



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

The parity has not actually been measured, but + is of course expected.

We have omitted some results that have been superseded by later experiments. See our earlier editions.

### $\Xi^-$ MASS

The fit uses the  $\Xi^-$ ,  $\Xi^+$ , and  $\Xi^0$  masses and the  $\Xi^- - \Xi^+$  mass difference. It assumes that the  $\Xi^-$  and  $\Xi^+$  masses are the same.

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>1321.71 ± 0.07 OUR FIT</b>				
<b>1321.70 ± 0.08 ± 0.05</b>	2478 ± 68	ABDALLAH	06E	DLPH from Z decays
• • •				We do not use the following data for averages, fits, limits, etc. • • •
1321.46 ± 0.34	632	DIBIANCA	75	DBC 4.9 GeV/c $K^- d$
1321.12 ± 0.41	268	WILQUET	72	HLBC
1321.87 ± 0.51	195	<sup>1</sup> GOLDWASSER	70	HBC 5.5 GeV/c $K^- p$
1321.67 ± 0.52	6	CHIEN	66	HBC 6.9 GeV/c $\bar{p} p$
1321.4 ± 1.1	299	LONDON	66	HBC
1321.3 ± 0.4	149	PJERROU	65B	HBC
1321.1 ± 0.3	241	<sup>2</sup> BADIER	64	HBC
1321.4 ± 0.4	517	<sup>2</sup> JAUNEAU	63D	FBC
1321.1 ± 0.65	62	<sup>2</sup> SCHNEIDER	63	HBC

<sup>1</sup> GOLDWASSER 70 uses  $m_\Lambda = 1115.58$  MeV.

<sup>2</sup> These masses have been increased 0.09 MeV because the  $\Lambda$  mass increased.

### $\Xi^+$ MASS

The fit uses the  $\Xi^-$ ,  $\Xi^+$ , and  $\Xi^0$  masses and the  $\Xi^- - \Xi^+$  mass difference. It assumes that the  $\Xi^-$  and  $\Xi^+$  masses are the same.

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>1321.71 ± 0.07 OUR FIT</b>				
<b>1321.73 ± 0.08 ± 0.05</b>	2256 ± 63	ABDALLAH	06E	DLPH from Z decays
• • •				We do not use the following data for averages, fits, limits, etc. • • •
1321.6 ± 0.8	35	VOTRUBA	72	HBC 10 GeV/c $K^+ p$
1321.2 ± 0.4	34	STONE	70	HBC
1320.69 ± 0.93	5	CHIEN	66	HBC 6.9 GeV/c $\bar{p} p$

$$(m_{\Xi^-} - m_{\Xi^+}) / m_{\Xi^-}$$

A test of *CPT* invariance.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>(-2.5 ± 8.7) × 10<sup>-5</sup></b>	ABDALLAH	06E	DLPH from Z decays

**$\Xi^-$  MEAN LIFE**

Measurements with an error  $> 0.2 \times 10^{-10}$  s or with systematic errors not included have been omitted.

<u>VALUE (<math>10^{-10}</math> s)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1.639±0.015 OUR AVERAGE</b>				
1.65 ±0.07 ±0.12	2478 ± 68	ABDALLAH	06E DLPH	from Z decays
1.652±0.051	32k	BOURQUIN	84 SPEC	Hyperon beam
1.665±0.065	41k	BOURQUIN	79 SPEC	Hyperon beam
1.609±0.028	4286	HEMINGWAY	78 HBC	4.2 GeV/c $K^- p$
1.67 ±0.08		DIBIANCA	75 DBC	4.9 GeV/c $K^- d$
1.63 ±0.03	4303	BALTAY	74 HBC	1.75 GeV/c $K^- p$
1.73 <sup>+0.08</sup> <sub>-0.07</sub>	680	MAYEUR	72 HLBC	2.1 GeV/c $K^-$
1.61 ±0.04	2610	DAUBER	69 HBC	
1.80 ±0.16	299	LONDON	66 HBC	
1.70 ±0.12	246	PJERROU	65B HBC	
1.69 ±0.07	794	HUBBARD	64 HBC	
1.86 <sup>+0.15</sup> <sub>-0.14</sub>	517	JAUNEAU	63D FBC	

 **$\Xi^+$  MEAN LIFE**

<u>VALUE (<math>10^{-10}</math> s)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1.70±0.08±0.12</b>				
	2256 ± 63	ABDALLAH	06E DLPH	from Z decays
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
1.55 <sup>+0.35</sup> <sub>-0.20</sub>	35	<sup>1</sup> VOTRUBA	72 HBC	10 GeV/c $K^+ p$
1.6 ±0.3	34	STONE	70 HBC	
1.9 <sup>+0.7</sup> <sub>-0.5</sub>	12	<sup>1</sup> SHEN	67 HBC	
1.51±0.55	5	<sup>1</sup> CHIEN	66 HBC	6.9 GeV/c $\bar{p} p$

<sup>1</sup>The error is statistical only.

$$(\tau_{\Xi^-} - \tau_{\Xi^+}) / \tau_{\Xi^-}$$

A test of *CPT* invariance.

