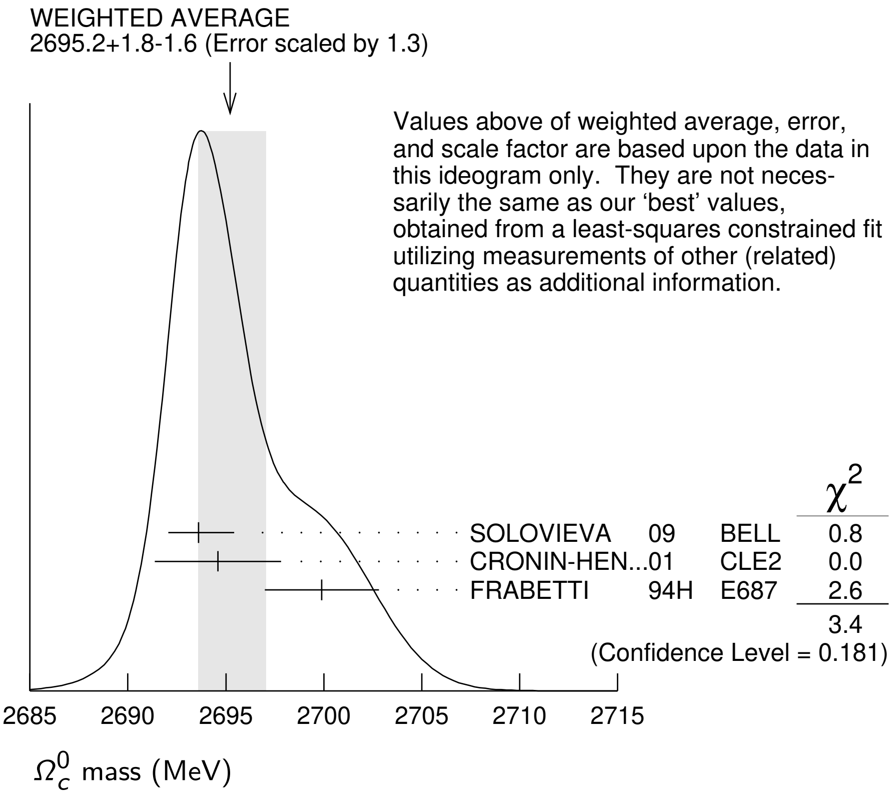
Ω_c^0

$I(J^P) = 0(\frac{1}{2}^+)$ Status: ∗∗∗

The quantum numbers have not been measured, but are simply assigned in accord with the quark model, in which the Ω_c^0 is the ssc ground state. No absolute branching fractions have been measured.

Ω_c^0 MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
2695.2± 1.7 OUR FIT	Error includes scale factor of 1.3.			
$2695.2^{+1.8}_{-1.6}$ OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.			
$2693.6 \pm 0.3^{+1.8}_{-1.5}$	725	SOLOVIEVA 09	BELL	$\Omega^- \pi^+$ in $e^+ e^- \to \Upsilon(4S)$
$2694.6 \pm 2.6 \pm 1.9$	40	[1] CRONIN-HEN...01	CLE2	$e^+ e^- \approx$ 10.6 GeV
$2699.9 \pm 1.5 \pm 2.5$	42	[2] FRABETTI 94H	E687	γBe, $\overline{E}_\gamma$= 221 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2705.9 \pm 3.3 \pm 2.0$	10	[3] FRABETTI 93	E687	γBe, $\overline{E}_\gamma$= 221 GeV
$2719.0 \pm 7.0 \pm 2.5$	11	[4] ALBRECHT 92H	ARG	$e^+ e^- \approx$ 10.6 GeV
2740 ± 20	3	BIAGI 85B	SPEC	Σ^- Be 135 GeV/c


WEIGHTED AVERAGE
2695.2+1.8-1.6 (Error scaled by 1.3)

Values above of weighted average, error, and scale factor are based upon the data in this ideogram only. They are not necessarily the same as our 'best' values, obtained from a least-squares constrained fit utilizing measurements of other (related) quantities as additional information.

