Baryon Full Listings

Ξ^0

Ξ^0 DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1	$\Lambda\pi^0$	(99.54 ± 0.05) %	
Γ_2	$\Lambda\gamma$	(1.06 ± 0.16) × 10^{-3}	
Γ_3	$\Sigma^0\gamma$	(3.5 ± 0.4) × 10^{-3}	
Γ_4	$\Sigma^+ e^- \overline{\nu}_e$	< 1.1 × 10^{-3}	90%
Γ_5	$\Sigma^+ \mu^- \overline{\nu}_\mu$	< 1.1 × 10^{-3}	90%
	$\Delta S = \Delta Q$ (SQ) violating modes or $\Delta S = 2$ forbidden ($S2$) modes		
Γ_6	$\Sigma^- e^+ \nu_e$	SQ < 9 × 10^{-4}	90%
Γ_7	$\Sigma^- \mu^+ \nu_\mu$	SQ < 9 × 10^{-4}	90%
Γ_8	$p\pi^-$	$S2$ < 4 × 10^{-5}	90%
Γ_9	$p e^- \overline{\nu}_e$	$S2$ < 1.3 × 10^{-3}	
Γ_{10}	$p \mu^- \overline{\nu}_\mu$	$S2$ < 1.3 × 10^{-3}	

CONSTRAINED FIT INFORMATION

An overall fit to 2 branching ratios uses 2 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 = 0.0$ for 0 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta x_i \delta x_j \rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	−35		
x_3	−94	0	
	x_1	x_2	

Ξ^0 BRANCHING RATIOS

$\Gamma(\Lambda\gamma)/\Gamma(\Lambda\pi^0)$ Γ_2/Γ_1

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.06 ± 0.16 OUR FIT					
1.06 ± 0.12 ± 0.11	116	JAMES	90	SPEC	FNAL hyperons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5 ± 5	1	YEH	74	HBC	Effective denom.=200

$\Gamma(\Sigma^0\gamma)/\Gamma(\Lambda\pi^0)$ Γ_3/Γ_1

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.6 ± 0.4 OUR FIT						
3.56 ± 0.42 ± 0.10		85	TEIGE	89	SPEC	FNAL hyperons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 8	90		BENSINGER	88	MPS2	K^- W 6 GeV/c
<65	90	0–1	YEH	74	HBC	Effective denom.=60

$\Gamma(\Sigma^+ e^- \overline{\nu}_e)/\Gamma(\Lambda\pi^0)$ Γ_4/Γ_1

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<1.1	90	0	YEH	74	HBC	Effective denom.=2100
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.5			DAUBER	69	HBC	
<7			HUBBARD	66	HBC	

$\Gamma(\Sigma^+ \mu^- \overline{\nu}_\mu)/\Gamma(\Lambda\pi^0)$ Γ_5/Γ_1

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<1.1	90	0	YEH	74	HBC	Effective denom.=2100
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.5			DAUBER	69	HBC	
<7			HUBBARD	66	HBC	

$\Gamma(\Sigma^- e^+ \nu_e)/\Gamma(\Lambda\pi^0)$ Γ_6/Γ_1

Test of $\Delta S = \Delta Q$ rule.

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.9	90	0	YEH	74	HBC	Effective denom.=2500
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.5			DAUBER	69	HBC	
<6			HUBBARD	66	HBC	

$\Gamma(\Sigma^- \mu^+ \nu_\mu)/\Gamma(\Lambda\pi^0)$ Γ_7/Γ_1

Test of $\Delta S = \Delta Q$ rule.

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.9	90	0	YEH	74	HBC	Effective denom.=2500
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.5			DAUBER	69	HBC	
<6			HUBBARD	66	HBC	

$\Gamma(p\pi^-)/\Gamma(\Lambda\pi^0)$ Γ_8/Γ_1

ΔS=2. Forbidden in first-order weak interaction.

