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*
2695.3 ± 0.4 OUR FIT				
2695.3 ± 0.4 OUR AVERAGE				
2695.28 ± 0.07 ± 0.41	9330	[1] AAIJ 24C	LHCB	5.4fb^{-1}, pp at 13 TeV
2693.6 ± 0.3 $^{+1.8}_{-1.5}$	725	SOLOVIEVA 09	BELL	$\Omega^-\pi^+$ in $e^+e^- \to \Upsilon(4S)$
2694.6 ± 2.6 ± 1.9	40	[2] CRONIN-HEN..01	CLE2	$e^+e^- \approx$ 10.6 GeV
2699.9 ± 1.5 ± 2.5	42	[3] FRABETTI 94H	E687	γBe, $\overline{E}_\gamma$= 221 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2705.9 ± 3.3 ± 2.0	10	[4] FRABETTI 93	E687	γBe, $\overline{E}_\gamma$= 221 GeV
2719.0 ± 7.0 ± 2.5	11	[5] ALBRECHT 92H	ARG	$e^+e^- \approx$ 10.6 GeV
2740 ±20	3	BIAGI 85B	SPEC	Σ^- Be 135 GeV/c

[1] AAIJ 24C reports this measurements as 2695.28 ± 0.07 ± 0.27 ± 0.30 MeV. The last uncertainty is due to the uncertainty in the Ω^- mass. Also reported is $m_{\Omega_c^0} - m_{\Omega^-}$ = 1022.83 ± 0.07 ± 0.27 MeV.

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

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

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

[5] 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*
274 ±10 OUR AVERAGE				
276.3 ± 19.4 ± 1.8 ± 0.7	0.36k	[1] AAIJ 25AM	LHCB	$\Omega_b^- \to \Omega_c^0\pi^-$, $\Omega_c^0 \to pK^-K^-\pi^+$
243 ±48 ±11	88	ABUDINEN 23	BEL2	$e^+e^- \to \Omega_c^0 + X$, $\Omega_c^0 \to \Omega^-\pi^+$
276.5 ± 13.4 ± 4.5		[2,3] AAIJ 22Y	LHCB	$pp \to \Omega_c X$, $\Omega_c \to pK^-K^-\pi^+$
268 ±24 ±10	978	[2,4] AAIJ 18J	LHCB	$\Omega_b \to \Omega_c\mu\nu + X$, $\Omega_c \to pK^-K^-\pi^+$
• • • 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	$\Omega^-\pi^-\pi^+\pi^+$, $\Xi^-K^-\pi^+\pi^+$

$86\ ^{+27}_{-20}\ \pm 28$	25	FRABETTI	95D	E687	$\Sigma^+ K^- K^- \pi^+$

[1] Uses $B^- \to D^0 \pi^-$, $D^0 \to K^- K^+ \pi^- \pi^+$ as a normalization mode to minimize the uncertainties associated with the decay time acceptance. The third uncertainty is due to the uncertainty of the D^0 lifetime, which is taken to be 410.3 ± 1.0 fs.

[2] 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, $(69 \pm 12) \times 10^{-15}$ 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.

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

[4] 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 ± 0.29	
Γ_6	$\Omega^- \mu^+ \nu_\mu$	1.94 ± 0.21	
Γ_7	$\Xi^0 \overline{K}^0$	1.64 ± 0.29	
Γ_8	$\Xi^0 K^- \pi^+$	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}	$\Xi^- \pi^+$	0.161 ± 0.010	

Γ_{20}	$\Omega^- K^+$	0.061 ± 0.006	

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±0.17±0.11	403	YELTON	18	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$, +higher
1.27±0.31±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	$e^+ e^- \rightarrow \Upsilon(4S)$, +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.

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

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.31±0.05 OUR AVERAGE					
0.32±0.05±0.02	108	YELTON	18	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$, +higher
0.28±0.09±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*
1.84±0.32 OUR AVERAGE		Error includes scale factor of 2.3.			
1.12±0.22±0.27	232	[1] ACHARYA	24A	ALCE	pp at 13 TeV
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 ±1.1 ±0.2	11	[2] AMMAR	02	CLE2	$e^+ e^- \approx \Upsilon(4S)$

[1] ACHARYA 24A measurement performed over p_T intervals in the range $2 < p_T < 12$ GeV, from which a p_T-independent branching ratio is derived from a weighted average over p_T.

[2] 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	$e^+e^- \to \Upsilon(4S)$, +higher

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

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

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

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
0.57±0.10	95	[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.

$\Gamma(\Omega(2012)^-\pi^+,\ \Omega(2012)^-\to\Xi^0K^-)/\Gamma(\Xi^0K^-\pi^+)$ 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 $B(\Omega_c^0 \to \Omega(2012)^-\pi^+,\ \Omega(2012)^- \to (\overline{K}\Xi)^-)/B(\Omega_c^0 \to \Xi^0K^-\pi^+) = 0.220 \pm 0.059 \pm 0.035$.

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

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

$\Gamma(\Omega(2012)^-\pi^+,\ \Omega(2012)^-\to\Xi^-\overline{K}^0)/\Gamma(\Xi^-\overline{K}^0\pi^+)$ 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 $B(\Omega_c^0 \to \Omega(2012)^-\pi^+,\ \Omega(2012)^- \to (\overline{K}\Xi)^-)/B(\Omega_c^0 \to \Xi^0K^-\pi^+) = 0.220 \pm 0.059 \pm 0.035$.

$\Gamma(\Xi^-K^-2\pi^+)/\Gamma(\Omega^-\pi^+)$ 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	$e^+e^- \to \Upsilon(4S)$, +higher
0.46±0.13±0.03	45	AUBERT 07AH	BABR	$e^+e^- \approx \Upsilon(4S)$

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

$\Gamma(\Xi^-\overline{K}^{*0}\pi^+)/\Gamma(\Xi^-K^-2\pi^+)$ 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.

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

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AAIJ	25AM	LHCB	pp at 7, 8, 13 TeV
seen	AAIJ	16O	LHCB	pp at 7, 8 TeV

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

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

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

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

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
16.1 ±1.0 OUR AVERAGE					
15.81±0.87±0.47	2780	[1] AAIJ	24C	LHCB	5.4fb^{-1}, pp at 13 TeV
25.3 ±5.2 ±3.0	208	HAN	23	BELL	$e^+e^- \to \Upsilon$(nS)

[1] AAIJ 24C reports this measurements as (15.81 ± 0.87 ± 0.44 ± 0.16)%. The last uncertainty is due to branching ratios of $\Omega^- \to \Lambda K^-$ and $\Xi^- \to \Lambda\pi^-$ decays taken as external inputs, which are taken to be 67.8 ± 0.7% and 99.887 ± 0.035%, respectively.

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

VALUE (units 10^{-2})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
6.08±0.51±0.40		425	AAIJ	24C	LHCB	5.4fb^{-1}, pp at 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<29	90		HAN	23	BELL	$e^+e^- \to \Upsilon$(nS)

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

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

Ω_c^0 REFERENCES

AAIJ	25AM	JHEP 2509 157	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	24C	PRL 132 081802	R. Aaij *et al.*	(LHCb Collab.)
ACHARYA	24A	PR D110 032014	S. Acharya *et al.*	(ALICE Collab.)
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.)