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>-0.01±0.07</b>	ABDALLAH	06E DLPH	from Z decays

 **$\Xi^-$  MAGNETIC MOMENT**

See the "Quark Model" review.

<u>VALUE (<math>\mu_N</math>)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>-0.6507±0.0025 OUR AVERAGE</b>				
-0.6505±0.0025	4.36M	DURYEA	92 SPEC	800 GeV $p$ Be
-0.661 ±0.036 ±0.036	44k	TROST	89 SPEC	$\Xi^- \sim 250$ GeV
-0.69 ±0.04	218k	RAMEIKA	84 SPEC	400 GeV $p$ Be

• • • We do not use the following data for averages, fits, limits, etc. • • •

-0.674 ±0.021 ±0.020	122k	HO	90	SPEC	See
					DURYEY 92
-2.1 ±0.8	2436	COOL	74	OSPK	1.8 GeV/c $K^- p$
-0.1 ±2.1	2724	BINGHAM	70B	OSPK	1.8 GeV/c $K^- p$

## $\Xi^+$ MAGNETIC MOMENT

See the "Quark Model" review.

VALUE ( $\mu_N$ )	EVTS	DOCUMENT ID	TECN	COMMENT
<b>+0.657±0.028±0.020</b>	70k	HO	90	SPEC 800 GeV $p$ Be

$$(\mu_{\Xi^-} + \mu_{\Xi^+}) / |\mu_{\Xi^-}|$$

A test of *CPT* invariance. We calculate this from the  $\Xi^-$  and  $\Xi^+$  magnetic moments above.

VALUE	DOCUMENT ID
<b>+0.01±0.05 OUR EVALUATION</b>	

## $\Xi^-$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )	Confidence level
$\Gamma_1$ $\Lambda\pi^-$	(99.887±0.035) %	
$\Gamma_2$ $\Sigma^-\gamma$	( 1.27 ±0.23 ) × 10 <sup>-4</sup>	
$\Gamma_3$ $\Lambda e^- \bar{\nu}_e$	( 5.63 ±0.31 ) × 10 <sup>-4</sup>	
$\Gamma_4$ $\Lambda\mu^- \bar{\nu}_\mu$	( 3.5 <sup>+3.5</sup> <sub>-2.2</sub> ) × 10 <sup>-4</sup>	
$\Gamma_5$ $\Sigma^0 e^- \bar{\nu}_e$	( 8.7 ±1.7 ) × 10 <sup>-5</sup>	
$\Gamma_6$ $\Sigma^0 \mu^- \bar{\nu}_\mu$	< 8 × 10 <sup>-4</sup>	90%
$\Gamma_7$ $\Xi^0 e^- \bar{\nu}_e$	< 2.59 × 10 <sup>-4</sup>	90%

### $\Delta S = 2$ forbidden (*S2*) modes

$\Gamma_8$ $n\pi^-$	<i>S2</i> < 1.9	× 10 <sup>-5</sup>	90%
$\Gamma_9$ $ne^- \bar{\nu}_e$	<i>S2</i> < 3.2	× 10 <sup>-3</sup>	90%
$\Gamma_{10}$ $n\mu^- \bar{\nu}_\mu$	<i>S2</i> < 1.5	%	90%
$\Gamma_{11}$ $p\pi^-\pi^-$	<i>S2</i> < 4	× 10 <sup>-4</sup>	90%
$\Gamma_{12}$ $p\pi^- e^- \bar{\nu}_e$	<i>S2</i> < 4	× 10 <sup>-4</sup>	90%
$\Gamma_{13}$ $p\pi^- \mu^- \bar{\nu}_\mu$	<i>S2</i> < 4	× 10 <sup>-4</sup>	90%
$\Gamma_{14}$ $p\mu^- \mu^-$	<i>L</i> < 4	× 10 <sup>-8</sup>	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  $\chi^2 = 1.0$  for 1 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients  $\langle \delta x_i \delta x_j \rangle / (\delta x_i \delta x_j)$ , 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.