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 3.6	90		GEWENIGER	75	SPEC	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<180	90	0	YEH	74	HBC	Effective denom.=1300
< 90			DAUBER	69	HBC	
<500			HUBBARD	66	HBC	

$\Gamma(p e^- \overline{\nu}_e)/\Gamma(\Lambda\pi^0)$ Γ_9/Γ_1

ΔS=2. Forbidden in first-order weak interaction.

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<1.3			DAUBER	69	HBC	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<3.4	90	0	YEH	74	HBC	Effective denom.=670
<6			HUBBARD	66	HBC	

$\Gamma(p \mu^- \overline{\nu}_\mu)/\Gamma(\Lambda\pi^0)$ Γ_{10}/Γ_1

ΔS=2. Forbidden in first-order weak interaction.

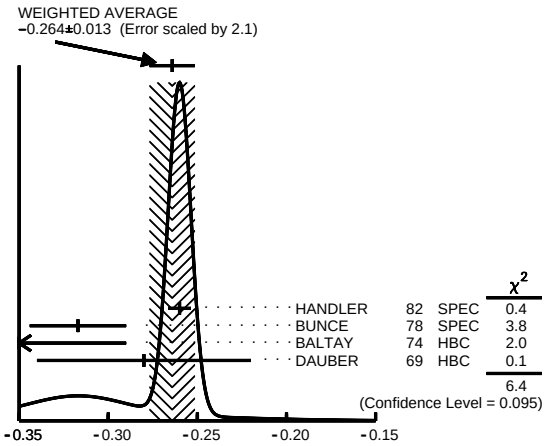
VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<1.3			DAUBER	69	HBC	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<3.5	90	0	YEH	74	HBC	Effective denom.=664
<6			HUBBARD	66	HBC	

Ξ^0 DECAY PARAMETERS

See the Note on Baryon Decay Parameters in the neutron Listings.

$\alpha(\Xi^0)$ $\alpha_-(\Lambda)$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
−0.264 ± 0.013 OUR AVERAGE Error includes scale factor of 2.1. See the ideogram below.					
−0.260 ± 0.004 ± 0.005	300k	HANDLER	82	SPEC	FNAL hyperons
−0.317 ± 0.027	6075	BUNCE	78	SPEC	FNAL hyperons
−0.35 ± 0.06	505	BALTAY	74	HBC	K^-p 1.75 GeV/c
−0.28 ± 0.06	739	DAUBER	69	HBC	K^-p 1.7–2.6 GeV/c



$\alpha(\Xi^0)\alpha_-(\Lambda)$

α FOR $\Xi^0 \to \Lambda\pi^0$

The above average, $\alpha(\Xi^0)\alpha_-(\Lambda) = -0.264 \pm 0.013$, where the error includes a scale factor of 2.1, divided by our current average $\alpha_-(\Lambda) = 0.642 \pm 0.013$, gives the following value for $\alpha(\Xi^0)$.

VALUE	DOCUMENT ID
−0.411 ± 0.022 OUR EVALUATION Error includes scale factor of 2.1.	

ϕ ANGLE FOR $\Xi^0 \to \Lambda\pi^0$ ($\tan\phi = \beta/\gamma$)

VALUE (°)	EVTS	DOCUMENT ID		TECN	COMMENT
21 ± 12 OUR AVERAGE					
16 ± 17	652	BALTAY	74	HBC	1.75 GeV/c K^-p
38 ± 19	739	[3] DAUBER	69	HBC	
− 8 ± 30	146	[4] BERGE	66	HBC	

[3] DAUBER 69 uses $\alpha_\Lambda = 0.647 \pm 0.020$.

[4] The errors have been multiplied by 1.2 due to approximations used for the Ξ polarization; see DAUBER 69 for a discussion.

α FOR $\Xi^0 \to \Lambda\gamma$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
+0.43 ± 0.44	87	JAMES	90	SPEC	FNAL hyperons