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[1] CRONIN-HENNESSY 01 sees 40.4 ± 9.0 events in a sum over five channels.

[2] FRABETTI 94H claims a signal of 42.5 ± 8.8 $\Sigma^+ K^- K^- \pi^+$ events. The background is about 24 events.

[3] FRABETTI 93 claims a signal of 10.3 ± 3.9 $\Omega^-\pi^+$ events above a background of 5.8 events.

[4] ALBRECHT 92H claims a signal of 11.5 ± 4.3 $\Xi^- K^- \pi^+ \pi^+$ events. The background is about 5 events.

Ω_c^0 MEAN LIFE

VALUE (10^{-15} s)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
273 ±12 OUR AVERAGE					
243 ±48 ±11	88	ABUDINEN	23	BEL2	$e^+e^- \rightarrow \Omega_c^0 + X$, $\Omega_c^0 \rightarrow \Omega^-\pi^+$
276.5±13.4± 4.5		[1,2] AAIJ	22Y	LHCB	$pp \rightarrow \Omega_c X$, $\Omega_c \rightarrow pK^-K^-\pi^+$
268 ±24 ±10	978	[1,3] AAIJ	18J	LHCB	$\Omega_b \rightarrow \Omega_c \mu\nu + X$, $\Omega_c \rightarrow pK^-K^-\pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
72 ±11 ±11	64	LINK	03C	FOCS	$\Omega^-\pi^+$, $\Xi^-K^-\pi^+\pi^+$
55 $^{+13}_{-11}$ $^{+18}_{-23}$	86	ADAMOVICH	95B	WA89	$\Omega^-\pi^-\pi^+\pi^+$, $\Xi^-K^-\pi^+\pi^+$
86 $^{+27}_{-20}$ ±28	25	FRABETTI	95D	E687	$\Sigma^+K^-K^-\pi^+$

[1] Recent measurements by AAIJ 18J, AAIJ 22Y, and ABUDINEN 23 obtain consistent results that are nearly four times larger than the average result of previous experiments, (69 ± 12) × 10^{-15} s. We go with the more recent results, mostly obtained with much larger data samples, and also note the positive correlation between the measured value and the inverse of the estimated statistical uncertainty in lifetime measurements.

[2] AAIJ 22Y reports this measurement as (276.5 ± 13.4 ± 4.4 ± 0.7) × 10^{-15} s. The last uncertainty is due to the uncertainty on the D^0 lifetime τ_{D^0} = (410.1 ± 1.5) fs from PDG 20. Measured in Ω_c produced promptly in pp collisions, using $D^0 \rightarrow K^+K^-\pi^+\pi^-$ as normalisation mode.

[3] Measured using Ω_c produced in semileptonic Ω_b decays.

Ω_c^0 DECAY MODES

No absolute branching fractions have been measured. The following are branching *ratios* relative to $\Omega^-\pi^+$.

	Mode	Fraction (Γ_i/Γ)	Confidence level
	Cabibbo-favored ($S = -3$) decays — relative to $\Omega^-\pi^+$		
Γ_1	$\Omega^-\pi^+$	**DEFINED AS 1**	
Γ_2	$\Omega^-\pi^+\pi^0$	1.80±0.33	
Γ_3	$\Omega^-\rho^+$	>1.3	90%
Γ_4	$\Omega^-\pi^-2\pi^+$	0.31±0.05	
Γ_5	$\Omega^-e^+\nu_e$	1.98±0.15	
Γ_6	$\Omega^-\mu^+\nu_\mu$	1.94±0.21	
Γ_7	$\Xi^0\overline{K}^0$	1.64±0.29	
Γ_8	$\Xi^0K^-\pi^+$	1.20±0.18	

