

$\Sigma_c(2520)$

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

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

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. • • •

VALUE (MeV)	EVTs	DOCUMENT ID	TECN	COMMENT
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
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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

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

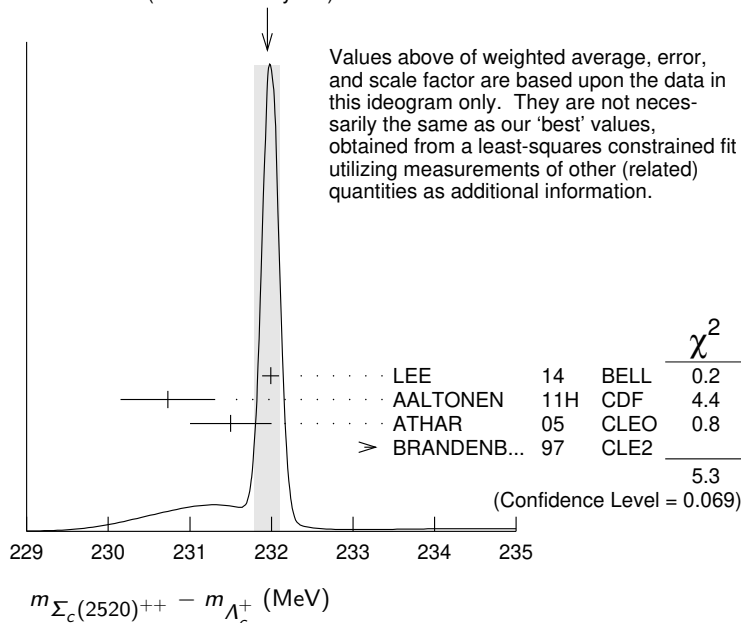
VALUE (MeV)	EVTs	DOCUMENT ID	TECN	COMMENT
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231.95 ± 0.18 OUR FIT Error includes scale factor of 1.8.

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)



NODE=B115

NODE=B115

NODE=B115205

NODE=B115205

NODE=B115M++

NODE=B115M++

NODE=B115M++;LINKAGE=A

NODE=B115M+

NODE=B115M+

NODE=B115M0

NODE=B115M0

NODE=B115210

NODE=B115D++

NODE=B115D++

SYCLP2=H

SYCLP2=F

SYCLP2=C

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

VALUE (MeV)	EVTs	DOCUMENT ID	TECN	COMMENT
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NODE=B115D+
NODE=B115D+

$$230.9^{+0.7}_{-0.5} \text{ OUR FIT}$$

$$230.9^{+0.7}_{-0.5} \text{ OUR AVERAGE}$$

230.9 ± 0.5 ^{+0.5} _{-0.1}		YELTON	21	BELL	e ⁺ e ⁻ at Υ (nS)
231.0 ± 1.1 ± 2.0	327	AMMAR	01	CLE2	e ⁺ e ⁻ ≈ Υ (4S)

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

VALUE (MeV)	EVTs	DOCUMENT ID	TECN	COMMENT
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NODE=B115D0
NODE=B115D0

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.

