Baryon Full Listings

Ξ^-

Ξ^- DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1	$\Lambda\pi^-$	(99.887 ± 0.035) %	
Γ_2	$\Sigma^-\gamma$	(1.27 ± 0.23) × 10^{-4}	
Γ_3	$\Lambda e^-\overline{\nu}_e$	(5.63 ± 0.31) × 10^{-4}	
Γ_4	$\Lambda\mu^-\overline{\nu}_\mu$	(3.5 $^{+3.5}_{-2.2}$) × 10^{-4}	
Γ_5	$\Sigma^0 e^-\overline{\nu}_e$	(8.7 ± 1.7) × 10^{-5}	
Γ_6	$\Sigma^0\mu^-\overline{\nu}_\mu$	< 8 × 10^{-4}	90%
Γ_7	$\Xi^0 e^-\overline{\nu}_e$	< 2.3 × 10^{-3}	90%
	$\Delta S = 2$ forbidden ($S2$) modes		
Γ_8	$n\pi^-$	$S2$ < 1.9 × 10^{-5}	90%
Γ_9	$ne^-\overline{\nu}_e$	$S2$ < 3.2 × 10^{-3}	90%
Γ_{10}	$n\mu^-\overline{\nu}_\mu$	$S2$ < 1.5 %	90%
Γ_{11}	$p\pi^-\pi^-$	$S2$ < 4 × 10^{-4}	90%
Γ_{12}	$p\pi^- e^-\overline{\nu}_e$	$S2$ < 4 × 10^{-4}	90%
Γ_{13}	$p\pi^-\mu^-\overline{\nu}_\mu$	$S2$ < 4 × 10^{-4}	90%
Γ_{14}	$p\mu^-\mu^-$	L < 4 × 10^{-4}	90%

CONSTRAINED FIT INFORMATION

An overall fit to 4 branching ratios uses 5 measurements and one constraint to determine 5 parameters. The overall fit has a χ^2 = 1.0 for 1 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, $x_i \equiv \Gamma_i/\Gamma_{\rm total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

	x_1	x_2	x_3	x_4
x_2	−6			
x_3	−8	0		
x_4	−99	0	−1	
x_5	−5	0	0	0

Ξ^- BRANCHING RATIOS

A number of early results have been omitted.

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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.27 ± 0.24 OUR FIT					
1.27 ± 0.23 OUR AVERAGE					
1.22 ± 0.23 ± 0.06	211	[4] DUBBS	94	E761	Ξ^- 375 GeV
2.27 ± 1.02	9	BIAGI	87B	SPEC	SPS hyperon beam

[4] DUBBS 94 also finds weak evidence that the asymmetry parameter α_γ is positive (α_γ = 1.0 ± 1.3).

$\Gamma(\Lambda e^-\overline{\nu}_e)/\Gamma(\Lambda\pi^-)$ Γ_3/Γ_1

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.564 ± 0.031 OUR FIT					
0.564 ± 0.031	2857	BOURQUIN	83	SPEC	SPS hyperon beam
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.30 ± 0.13	11	THOMPSON	80	ASPK	Hyperon beam

$\Gamma(\Lambda\mu^-\overline{\nu}_\mu)/\Gamma(\Lambda\pi^-)$ Γ_4/Γ_1

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.35 $^{+0.35}_{-0.22}$ OUR FIT						
0.35 ± 0.35		1	YEH	74	HBC	Effective denom. = 2859
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 2.3	90	0	THOMPSON	80	ASPK	Effective denom. = 1017
< 1.3			DAUBER	69	HBC	
<12			BERGE	66	HBC	

$\Gamma(\Sigma^0 e^-\overline{\nu}_e)/\Gamma(\Lambda\pi^-)$ Γ_5/Γ_1

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.087 ± 0.017 OUR FIT					
0.087 ± 0.017	154	BOURQUIN	83	SPEC	SPS hyperon beam

$\Gamma(\Sigma^0\mu^-\overline{\nu}_\mu)/\Gamma(\Lambda\pi^-)$ Γ_6/Γ_1

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 0.76	90	0	YEH	74	HBC	Effective denom. = 3026
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<5			BERGE	66	HBC	