$x_2$	-6			
$x_3$	-8	0		
$x_4$	-99	0	-1	
$x_5$	-5	0	0	0
	$x_1$	$x_2$	$x_3$	$x_4$

## $\Xi^-$ BRANCHING RATIOS

A number of early results have been omitted.

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

 $\Gamma_2 / \Gamma_1$ 

VALUE (units $10^{-4}$ )	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>1.27 \pm 0.24</math></b>				<b>OUR FIT</b>
<b><math>1.27 \pm 0.23</math></b>				<b>OUR AVERAGE</b>
$1.22 \pm 0.23 \pm 0.06$	211	<sup>1</sup> DUBBS	94 E761	$\Xi^-$ 375 GeV
$2.27 \pm 1.02$	9	BIAGI	87B SPEC	SPS hyperon beam

<sup>1</sup> DUBBS 94 also finds weak evidence that the asymmetry parameter  $\alpha_\gamma$  is positive ( $\alpha_\gamma = 1.0 \pm 1.3$ ).

### $\Gamma(\Lambda e^- \bar{\nu}_e) / \Gamma(\Lambda \pi^-)$

 $\Gamma_3 / \Gamma_1$ 

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

### $\Gamma(\Lambda \mu^- \bar{\nu}_\mu) / \Gamma(\Lambda \pi^-)$

 $\Gamma_4 / \Gamma_1$ 

VALUE (units $10^{-3}$ )	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>0.35^{+0.35}_{-0.22}</math></b>					<b>OUR FIT</b>
<b><math>0.35 \pm 0.35</math></b>		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	

$$\Gamma(\Sigma^0 e^- \bar{\nu}_e) / \Gamma(\Lambda \pi^-) \qquad \Gamma_5 / \Gamma_1$$

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

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

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	<sup>1</sup> BOURQUIN 83	SPEC	SPS hyperon beam
0.68 ± 0.22	17	<sup>2</sup> DUCLOS 71	OSPK	

<sup>1</sup>See the separate BOURQUIN 83 values for  $\Gamma(\Lambda e^- \bar{\nu}_e) / \Gamma(\Lambda \pi^-)$  and  $\Gamma(\Sigma^0 e^- \bar{\nu}_e) / \Gamma(\Lambda \pi^-)$  above.

<sup>2</sup>DUCLOS 71 cannot distinguish  $\Sigma^0$ 's from  $\Lambda$ 's. The Cabibbo theory predicts the  $\Sigma^0$  rate is about a factor 6 smaller than the  $\Lambda$  rate.

$$\Gamma(\Sigma^0 \mu^- \bar{\nu}_\mu) / \Gamma(\Lambda \pi^-) \qquad \Gamma_6 / \Gamma_1$$

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

$$\Gamma(\Xi^0 e^- \bar{\nu}_e) / \Gamma_{\text{total}} \qquad \Gamma_7 / \Gamma$$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;2.59 × 10<sup>-4</sup></b>	90	ABLIKIM 21AH	BES3	$J/\psi \rightarrow \Xi \bar{\Xi}$

$$\Gamma(\Xi^0 e^- \bar{\nu}_e) / \Gamma(\Lambda \pi^-) \qquad \Gamma_7 / \Gamma_1$$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<2.3 × 10 <sup>-3</sup>	90	YEH 74	HBC	Effective denom.=1000

$$\Gamma(n \pi^-) / \Gamma(\Lambda \pi^-) \qquad \Gamma_8 / \Gamma_1$$

$\Delta S=2$ . Forbidden in first-order weak interaction.

VALUE (units $10^{-3}$ )	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.019</b>	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	

$$\Gamma(n e^- \bar{\nu}_e) / \Gamma(\Lambda \pi^-) \qquad \Gamma_9 / \Gamma_1$$

$\Delta S=2$ . Forbidden in first-order weak interaction.

VALUE (units $10^{-3}$ )	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b>&lt; 3.2</b>	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	

$\Gamma(n\mu^-\bar{\nu}_\mu)/\Gamma(\Lambda\pi^-)$   $\Gamma_{10}/\Gamma_1$ 
 $\Delta S=2$ . 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

 $\Gamma(p\pi^-\pi^-)/\Gamma(\Lambda\pi^-)$   $\Gamma_{11}/\Gamma_1$ 
 $\Delta S=2$ . 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

 $\Gamma(p\pi^-e^-\bar{\nu}_e)/\Gamma(\Lambda\pi^-)$   $\Gamma_{12}/\Gamma_1$ 
 $\Delta S=2$ . 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

 $\Gamma(p\pi^-\mu^-\bar{\nu}_\mu)/\Gamma(\Lambda\pi^-)$   $\Gamma_{13}/\Gamma_1$ 
 $\Delta S=2$ . 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

 $\Gamma(p\mu^-\mu^-)/\Gamma(\Lambda\pi^-)$   $\Gamma_{14}/\Gamma_1$ 
A  $\Delta L=2$  decay, forbidden by total lepton number conservation.