Γ_{9}	$\Xi^0 \overline{K}^{*0}$, $\overline{K}^{*0} \to K^- \pi^+$	0.68 ± 0.16	
Γ_{10}	$\Omega(2012)^- \pi^+$, $\Omega(2012)^- \to \Xi^0 K^-$	0.12 ± 0.05	
Γ_{11}	$\Xi^- \overline{K}^0 \pi^+$	2.12 ± 0.28	
Γ_{12}	$\Omega(2012)^- \pi^+$, $\Omega(2012)^- \to \Xi^- \overline{K}^0$	0.12 ± 0.06	
Γ_{13}	$\Xi^- K^- 2\pi^+$	0.63 ± 0.09	
Γ_{14}	$\Xi(1530)^0 K^- \pi^+$, $\Xi^{*0} \to \Xi^- \pi^+$	0.21 ± 0.06	
Γ_{15}	$\Xi^- \overline{K}^{*0} \pi^+$	0.34 ± 0.11	
Γ_{16}	$p K^- K^- \pi^+$	seen	
Γ_{17}	$\Sigma^+ K^- K^- \pi^+$	<0.32	90%
Γ_{18}	$\Lambda \overline{K}^0 \overline{K}^0$	1.72 ± 0.35	

Singly Cabibbo-suppressed modes — relative to $\Omega^- \pi^+$

Γ_{19}	$\Xi^- \pi^+$	0.25 ± 0.06	
Γ_{20}	$\Omega^- K^+$	<0.29	90%

Doubly Cabibbo-suppressed modes — relative to $\Omega^- \pi^+$

Γ_{21}	$\Xi^- K^+$	<0.07	90%

Ω_c^0 BRANCHING RATIOS

A few early but now obsolete measurements have been omitted. See K.A. Olive, et al. (Particle Data Group), Chinese Physics **C38** 070001 (2014).

$\Gamma(\Omega^- \pi^+ \pi^0)/\Gamma(\Omega^- \pi^+)$ — Γ_2/Γ_1

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
1.80±0.33 OUR AVERAGE	Error includes scale factor of 1.9.			
$2.00 \pm 0.17 \pm 0.11$	403	YELTON 18	BELL	$e^+ e^- \to \Upsilon(4S)$, +higher
$1.27 \pm 0.31 \pm 0.11$	64	AUBERT 07AH	BABR	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(\Omega^- \rho^+)/\Gamma(\Omega^- \pi^+ \pi^0)$ — Γ_3/Γ_2

VALUE	*CL%*	*DOCUMENT ID*	*TECN*	*COMMENT*
>0.71	90	[1] YELTON 18	BELL	$e^+ e^- \to \Upsilon(4S)$, +higher

[1] This submode fraction is evaluated from a background-subtracted signal in a mass plot. Result ignores interference effects and systematic uncertainties, which YELTON 18 claim are both small.

$\Gamma(\Omega^- \pi^- 2\pi^+)/\Gamma(\Omega^- \pi^+)$ — Γ_4/Γ_1

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
0.31±0.05 OUR AVERAGE				
$0.32 \pm 0.05 \pm 0.02$	108	YELTON 18	BELL	$e^+ e^- \to \Upsilon(4S)$, +higher
$0.28 \pm 0.09 \pm 0.01$	25	AUBERT 07AH	BABR	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(\Omega^- e^+ \nu_e)/\Gamma(\Omega^- \pi^+)$ — Γ_5/Γ_1

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
1.98±0.13±0.08		LI 22A	BELL	$e^+ e^-$ at Υ(nS)
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2.4 \pm 1.1 \pm 0.2$	11	[1] AMMAR 02	CLE2	$e^+ e^- \approx \Upsilon(4S)$

[1] AMMAR 02 reported 0.41 ± 0.19 ± 0.04 for the inverse of this branching fraction.

