



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

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We have omitted some results that have been superseded by later experiments.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  $\Xi^0$  mass and mass difference measurements. It assumes the  $\Xi^-$  and  $\Xi^+$  masses are the same.

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1321.31±0.13 OUR FIT</b>				
<b>1321.34±0.14 OUR AVERAGE</b>				
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  $\Xi^0$  mass and mass difference measurements. It assumes the  $\Xi^-$  and  $\Xi^+$  masses are the same.

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1321.31±0.13 OUR FIT</b>				
<b>1321.20±0.33 OUR AVERAGE</b>				
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. We calculate this from the average  $\Xi^-$  and  $\Xi^+$  masses above.

<u>VALUE</u>	<u>DOCUMENT ID</u>
<b>(1.1±2.7) × 10<sup>-4</sup> OUR EVALUATION</b>	

## $\Xi^-$ 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>				
1.652±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 $\begin{smallmatrix} +0.08 \\ -0.07 \end{smallmatrix}$	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 $\begin{smallmatrix} +0.15 \\ -0.14 \end{smallmatrix}$	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>1.6 ±0.3</b>	34	STONE	70 HBC	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
1.55 $\begin{smallmatrix} +0.35 \\ -0.20 \end{smallmatrix}$	35	<sup>3</sup> VOTRUBA	72 HBC	10 GeV/c $K^+ p$
1.9 $\begin{smallmatrix} +0.7 \\ -0.5 \end{smallmatrix}$	12	<sup>3</sup> SHEN	67 HBC	
1.51±0.55	5	<sup>3</sup> CHIEN	66 HBC	6.9 GeV/c $\bar{p} p$
<sup>3</sup> The error is statistical only.				

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

A test of *CPT* invariance. Calculated from the  $\Xi^-$  and  $\Xi^+$  mean lives, above.

<u>VALUE</u>	<u>DOCUMENT ID</u>
<b>0.02±0.18 OUR EVALUATION</b>	

## $\Xi^-$ MAGNETIC MOMENT

See the "Note on Baryon Magnetic Moments" in the  $\Lambda$  Listings.

<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 DURYEA 92
-2.1 ±0.8	2436	COOL	74	OSPK	1.8 GeV/c K <sup>-</sup> p
-0.1 ±2.1	2724	BINGHAM	70B	OSPK	1.8 GeV/c K <sup>-</sup> p

### $\Xi^+$ MAGNETIC MOMENT

See the "Note on Baryon Magnetic Moments" in the  $\Lambda$  Listings.

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

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

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%
$\Gamma_7$ $\Xi^0 e^-\bar{\nu}_e$	< 2.3 × 10 <sup>-3</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>-4</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>1.27 ± 0.24 OUR FIT</b>					
<b>1.27 ± 0.23 OUR AVERAGE</b>					
1.22 ± 0.23 ± 0.06	211	<sup>4</sup> DUBBS	94 E761	$\Xi^-$ 375 GeV	
2.27 ± 1.02	9	BIAGI	87B SPEC	SPS hyperon beam	

<sup>4</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>0.564 ± 0.031 OUR FIT</b>					
<b>0.564 ± 0.031</b>	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	

$\Gamma(\Lambda \mu^- \bar{\nu}_\mu) / \Gamma(\Lambda \pi^-)$					$\Gamma_4 / \Gamma_1$
VALUE (units $10^{-3}$ )	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.35<sup>+0.35</sup><sub>-0.22</sub> OUR FIT</b>					
<b>0.35 ± 0.35</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	

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

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

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

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<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	

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

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

<sup>5</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>6</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.

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

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt;2.3</b>	90	0	YEH	74 HBC	Effective denom.=1000

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

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

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<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	

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

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

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<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.

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt;15.3</b>	90	0	YEH	74 HBC	Effective denom.=150

$\Gamma(\rho\pi^-\pi^-)/\Gamma(\Lambda\pi^-)$   $\Gamma_{11}/\Gamma_1$

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

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

$\Gamma(\rho\pi^-e^-\bar{\nu}_e)/\Gamma(\Lambda\pi^-)$   $\Gamma_{12}/\Gamma_1$

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

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

$\Gamma(\rho\pi^-\mu^-\bar{\nu}_\mu)/\Gamma(\Lambda\pi^-)$   $\Gamma_{13}/\Gamma_1$

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

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

$\Gamma(\rho\mu^-\mu^-)/\Gamma(\Lambda\pi^-)$   $\Gamma_{14}/\Gamma_1$

A  $\Delta L=2$  decay, forbidden by total lepton number conservation.