VALUE (units $10^{-8}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<4.0	90	RAJARAM 05	HYCP	$p$ Cu, 800 GeV

••• We do not use the following data for averages, fits, limits, etc. •••

<3.7  $\times 10^4$  90 <sup>1</sup>LITTENBERG 92B HBC Uses YEH 74 data<sup>1</sup>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  $\Xi^-$ . 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.

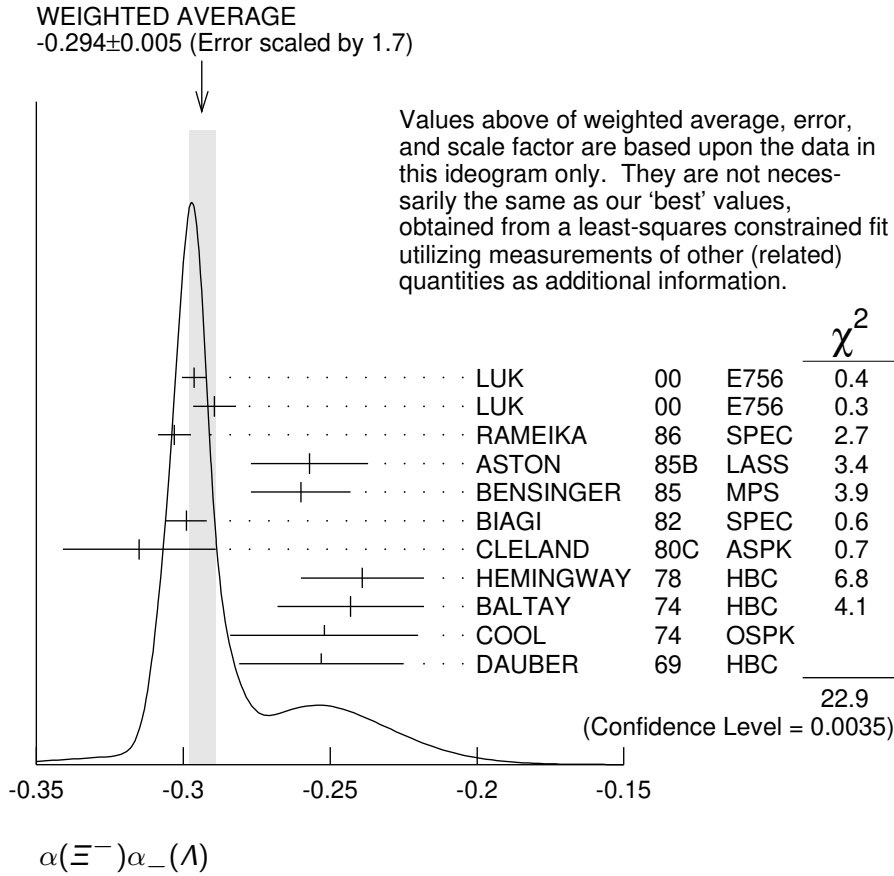
 $\alpha(\Xi^-)\alpha_-(\Lambda)$ 
OUR FIT value is obtained from measurements of  $\alpha(\Xi^-)$ ,  $\alpha_-(\Lambda)$ , and  $\alpha(\Xi^-)\alpha_-(\Lambda)$ .

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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-0.291 ±0.004 **OUR FIT** Error includes scale factor of 1.8.-0.294 ±0.005 **OUR AVERAGE** Error includes scale factor of 1.7. See the ideogram below.

-0.2963 ±0.0042	189k	LUK	00	E756	$p$ Be, 800 GeV
-0.2894 ±0.0073	63k	<sup>1</sup> LUK	00	E756	$p$ Be, 800 GeV
-0.303 ±0.004 ±0.004	192k	RAMEIKA	86	SPEC	400 GeV $p$ Be
-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	

<sup>1</sup>This LUK 00 value is for  $\alpha(\Xi^+) \alpha_+(\bar{\Lambda})$ . We assume  $CP$  conservation here by including it in the average for  $\alpha(\Xi^-) \alpha_-(\Lambda)$ . But see the second data block below for the  $CP$  test.