$[\Gamma(\Lambda e^-\overline{\nu}_e) + \Gamma(\Sigma^0 e^-\overline{\nu}_e)]/\Gamma(\Lambda\pi^-)$ $(\Gamma_3+\Gamma_5)/\Gamma_1$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.651 ± 0.031	3011	[5] BOURQUIN	83	SPEC	SPS hyperon beam
0.68 ± 0.22	17	[6] DUCLOS	71	OSPK	

[5] See the separate BOURQUIN 83 values for $\Gamma(\Lambda e^-\overline{\nu}_e)/\Gamma(\Lambda\pi^-)$ and $\Gamma(\Sigma^0 e^-\overline{\nu}_e)/\Gamma(\Lambda\pi^-)$ above.

[6] DUCLOS 71 cannot distinguish Σ^0's from Λ's. The Cabibbo theory predicts the Σ^0 rate is about a factor 6 smaller than the Λ rate.

$\Gamma(\Xi^0 e^-\overline{\nu}_e)/\Gamma(\Lambda\pi^-)$ Γ_7/Γ_1

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 2.3	90	0	YEH	74	HBC	Effective denom. = 1000

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

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

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 0.019	90		BIAGI	82B	SPEC	SPS hyperon beam
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<3.0	90	0	YEH	74	HBC	Effective denom. = 760
<1.1			DAUBER	69	HBC	
<5.0			FERRO-LUZZI	63	HBC	

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

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

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 3.2	90	0	YEH	74	HBC	Effective denom. = 715
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<10	90		BINGHAM	65	RVUE	

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

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

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 15.3	90	0	YEH	74	HBC	Effective denom. = 150

$\Gamma(p\pi^-\pi^-)/\Gamma(\Lambda\pi^-)$ Γ_{11}/Γ_1

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

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 3.7	90	0	YEH	74	HBC	Effective denom. = 6200

$\Gamma(p\pi^- e^-\overline{\nu}_e)/\Gamma(\Lambda\pi^-)$ Γ_{12}/Γ_1

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

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 3.7	90	0	YEH	74	HBC	Effective denom. = 6200

$\Gamma(p\pi^-\mu^-\overline{\nu}_\mu)/\Gamma(\Lambda\pi^-)$ Γ_{13}/Γ_1

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

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 3.7	90	0	YEH	74	HBC	Effective denom. = 6200

$\Gamma(p\mu^-\mu^-)/\Gamma(\Lambda\pi^-)$ Γ_{14}/Γ_1

A ΔL=2 decay, forbidden by total lepton number conservation.

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 3.7	90	[7] LITTENBERG	92B	HBC	Uses YEH 74 data

[7] This LITTENBERG 92B limit and the identical YEH 74 limits for the preceding three modes all result from nonobservance of any 3-prong decays of the Ξ^-. One could as well apply the limit to the *sum* of the four modes.

Ξ^- DECAY PARAMETERS

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

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
−0.293 ± 0.007 OUR AVERAGE	Error includes scale factor of 1.8. See the ideogram below.				
−0.303 ± 0.004 ± 0.004	192k	RAMEIKA	86	SPEC	400 GeV pBe
−0.257 ± 0.020	11k	ASTON	85B	LASS	11 GeV/c K^-p
−0.260 ± 0.017	21k	BENSINGER	85	MPS	5 GeV/c K^-p
−0.299 ± 0.007	150k	BIAGI	82	SPEC	SPS hyperon beam
−0.315 ± 0.026	9046	CLELAND	80C	ASPK	BNL hyperon beam
−0.239 ± 0.021	6599	HEMINGWAY	78	HBC	4.2 GeV/c K^-p
−0.243 ± 0.025	4303	BALTAY	74	HBC	1.75 GeV/c K^-p
−0.252 ± 0.032	2436	COOL	74	OSPK	1.8 GeV/c K^- p
−0.253 ± 0.028	2781	DAUBER	69	HBC	