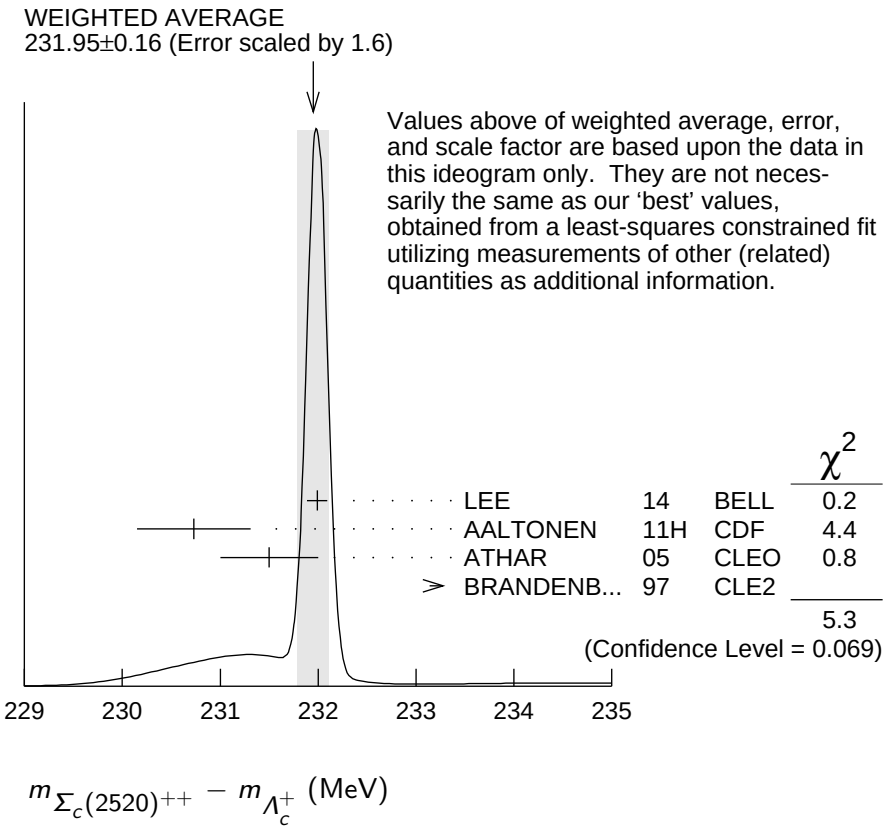
$\Sigma_c(2520)^0$ MASS

VALUE (MeV)	DOCUMENT ID
2518.48±0.20 OUR FIT Error includes scale factor of 1.1.	

$\Sigma_c(2520)$ MASS DIFFERENCES

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$231.95^{+0.17}_{-0.12}$ OUR FIT Error includes scale factor of 1.3.					
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	$p\overline{p}$ 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	$e^+e^- \approx \Upsilon(4S)$

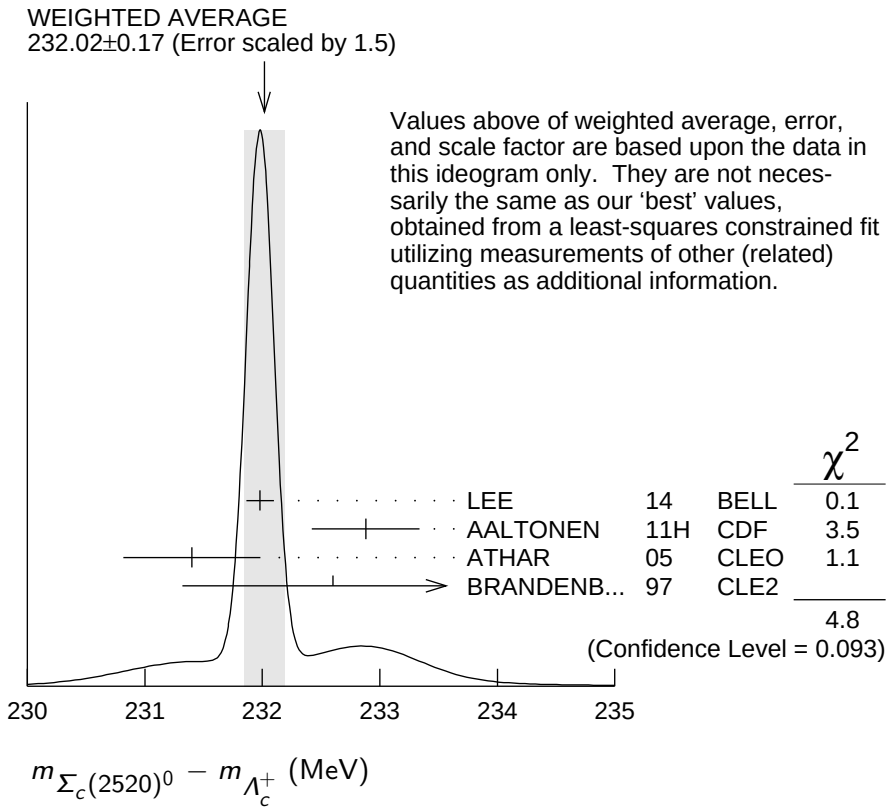


$m_{\Sigma_c(2520)^+} - m_{\Lambda_c^+}$

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
231.0±2.3 OUR FIT					
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*
$232.02^{+0.15}_{-0.14}$ OUR FIT	Error includes scale factor of 1.3.				
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	$p\overline{p}$ 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±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					
$14.77 \pm 0.25^{+0.18}_{-0.30}$	44k	LEE	14	BELL	e^+e^- at $\Upsilon(4S)$
15.03±2.12±1.36	8.8k	AALTONEN	11H	CDF	$p\overline{p}$ 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	90	327	AMMAR	01	CLE2	$e^+e^- \approx \Upsilon(4S)$

$\Sigma_c(2520)^0$ 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	$p\overline{p}$ 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)
Γ_1	$\Lambda_c^+ \pi$	≈ 100 %

$\Sigma_c(2520)$ REFERENCES

LEE	14	PR D89 091102	S.-H. Lee *et al.*	(BELLE Collab.)
AALTONEN	11H	PR D84 012003	T. Aaltonen *et al.*	(CDF Collab.)
ATHAR	05	PR D71 051101	S.B. Athar *et al.*	(CLEO Collab.)
AMMAR	01	PRL 86 1167	R. Ammar *et al.*	(CLEO Collab.)
BRANDENB...	97	PRL 78 2304	G. Brandenburg *et al.*	(CLEO Collab.)
AMMOSOV	93	JETPL 58 247	V.V. Ammosov *et al.*	(SERP)

Translated from ZETFP 58 241.