### $\alpha(\Xi^-)$ for $\Xi^- \rightarrow \Lambda\pi^-$

OUR FIT value is obtained from measurements of  $\alpha(\Xi^-)$ ,  $\alpha_-(\Lambda)$ , and  $\alpha(\Xi^-)\alpha_-(\Lambda)$ .

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>-0.390±0.007 OUR FIT</b>				Error includes scale factor of 2.0.
<b>-0.376±0.007±0.003</b>	73k	ABLIKIM	22AD BES3	$J/\psi \rightarrow \Xi\Xi \rightarrow \Lambda\bar{\Lambda}\pi\pi$
••• We do not use the following data for averages, fits, limits, etc. •••				
-0.344±0.025±0.007	5.4k	ABLIKIM	22BE BES3	$\psi(3686) \rightarrow \Xi\Xi \rightarrow \Lambda\bar{\Lambda}\pi\pi$

### $\alpha(\Xi^+)$ for $\Xi^+ \rightarrow \bar{\Lambda}\pi^+$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.371±0.007±0.002</b>	73k	ABLIKIM	22AD BES3	$J/\psi \rightarrow \Xi\Xi \rightarrow \Lambda\bar{\Lambda}\pi\pi$
••• We do not use the following data for averages, fits, limits, etc. •••				
0.355±0.025±0.002	5.4k	ABLIKIM	22BE BES3	$\psi(3686) \rightarrow \Xi\Xi \rightarrow \Lambda\bar{\Lambda}\pi\pi$

### $(\alpha + \bar{\alpha}) / (\alpha - \bar{\alpha})$ for $\Xi^- \rightarrow \Lambda\pi^-$ , $\Xi^+ \rightarrow \bar{\Lambda}\pi^+$

VALUE (units $10^{-3}$ )	EVTS	DOCUMENT ID	TECN	COMMENT
<b>6±13±6</b>	73k	ABLIKIM	22AD BES3	$J/\psi \rightarrow \Xi\Xi \rightarrow \Lambda\bar{\Lambda}\pi\pi$
••• We do not use the following data for averages, fits, limits, etc. •••				
-15±51±10	5.4k	ABLIKIM	22BE BES3	$\psi(3686) \rightarrow \Xi\Xi \rightarrow \Lambda\bar{\Lambda}\pi\pi$

$$\frac{[\alpha(\Xi^-)\alpha_{-}(\Lambda)-\alpha(\Xi^+)\alpha_{+}(\bar{\Lambda})]}{[\alpha(\Xi^-)\alpha_{-}(\Lambda)+\alpha(\Xi^+)\alpha_{+}(\Lambda)]}$$

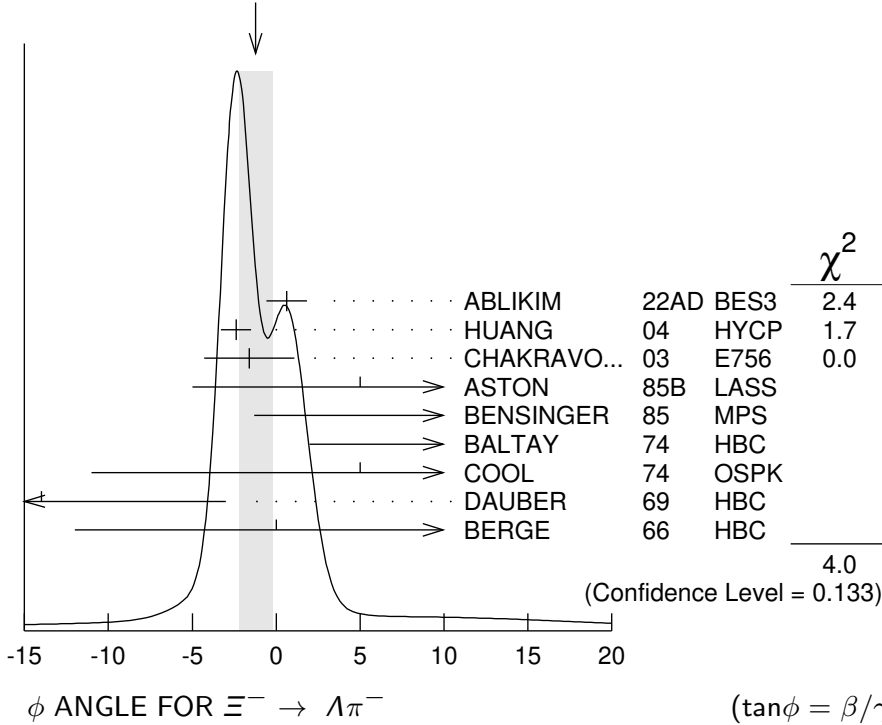
This is zero if  $CP$  is conserved. The  $\alpha$ 's are the decay-asymmetry parameters for  $\Xi^- \rightarrow \Lambda\pi^-$  and  $\Lambda \rightarrow p\pi^-$  and for  $\Xi^+ \rightarrow \bar{\Lambda}\pi^+$  and  $\bar{\Lambda} \rightarrow \bar{p}\pi^+$ .