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;3.7</b>	90	<sup>7</sup> LITTENBERG	92B	HBC Uses YEH 74 data

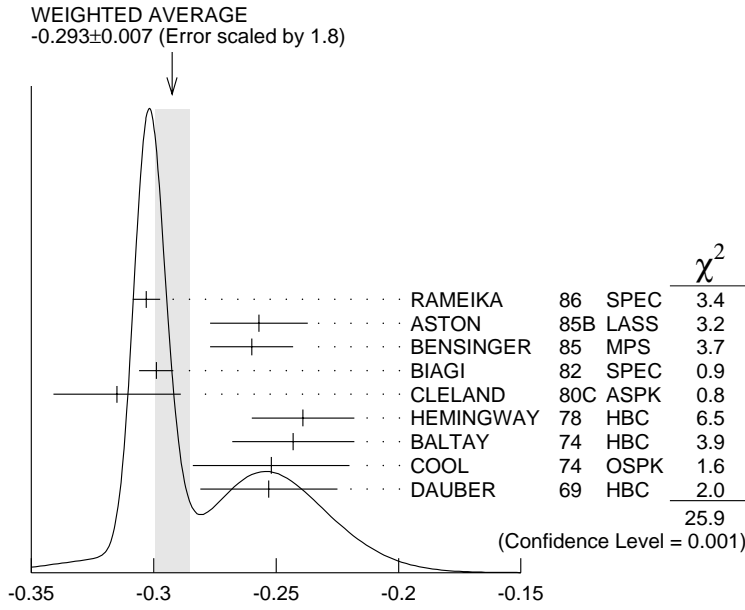
<sup>7</sup>This LITTENBERG 92B limit and the identical YEH 74 limits for the preceding three modes all result from nonobservance of any 3-prong decays of the  $\Xi^-$ . One could as well apply the limit to the *sum* of the four modes.

### $\Xi^-$ DECAY PARAMETERS

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

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>-0.293±0.007 OUR AVERAGE</b>				Error includes scale factor of 1.8. See the ideogram below.
-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



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

### $\alpha$ FOR $\Xi^- \rightarrow \Lambda\pi^-$

The above average,  $\alpha(\Xi^-)\alpha_-(\Lambda) = -0.293 \pm 0.007$ , where the error includes a scale factor of 1.8, divided by our current average  $\alpha_-(\Lambda) = 0.642 \pm 0.013$ , gives the following value for  $\alpha(\Xi^-)$ .

<u>VALUE</u>	<u>DOCUMENT ID</u>
<b><math>-0.456 \pm 0.014</math> OUR EVALUATION</b>	Error includes scale factor of 1.8.

### $\phi$ ANGLE FOR $\Xi^- \rightarrow \Lambda\pi^-$

$$(\tan\phi = \beta/\gamma)$$

<u>VALUE (<math>^\circ</math>)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>4 \pm 4</math> OUR AVERAGE</b>				
$5 \pm 10$	11k	ASTON	85B LASS	$K^- p$
$14.7 \pm 16.0$	21k	<sup>8</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 $K^- p$
$-26 \pm 30$	2724	BINGHAM	70B OSPK	
$-14 \pm 11$	2781	DAUBER	69 HBC	Uses $\alpha_\Lambda = 0.647 \pm 0.020$
$0 \pm 12$	1004	<sup>9</sup> BERGE	66 HBC	
$0 \pm 20.4$	364	<sup>9</sup> LONDON	66 HBC	Using $\alpha_\Lambda = 0.62$
$54 \pm 30$	356	<sup>9</sup> CARMONY	64B HBC	

<sup>8</sup> BENSINGER 85 used  $\alpha_\Lambda = 0.642 \pm 0.013$ .

<sup>9</sup> The errors have been multiplied by 1.2 due to approximations used for the  $\Xi$  polarization; see DAUBER 69 for a discussion.

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
$-0.25 \pm 0.05$	1992	<sup>10</sup> BOURQUIN	83 SPEC	SPS hyperon beam

<sup>10</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.

DUBBS	94	PRL 72 808	T. Dubbs <i>et al.</i>	(FNAL E761 Collab.)
LURYEA	92	PRL 68 768	J. Duryea <i>et al.</i>	(MINN, FNAL, MICH, RUTG)
LITTENBERG	92B	PR D46 R892	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	91	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. Bensingler <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	72	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	65	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 135B 183	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	63B	PL 5 261	L. Jauneau <i>et al.</i>	(EPOL, CERN, LOUC+)
SCHNEIDER	63	PL 4 360	J. Schneider	(CERN)