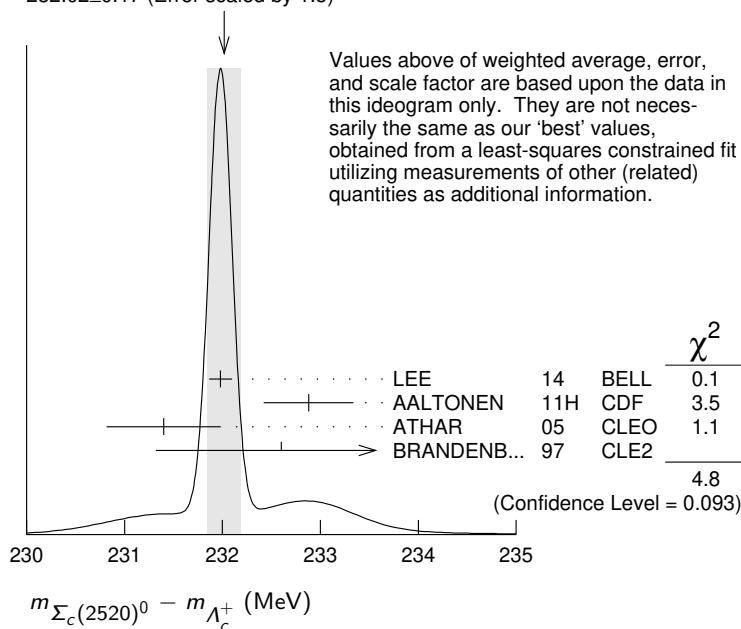
231.98 ± 0.11 ± 0.04	41k	LEE	14	BELL	e ⁺ e ⁻ at Υ (4S)
232.88 ± 0.43 ± 0.16	9.0k	AALTONEN	11H	CDF	p $\bar{p}$ at 1.96 TeV
231.4 ± 0.5 ± 0.3	1.3k	ATHAR	05	CLEO	e ⁺ e ⁻ , 9.4–11.5 GeV
232.6 ± 1.0 ± 0.8	504	BRANDENB...	97	CLE2	e ⁺ e ⁻ ≈ Υ (4S)

SYCLP2=H

SYCLP2=F

SYCLP2=C

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
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NODE=B115DI
NODE=B115DI

0.01 ± 0.15 ± 0.03 44/41k LEE 14 BELL e⁺e⁻ at Υ (4S)

SYCLP2=H

• • • 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 ⁻ ≈ Υ (4S)

SYCLP2=F

SYCLP2=C

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

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

NODE=B115DI;LINKAGE=AT
NODE=B115DI;LINKAGE=A

$\Sigma_c(2520)$ WIDTHS

NODE=B115215

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

VALUE (MeV)	EVTs	DOCUMENT ID	TECN	COMMENT
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NODE=B115W++
NODE=B115W++

$$14.78^{+0.30}_{-0.40} \text{ OUR AVERAGE}$$

14.77 ± 0.25 ^{+0.18} _{-0.30}	44k	LEE	14	BELL	e ⁺ e ⁻ at Υ (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 ⁻ ≈ Υ (4S)

Σ_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 γ(nS)
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<17	90	327	AMMAR	01	CLE2 e ⁺ e ⁻ ≈ γ(4S)

NODE=B115W+
NODE=B115W+

Σ_c(2520)⁰ WIDTH

VALUE (MeV)	EVTs	DOCUMENT ID	TECN	COMMENT
15.3 ^{+0.4} _{-0.5} OUR AVERAGE				
15.41±0.41 ^{+0.20} _{-0.32}	41k	LEE	14	BELL e ⁺ e ⁻ at γ(4S)
12.51±1.82±1.37	9.0k	AALTONEN	11H	CDF p $\bar{p}$ at 1.96 TeV
16.6 ^{+1.9} _{-1.7} ±1.4	1.3k	ATHAR	05	CLEO e ⁺ e ⁻ , 9.4–11.5 GeV
13.0 ^{+3.7} _{-3.0} ±4.0	504	BRANDENB...	97	CLE2 e ⁺ e ⁻ ≈ γ(4S)

NODE=B115W0
NODE=B115W0

Σ_c(2520) DECAY MODES

NODE=B115220;NODE=B115

Λ_c⁺ π is the only strong decay allowed to a Σ_c having this mass.

NODE=B115

Mode	Fraction (Γ _i /Γ)
Γ ₁ Λ _c ⁺ π	≈ 100 %

DESIG=1;OUR EST;→ UNCHECKED ←

Σ_c(2520) REFERENCES

NODE=B115

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.				

REFID=61435
REFID=55815
REFID=16435
REFID=50621
REFID=48043
REFID=45300
REFID=43570