VALUE (units $10^{-4}$ )	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>0.0 \pm 5.1 \pm 4.4</math></b>	158M	HOLMSTROM 04	HYCP	$p$ Cu, 800 GeV
••• We do not use the following data for averages, fits, limits, etc. •••				
+120 $\pm$ 140	252k	LUK	00 E756	$p$ Be, 800 GeV

**$\phi$  ANGLE FOR  $\Xi^- \rightarrow \Lambda\pi^-$  ( $\tan\phi = \beta/\gamma$ )**

VALUE ( $^\circ$ )	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>-1.2 \pm 1.0</math> OUR AVERAGE</b>				Error includes scale factor of 1.4. See the ideogram below.
$0.63 \pm 1.09 \pm 0.52$	73k	<sup>1</sup> ABLIKIM 22AD BES3		$J/\psi \rightarrow \Xi\bar{\Xi} \rightarrow \Lambda\bar{\Lambda}\pi\pi$
$-2.39 \pm 0.64 \pm 0.64$	144M	<sup>2</sup> HUANG 04 HYCP		$p$ Cu, 800 GeV
$-1.61 \pm 2.66 \pm 0.37$	1.35M	<sup>3</sup> CHAKRAVO... 03 E756		$p$ Be, 800 GeV
$5 \pm 10$	11k	ASTON 85B LASS		$K^- p$
$14.7 \pm 16.0$	21k	<sup>4</sup> BENSINGER 85 MPS		5 GeV/c $K^- p$
$11 \pm 9$	4303	BALTAY 74 HBC		1.75 GeV/c $K^- p$
$5 \pm 16$	2436	COOL 74 OSPK		1.8 GeV/c $K^- p$
$-14 \pm 11$	2781	DAUBER 69 HBC		Uses $\alpha_\Lambda = 0.647 \pm 0.020$
$0 \pm 12$	1004	<sup>5</sup> BERGE 66 HBC		
••• We do not use the following data for averages, fits, limits, etc. •••				
$1.32 \pm 4.24 \pm 0.17$	5.4k	<sup>6</sup> ABLIKIM 22BE BES3		$\psi(3686) \rightarrow \Xi\bar{\Xi} \rightarrow \Lambda\bar{\Lambda}\pi\pi$
$-26 \pm 30$	2724	BINGHAM 70B OSPK		
$0 \pm 20.4$	364	<sup>5</sup> LONDON 66 HBC		Using $\alpha_\Lambda = 0.62$
$54 \pm 30$	356	<sup>5</sup> CARMONY 64B HBC		

WEIGHTED AVERAGE  
 $-1.2 \pm 1.0$  (Error scaled by 1.4)





- <sup>1</sup> Converted from radians to degrees. ABLIKIM 22AD reports a value of  $0.011 \pm 0.019 \pm 0.009$  radians.
- <sup>2</sup> From this result and  $\alpha_{\Xi}$ , HUANG 04 gets  $\beta_{\Xi} = -0.037 \pm 0.011 \pm 0.010$  and  $\gamma_{\Xi} = 0.888 \pm 0.0004 \pm 0.006$ . And the strong p-s phase difference for  $\Lambda\pi^-$  scattering is  $(4.6 \pm 1.4 \pm 1.2)^\circ$ .
- <sup>3</sup> From this result and  $\alpha_{\Xi}$ , CHAKRAVORTY 03 obtains  $\beta_{\Xi} = -0.025 \pm 0.042 \pm 0.006$  and  $\gamma_{\Xi} = 0.889 \pm 0.001 \pm 0.007$ . And the strong p-s phase difference for  $\Lambda\pi^-$  scattering is  $(3.17 \pm 5.28 \pm 0.73)^\circ$ .
- <sup>4</sup> BENSINGER 85 used  $\alpha_{\Lambda} = 0.642 \pm 0.013$ .
- <sup>5</sup> The errors have been multiplied by 1.2 due to approximations used for the  $\Xi$  polarization; see DAUBER 69 for a discussion.
- <sup>6</sup> Converted from radians to degrees. ABLIKIM 22BE reports a value of  $0.023 \pm 0.074 \pm 0.003$  radians.

