$\Sigma_c(2455)$

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

Neither J nor P has been measured; $1/2^+$ is the quark model prediction.

$\Sigma_c(2455)$ MASSES

The masses are obtained from the mass-difference measurements that follow.

$\Sigma_c(2455)^{++}$ MASS

VALUE (MeV)	*DOCUMENT ID*
2452.8±0.6 OUR FIT	

$\Sigma_c(2455)^{+}$ MASS

VALUE (MeV)	*DOCUMENT ID*
2453.6±0.9 OUR FIT	

$\Sigma_c(2455)^{0}$ MASS

VALUE (MeV)	*DOCUMENT ID*
2452.2±0.6 OUR FIT	

$m_{\Sigma_c(2455)} - m_{\Lambda_c^+}$

$m_{\Sigma_c^{++}} - m_{\Lambda_c^+}$

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
167.87± 0.19 OUR FIT					
167.87± 0.20 OUR AVERAGE					
167.76± 0.29±0.15	122	AITALA	96B	E791	$\pi^- N$, 500 GeV
167.6 ± 0.6 ±0.6	56	FRABETTI	96	E687	γBe, $\overline{E}_\gamma \approx$ 220 GeV
168.2 ± 0.3 ±0.2	126	CRAWFORD	93	CLE2	$e^+e^- \approx \Upsilon(4S)$
167.8 ± 0.4 ±0.3	54	BOWCOCK	89	CLEO	e^+e^- 10 GeV
168.2 ± 0.5 ±1.6	92	ALBRECHT	88D	ARG	e^+e^- 10 GeV
167.4 ± 0.5 ±2.0	46	DIESBURG	87	SPEC	$nA \sim$ 600 GeV
167 ± 1	2	JONES	87	HBC	νp in BEBC
168 ± 3	6	BALTAY	79	HLBC	ν Ne-H in 15-ft
• • • We do not use the following data for averages, fits, limits, etc. • • •					
166 ± 1	1	BOSETTI	82	HBC	See JONES 87
166 ±15	1	CAZZOLI	75	HBC	νp in BNL 7-ft

$m_{\Sigma_c^{+}} - m_{\Lambda_c^+}$

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
168.7±0.6 OUR FIT					
168 ±3	1	CALICCHIO	80	HBC	νp in BEBC-TST
• • • We do not use the following data for averages, fits, limits, etc. • • •					
168.5±0.4±0.2	111	[1] CRAWFORD	93	CLE2	$e^+e^- \approx \Upsilon(4S)$

[1] This result enters the fit through $m_{\Sigma_c^+} - m_{\Sigma_c^0}$ below.

$m_{\Sigma_c^0} - m_{\Lambda_c^+}$

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
167.30±0.20 OUR FIT					
167.31±0.21 OUR AVERAGE					
167.38±0.29±0.15	143	AITALA	96B	E791	$\pi^- N$, 500 GeV
167.8 ±0.6 ±0.2		ALEEV	96	SPEC	n nucleus, 50 GeV/c
166.6 ±0.5 ±0.6	69	FRABETTI	96	E687	γBe, $\overline{E}_\gamma \approx$ 220 GeV
167.1 ±0.3 ±0.2	124	CRAWFORD	93	CLE2	$e^+ e^- \approx \Upsilon(4S)$
168.4 ±1.0 ±0.3	14	ANJOS	89D	E691	γBe 90–260 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
167.9 ±0.5 ±0.3	48	[2] BOWCOCK	89	CLEO	$e^+ e^-$ 10 GeV
167.0 ±0.5 ±1.6	70	[2] ALBRECHT	88D	ARG	$e^+ e^-$ 10 GeV
178.2 ±0.4 ±2.0	85	[3] DIESBURG	87	SPEC	nA $\sim$ 600 GeV
163 ±2	1	AMMAR	86	EMUL	νA

[2] This result enters the fit through $m_{\Sigma_c^{++}} - m_{\Sigma_c^0}$ given below.

[3] See the note on DIESBURG 87 in the $m_{\Sigma_c^{++}} - m_{\Sigma_c^0}$ section below.

Σ_c(2455) MASS DIFFERENCES

$m_{\Sigma_c^{++}} - m_{\Sigma_c^0}$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.57±0.23 OUR FIT				
0.66±0.28 OUR AVERAGE Error includes scale factor of 1.1.				
+ 0.38±0.40±0.15	AITALA	96B	E791	$\pi^- N$, 500 GeV
1.1 ±0.4 ±0.1	CRAWFORD	93	CLE2	$e^+ e^- \approx \Upsilon(4S)$
− 0.1 ±0.6 ±0.1	BOWCOCK	89	CLEO	$e^+ e^-$ 10 GeV
+ 1.2 ±0.7 ±0.3	ALBRECHT	88D	ARG	$e^+ e^- \sim$ 10 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−10.8 ±2.9	[4] DIESBURG	87	SPEC	nA $\sim$ 600 GeV

[4] DIESBURG 87 is completely incompatible with the other experiments, which is surprising since it agrees with them about $m_{\Sigma_c(2455)^{++}} - m_{\Lambda_c^+}$. We go with the majority here.

$m_{\Sigma_c^+} - m_{\Sigma_c^0}$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1.4±0.6 OUR FIT				
1.4±0.5±0.3	CRAWFORD	93	CLE2	$e^+ e^- \approx \Upsilon(4S)$

Σ_c(2455) 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 %

$\Sigma_c(2455)$ REFERENCES

AITALA	96B	PL B379 292	+Amato, Anjos+	(FNAL E791 Collab.)
ALEEV	96	JINRRC 3 31	+Balandin+	(Serpukhov EXCHARM Collab.)
FRABETTI	96	PL B365 461	+Cheung, Cumalat+	(FNAL E687 Collab.)
CRAWFORD	93	PRL 71 3259	+Daubenmier, Fulton+	(CLEO Collab.)
ANJOS	89D	PRL 62 1721	+Appel, Bean, Bracker, Browder+	(FNAL E691 Collab.)
BOWCOCK	89	PRL 62 1240	+Kinoshita, Pipkin, Procario, Wilson+	(CLEO Collab.)
ALBRECHT	88D	PL B211 489	+Boeckmann, Glaeser+	(ARGUS Collab.)
DIESBURG	87	PRL 59 2711	+Ladbury, Binkley+	(FNAL E400 Collab.)
JONES	87	ZPHY C36 593	+Jones, Kennedy, O'Neale+	(CERN WA21 Collab.)
AMMAR	86	JETPL 43 515	+Ammosov, Bakic, Baranov, Burnett+	(ITEP)
		Translated from ZETFP 43 401.		
BOSETTI	82	PL 109B 234	+Graessler+	(AACH3, BONN, CERN, MPIM, OXF)
CALICCHIO	80	PL 93B 521	+	(BARI, BIRM, BRUX, CERN, EPOL, RHEL+)
BALTAY	79	PRL 42 1721	+Caroumbalis, French, Hibbs+	(COLU, BNL) I
CAZZOLI	75	PRL 34 1125	+Cnops, Connolly, Louttit, Murtagh+	(BNL)