$\Sigma_c(2520)$

$I(J^P) = 1(\frac{3}{2}^+)$ 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*
2518.4±0.6 OUR FIT	Error includes scale factor of 1.4.				
• • • 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*
2518.0±0.5 OUR FIT	

$\Sigma_c(2520)$ MASS DIFFERENCES

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

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
231.9±0.6 OUR FIT	Error includes scale factor of 1.5.				
231.9±1.0 OUR AVERAGE	Error includes scale factor of 2.1.				
231.5±0.4±0.3	1330 ± 110	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*
231.6±0.5 OUR FIT	Error includes scale factor of 1.1.				
231.6±0.5 OUR AVERAGE					
231.4±0.5±0.3	1350 ± 120	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)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.3±0.6 OUR FIT Error includes scale factor of 1.2.				
0.5±0.8 OUR AVERAGE				
+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*
14.9±1.9 OUR AVERAGE					
$14.4^{+1.6}_{-1.5}\pm1.4$	1330 ± 110	ATHAR	05	CLEO	e^+e^-, 9.4–11.5 GeV
$17.9^{+3.8}_{-3.2}\pm4.0$	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*
16.1±2.1 OUR AVERAGE					
$16.6^{+1.9}_{-1.7}\pm1.4$	1350 ± 120	ATHAR	05	CLEO	e^+e^-, 9.4–11.5 GeV
$13.0^{+3.7}_{-3.0}\pm4.0$	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	$\Lambda_c^+\pi$	$\approx$ 100 %

$\Sigma_c(2520)$ REFERENCES

ATHAR	05	PR D71 051101R	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 Translated from ZETFP 58 241.	V.V. Ammosov *et al.*	(SERP)