# $\Sigma_c(2520)$

$I(J^P) = 1(\frac{3}{2}^+)$ 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** | | | | |
| $+0.1\pm0.8\pm0.3$ | [2] ATHAR | 05 | CLEO | $e^+e^-$, 9.4–11.5 GeV |
| $1.9\pm1.4\pm1.0$ | [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 $\Sigma_c$ having this mass.

| | Mode | Fraction ($\Gamma_i/\Gamma$) |
|---|---|---|
| $\Gamma_1$ | $\Lambda_c^+\pi$ | $\approx 100$ % |

## $\Sigma_c(2520)$ 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 | V.V. Ammosov *et al.* | (SERP) |

Translated from ZETFP 58 241.