**$\phi$  ANGLE FOR  $\Xi^+ \rightarrow \bar{\Lambda}\pi^+$  ( $\tan\phi = \beta/\gamma$ )**

VALUE ( $^\circ$ )	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>-1.20 \pm 1.09 \pm 0.40</math></b>	73k	<sup>1</sup> ABLIKIM 22AD	BES3	$J/\psi \rightarrow \Xi\bar{\Xi} \rightarrow \Lambda\bar{\Lambda}\pi\pi$
••• We do not use the following data for averages, fits, limits, etc. •••				
$-7.05 \pm 4.18 \pm 0.23$	5.4k	<sup>2</sup> ABLIKIM 22BE	BES3	$\psi(3686) \rightarrow \Xi\bar{\Xi} \rightarrow \Lambda\bar{\Lambda}\pi\pi$
<sup>1</sup> Converted from radians to degrees. ABLIKIM 22AD reports a value of $-0.021 \pm 0.019 \pm 0.007$ radians.				
<sup>2</sup> Converted from radians to degrees. ABLIKIM 22BE reports a value of $-0.123 \pm 0.073 \pm 0.004$ radians.				

**$\Delta\Phi_{CP} = (\Phi_- + \Phi_+)/2$**

VALUE ( $^\circ$ )	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>-0.28 \pm 0.78 \pm 0.17</math></b>	73k	<sup>1</sup> ABLIKIM 22AD	BES3	$J/\psi \rightarrow \Xi\bar{\Xi} \rightarrow \Lambda\bar{\Lambda}\pi\pi$
••• We do not use the following data for averages, fits, limits, etc. •••				
$-2.86 \pm 2.98 \pm 0.17$	5.4k	<sup>2</sup> ABLIKIM 22BE	BES3	$\psi(3686) \rightarrow \Xi\bar{\Xi} \rightarrow \Lambda\bar{\Lambda}\pi\pi$
<sup>1</sup> Converted from radians to degrees. ABLIKIM 22AD reports a value of $(-0.5 \pm 1.4 \pm 0.3) \times 10^{-2}$ radians.				
<sup>2</sup> Converted from radians to degrees. ABLIKIM 22BE reports a value of $(-5.0 \pm 5.2 \pm 0.3) \times 10^{-2}$ radians.				

**$g_A / g_V$  FOR  $\Xi^- \rightarrow \Lambda e^- \bar{\nu}_e$**

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>-0.25 \pm 0.05</math></b>	1992	<sup>1</sup> BOURQUIN 83	SPEC	SPS hyperon beam
<sup>1</sup> BOURQUIN 83 assumes that $g_2 = 0$ . Also, the sign has been changed to agree with our conventions, given in the "Note on Baryon Decay Parameters" in the neutron Listings.				

**$\Xi^-$  REFERENCES**

We have omitted some papers that have been superseded by later experiments. See our earlier editions.

ABLIKIM 22AD	NAT 606 64	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM 22BE	PR D106 L091101	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM 21AH	PR D104 072007	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABDALLAH 06E	PL B639 179	J. Abdallah <i>et al.</i>	(DELPHI Collab.)
RAJARAM 05	PRL 94 181801	D. Rajaram <i>et al.</i>	(FNAL HyperCP Collab.)
HOLMSTROM 04	PRL 93 262001	T. Holmstrom <i>et al.</i>	(FNAL HyperCP Collab.)
HUANG 04	PRL 93 011802	M. Huang <i>et al.</i>	(FNAL HyperCP Collab.)
CHAKRAVO... 03	PRL 91 031601	A. Chakravorty <i>et al.</i>	(FNAL E756 Collab.)