$\Gamma(\Omega^- \mu^+ \nu_\mu)/\Gamma(\Omega^- \pi^+)$ Γ_6/Γ_1

VALUE	*DOCUMENT ID*	*TECN*	*COMMENT*
1.94±0.18±0.10	LI 22A	BELL	$e^+ e^-$ at Υ(nS)

$\Gamma(\Omega^- e^+ \nu_e)/\Gamma(\Omega^- \mu^+ \nu_\mu)$ Γ_5/Γ_6

VALUE	*DOCUMENT ID*	*TECN*	*COMMENT*
1.02±0.10±0.02	LI 22A	BELL	$e^+ e^-$ at Υ(nS)

$\Gamma(\Xi^0 \overline{K}^0)/\Gamma(\Omega^- \pi^+)$ Γ_7/Γ_1

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
1.64±0.26±0.12	98	YELTON 18	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$, +higher

$\Gamma(\Xi^0 K^- \pi^+)/\Gamma(\Omega^- \pi^+)$ Γ_8/Γ_1

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
1.20±0.16±0.08	168	YELTON 18	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$, +higher

$\Gamma(\Xi^0 \overline{K}^{*0},\ \overline{K}^{*0} \rightarrow K^- \pi^+)/\Gamma(\Xi^0 K^- \pi^+)$ Γ_9/Γ_8

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
0.57±0.10	95	[1] YELTON 18	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$, +higher

[1] This submode fraction is evaluated from a background-subtracted signal in a mass plot. Result ignores interference effects and systematic uncertainties, which YELTON 18 claim are both small.

$\Gamma(\Omega(2012)^- \pi^+,\ \Omega(2012)^- \rightarrow \Xi^0 K^-)/\Gamma(\Xi^0 K^- \pi^+)$ Γ_{10}/Γ_8

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
9.6±3.2±1.8	28	[1] LI 21D	BELL	$e^+ e^-$ at Υ(nS)

[1] LI 21D reports the significance of the $\Omega(2012)$ signal is 4.2 σ including systematic uncertainties. Also measures $B(\Omega_c^0 \rightarrow \Omega(2012)^- \pi^+,\ \Omega(2012)^- \rightarrow (\overline{K}\Xi)^-)/B(\Omega_c^0 \rightarrow \Xi^0 K^- \pi^+) = 0.220 \pm 0.059 \pm 0.035$.

$\Gamma(\Xi^- \overline{K}^0 \pi^+)/\Gamma(\Omega^- \pi^+)$ Γ_{11}/Γ_1

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
2.12±0.24±0.14	349	YELTON 18	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$, +higher

$\Gamma(\Omega(2012)^- \pi^+,\ \Omega(2012)^- \rightarrow \Xi^- \overline{K}^0)/\Gamma(\Xi^- \overline{K}^0 \pi^+)$ Γ_{12}/Γ_{11}

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
5.5±2.8±0.7	18	[1] LI 21D	BELL	$e^+ e^-$ at Υ(nS)

[1] LI 21D reports the significance of the $\Omega(2012)$ signal is 4.2σ including systematic uncertainties. Also measures $B(\Omega_c^0 \rightarrow \Omega(2012)^- \pi^+,\ \Omega(2012)^- \rightarrow (\overline{K}\Xi)^-)/B(\Omega_c^0 \rightarrow \Xi^0 K^- \pi^+) = 0.220 \pm 0.059 \pm 0.035$.

$\Gamma(\Xi^- K^- 2\pi^+)/\Gamma(\Omega^- \pi^+)$ Γ_{13}/Γ_1

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
0.63±0.09 OUR AVERAGE	Error includes scale factor of 1.4.			
0.68±0.07±0.03	278	YELTON 18	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$, +higher
0.46±0.13±0.03	45	AUBERT 07AH	BABR	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma\big(\Xi(1530)^0 K^- \pi^+,\ \Xi^{*0} \to \Xi^- \pi^+\big)/\Gamma\big(\Xi^- K^- 2\pi^+\big)$ Γ_{14}/Γ_{13}

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.33±0.09	74	[1] YELTON	18	BELL	$e^+ e^- \to \Upsilon(4S)$, +higher

[1] This submode fraction is evaluated from a background-subtracted signal in a mass plot. Result ignores interference effects and systematic uncertainties, which YELTON 18 claim are both small.

