$\Sigma_c(2455)$

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

J^P is not confirmed. $1/2^+$ is the quark model prediction.

$\Sigma_c(2455)$ MASSES

The mass measurements in this section are redundant with the mass difference measurements that follow. We get the masses by adding $m_{\Sigma_c(2455)} - m_{\Lambda_c^+}$ to the Λ_c^+ mass.

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2452.9± 0.6 OUR FIT						
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2449 ± 3	2	JONES	87	HBC	++	νp in BEBC
2480	1	ADAMOVICH	84	EMUL	++	γA (OMEGA)
2454 ± 5	1	BOSETTI	82	HBC	++	See JONES 87
2425 ±10	6	BALTAY	79	HLBC	++	ν Ne-H in 15-ft
>2439	1	BARISH	77B	DBC	++	νd in 12-ft
2426 ±12	1	CAZZOLI	75	HBC	++	νp in BNL 7-ft

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2453.5±0.9 OUR FIT						
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2457 ±4	1	CALICCHIO	80	HBC	+	νp in BEBC-TST

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2452.1± 0.7 OUR FIT						
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2462 ±26	1	AMMAR	86	EMUL	0	νA
~ 2460	9	KNAPP	76	SPEC	0	γBe

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

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
167.95± 0.25 OUR FIT						
167.94± 0.26 OUR AVERAGE						
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	CLEO	++	$e^+e^- \approx \Upsilon(4S)$
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 ~ 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	CHG	COMMENT
168.5±0.7 OUR FIT Error includes scale factor of 1.1.						
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	CLEO	+	$e^+e^- \approx \Upsilon(4S)$

[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	CHG	COMMENT
167.2±0.4 OUR FIT Error includes scale factor of 1.1.						
167.2±0.9 OUR AVERAGE Error includes scale factor of 1.4.						
166.6±0.5±0.6	69	FRABETTI	96	E687	0	γBe, $\overline{E}_\gamma \approx 220$ GeV
168.4±1.0±0.3	14	ANJOS	89D	E691	0	γBe 90–260 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
167.1±0.3±0.2	124	[2] CRAWFORD	93	CLEO	0	$e^+e^- \approx \Upsilon(4S)$
167.9±0.5±0.3	48	[2] BOWCOCK	89	CLEO	0	e^+e^- 10 GeV
167.0±0.5±1.6	70	[2] ALBRECHT	88D	ARG	0	e^+e^- 10 GeV
178.2±0.4±2.0	85	[3] DIESBURG	87	SPEC	0	nA ~ 600 GeV
163 ±2	1	AMMAR	86	EMUL	0	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.

$\Sigma_c(2455)$ MASS DIFFERENCES

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

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
0.79±0.33 OUR FIT Error includes scale factor of 1.2.				
0.8 ±0.4 OUR AVERAGE Error includes scale factor of 1.2.				
1.1 ±0.4 ±0.1	CRAWFORD	93	CLEO	$e^+e^- \approx \Upsilon(4S)$
− 0.1 ±0.6 ±0.1	BOWCOCK	89	CLEO	e^+e^- 10 GeV
+ 1.2 ±0.7 ±0.3	ALBRECHT	88D	ARG	e^+e^- ~ 10 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−10.8 ±2.9	[4] DIESBURG	87	SPEC	nA ~ 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	CLEO	$e^+e^- \approx \Upsilon(4S)$

$\Sigma_c(2455)$ 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	$\Lambda_c^+ \pi$	≈ 100 %

$\Sigma_c(2455)$ REFERENCES

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.		
ADAMOVICH	84	PL 140B 119	+Alexandrov, Bolta, Bravo+	(CERN WA58 Collab.)
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)
BARISH	77B	PR D15 1	+Derrick, Dombeck, Musgrave+	(ANL, PURD)
KNAPP	76	PRL 37 882	+Lee, Leung, Smith+	(COLU, HAWA, ILL, FNAL)
CAZZOLI	75	PRL 34 1125	+Cnops, Connolly, Louttit, Murtagh+	(BNL)