LUK	00	PRL 85 4860	K.B. Luk <i>et al.</i>	(FNAL E756 Collab.)
DUBBS	94	PRL 72 808	T. Dubbs <i>et al.</i>	(FNAL E761 Collab.)
DURYEA	92	PRL 68 768	J. Duryea <i>et al.</i>	(MINN, FNAL, MICH, RUTG)
LITTENBERG	92B	PR D46 892	L.S. Littenberg, R.E. Shrock	(BNL, STON)
HO	90	PRL 65 1713	P.M. Ho <i>et al.</i>	(MICH, FNAL, MINN, RUTG)
Also		PR D44 3402	P.M. Ho <i>et al.</i>	(MICH, FNAL, MINN, RUTG)
TROST	89	PR D40 1703	L.H. Trost <i>et al.</i>	(FNAL-715 Collab.)
BIAGI	87B	ZPHY C35 143	S.F. Biagi <i>et al.</i>	(BRIS, CERN, GEVA+)
RAMEIKA	86	PR D33 3172	R. Rameika <i>et al.</i>	(RUTG, MICH, WISC+)
ASTON	85B	PR D32 2270	D. Aston <i>et al.</i>	(SLAC, CARL, CNRC, CINC)
BENSINGER	85	NP B252 561	J.R. Bensinger <i>et al.</i>	(CHIC, ELMT, FNAL+)
BOURQUIN	84	NP B241 1	M.H. Bourquin <i>et al.</i>	(BRIS, GEVA, HEIDP+)
RAMEIKA	84	PRL 52 581	R. Rameika <i>et al.</i>	(RUTG, MICH, WISC+)
BOURQUIN	83	ZPHY C21 1	M.H. Bourquin <i>et al.</i>	(BRIS, GEVA, HEIDP+)
BIAGI	82	PL 112B 265	S.F. Biagi <i>et al.</i>	(BRIS, CAVE, GEVA+)
BIAGI	82B	PL 112B 277	S.F. Biagi <i>et al.</i>	(LOQM, GEVA, RL+)
CLELAND	80C	PR D21 12	W.E. Cleland <i>et al.</i>	(PITT, BNL)
THOMPSON	80	PR D21 25	J.A. Thompson <i>et al.</i>	(PITT, BNL)
BOURQUIN	79	PL 87B 297	M.H. Bourquin <i>et al.</i>	(BRIS, GEVA, HEIDP+)
HEMINGWAY	78	NP B142 205	R.J. Hemingway <i>et al.</i>	(CERN, ZEEM, NIJM+)
DIBIANCA	75	NP B98 137	F.A. Dibianca, R.J. Endorf	(CMU)
BALTAY	74	PR D9 49	C. Baltay <i>et al.</i>	(COLU, BING) J
COOL	74	PR D10 792	R.L. Cool <i>et al.</i>	(BNL)
Also		PRL 29 1630	R.L. Cool <i>et al.</i>	(BNL)
YEH	74	PR D10 3545	N. Yeh <i>et al.</i>	(BING, COLU)
MAYEUR	72	NP B47 333	C. Mayeur <i>et al.</i>	(BRUX, CERN, TUFTS, LOUC)
VOTRUBA	72	NP B45 77	M.F. Votruba, A. Safder, T.M. Ratcliffe	(BIRM+)
WILQUET	72	PL 42B 372	G. Wilquet <i>et al.</i>	(BRUX, CERN, TUFTS+)
DUCLOS	71	NP B32 493	J. Duclos <i>et al.</i>	(CERN)
BINGHAM	70B	PR D1 3010	G.M. Bingham <i>et al.</i>	(UCSD, WASH)
GOLDWASSER	70	PR D1 1960	E.L. Goldwasser, P.F. Schultz	(ILL)
STONE	70	PL 32B 515	S.L. Stone <i>et al.</i>	(ROCH)
DAUBER	69	PR 179 1262	P.M. Dauber <i>et al.</i>	(LRL) J
SHEN	67	PL 25B 443	B.C. Shen, A. Firestone, G. Goldhaber	(UCB+)
BERGE	66	PR 147 945	J.P. Berge <i>et al.</i>	(LRL)
CHIEN	66	PR 152 1171	C.Y. Chien <i>et al.</i>	(YALE, BNL)
LONDON	66	PR 143 1034	G.W. London <i>et al.</i>	(BNL, SYRA)
BINGHAM	65	PRSL 285 202	H.H. Bingham	(CERN)
PJERROU	65B	PRL 14 275	G.M. Pjerrou <i>et al.</i>	(UCLA)
Also		Thesis	G.M. Pjerrou	(UCLA)
BADIER	64	Dubna Conf. 1 593	J. Badier <i>et al.</i>	(EPOL, SACL, ZEEM)
CARMONY	64B	PRL 12 482	D.D. Carmony <i>et al.</i>	(UCLA) J
HUBBARD	64	PR 135 B183	J.R. Hubbard <i>et al.</i>	(LRL)
FERRO-LUZZI	63	PR 130 1568	M. Ferro-Luzzi <i>et al.</i>	(LRL)
JAUNEAU	63D	Siena Conf. 4	L. Jauneau <i>et al.</i>	(EPOL, CERN, LOUC+)
Also		PL 5 261	L. Jauneau <i>et al.</i>	(EPOL, CERN, LOUC+)
SCHNEIDER	63	PL 4 360	J. Schneider	(CERN)