$\Gamma\big(\Xi^- \overline{K}^{*0} \pi^+\big)/\Gamma\big(\Xi^- K^- 2\pi^+\big)$ Γ_{15}/Γ_{13}

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.55±0.16	136	[1] YELTON	18	BELL	$e^+ e^- \to \Upsilon(4S)$, +higher

[1] This submode fraction is evaluated from a background-subtracted signal in a mass plot. Result ignores interference effects and systematic uncertainties, which YELTON 18 claim are both small.

$\Gamma\big(p K^- K^- \pi^+\big)/\Gamma_{\text{total}}$ Γ_{16}/Γ

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	AAIJ	16O	LHCB	pp at 7, 8 TeV

$\Gamma\big(\Sigma^+ K^- K^- \pi^+\big)/\Gamma\big(\Omega^- \pi^+\big)$ Γ_{17}/Γ_1

VALUE	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.32	90	17	YELTON	18	BELL	$e^+ e^- \to \Upsilon(4S)$, +higher

$\Gamma\big(\Lambda \overline{K}^0 \overline{K}^0\big)/\Gamma\big(\Omega^- \pi^+\big)$ Γ_{18}/Γ_1

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.72±0.32±0.14	95	YELTON	18	BELL	$e^+ e^- \to \Upsilon(4S)$, +higher

$\Gamma\big(\Xi^- \pi^+\big)/\Gamma\big(\Omega^- \pi^+\big)$ Γ_{19}/Γ_1

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.253±0.052±0.030	208	HAN	23	BELL	$e^+ e^- \to \Upsilon(\text{nS})$

$\Gamma\big(\Omega^- K^+\big)/\Gamma\big(\Omega^- \pi^+\big)$ Γ_{20}/Γ_1

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.29	90	HAN	23	BELL	$e^+ e^- \to \Upsilon(\text{nS})$

$\Gamma\big(\Xi^- K^+\big)/\Gamma\big(\Omega^- \pi^+\big)$ Γ_{21}/Γ_1

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.070	90	HAN	23	BELL	$e^+ e^- \to \Upsilon(\text{nS})$

Ω_c^0 REFERENCES

ABUDINEN	23	PR D107 L031103	F. Abudinen *et al.*	(BELLE II Collab.)
HAN	23	JHEP 2301 055	X. Han *et al.*	(BELLE Collab.)
AAIJ	22Y	SCIB 67 479	R. Aaij *et al.*	(LHCb Collab.)
LI	22A	PR D105 L091101	Y.B. Li *et al.*	(BELLE Collab.)
LI	21D	PR D104 052005	Y.B. Li *et al.*	(BELLE Collab.)
PDG	20	PTEP 2020 083C01	P.A. Zyla *et al.*	(PDG Collab.)
AAIJ	18J	PRL 121 092003	R. Aaij *et al.*	(LHCb Collab.)
YELTON	18	PR D97 032001	J. Yelton *et al.*	(BELLE Collab.)
AAIJ	16O	PR D93 092007	R. Aaij *et al.*	(LHCb Collab.)
PDG	14	CP C38 070001	K. Olive *et al.*	(PDG Collab.)
SOLOVIEVA	09	PL B672 1	E. Solovieva *et al.*	(BELLE Collab.)

AUBERT	07AH	PRL 99 062001	B. Aubert *et al.*	(BABAR Collab.)
LINK	03C	PL B561 41	J.M. Link *et al.*	(FNAL FOCUS Collab.)
AMMAR	02	PRL 89 171803	R. Ammar *et al.*	(CLEO Collab.)
CRONIN-HEN...	01	PRL 86 3730	D. Cronin-Hennessy *et al.*	(CLEO Collab.)
ADAMOVICH	95B	PL B358 151	M.I. Adamovich *et al.*	(CERN WA89 Collab.)
FRABETTI	95D	PL B357 678	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
FRABETTI	94H	PL B338 106	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
FRABETTI	93	PL B300 190	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
ALBRECHT	92H	PL B288 367	H. Albrecht *et al.*	(ARGUS Collab.)
BIAGI	85B	ZPHY C28 175	S.F. Biagi *et al.*	(CERN WA62 Collab.)