CUTKOSKY	80	Toronto Conf. 19	+Forsyth, Babcock, Kelly, Hendrick	(CMU, LBL) IJP
Also	79	PR D20 2839	Cutkosky, Forsyth, Hendrick, Kelly	(CMU, LBL) IJP
LIVANOS	80	Toronto Conf. 35	+Baton, Coutures, Kochowski, Neveu	(SACL) IJP
SAXON	80	NP B162 522	+Baker, Bell, Blissett, Bloodworth+	(RHEL, BRIS) IJP
BAKER	79	NP B156 93	+Brown, Clark, Davies, Depagter, Evans+	(RHEL) IJP
HOEHLER	79	PDAT 12-1	+Kaiser, Koch, Pietarinen	(KARLT) IJP
Also	80	Toronto Conf. 3	Koch	(KARLT) IJP
BAKER	78	NP B141 29	+Blissett, Bloodworth, Broome+	(RL, CAVE) IJP
BARBOUR	78	NP B141 253	+Crawford, Parsons	(GLAS)
LONGACRE	78	PR D17 1795	+Lasinski, Rosenfeld, Smadja+	(LBL, SLAC)
BAKER	77	NP B126 365	+Blissett, Bloodworth, Broome, Hart+	(RHEL) IJP
LONGACRE	77	NP B122 493	+Dolbeau	(SACL) IJP
Also	76	NP B108 365	Dolbeau, Triantis, Neveu, Cadiet	(SACL) IJP
FELLER	76	NP B104 219	+Fukushima, Horikawa, Kajikawa+	(NAGO, OSAK) IJP
DEANS	75	NP B96 90	+Mitchell, Montgomery+	(SFLA, ALAH) IJP
FELTESSE	75	NP B93 242	+Ayed, Bareyre, Borgeaud, David+	(SACL) IJP
KNASEL	75	PR D11 1	+Lindquist, Nelson+	(CHIC, WUSL, OSU, ANL) IJP
LONGACRE	75	PL 55B 415	+Rosenfeld, Lasinski, Smadja+	(LBL, SLAC) IJP

$N(1720)$ P_{13}

$I(J^P) = \frac{1}{2}(\frac{3}{2}^+)$ Status: ∗∗∗∗

Most of the results published before 1975 are now obsolete and have been omitted. They may be found in our 1982 edition, Physics Letters **111B** (1982).

$N(1720)$ MASS

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1650 to 1750 (≈ 1720) OUR ESTIMATE				
1717±31	MANLEY	92	IPWA	$\pi N \to \pi N$ & $N\pi\pi$
1700±50	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
1710±20	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1720	LI	93	IPWA	$\gamma N \to \pi N$
1785	CRAWFORD	80	DPWA	$\gamma N \to \pi N$
1690	SAXON	80	DPWA	$\pi^- p \to \Lambda K^0$
1710 to 1790	BAKER	78	DPWA	$\pi^- p \to \Lambda K^0$
1809	BARBOUR	78	DPWA	$\gamma N \to \pi N$
1640±10	[1] BAKER	77	IPWA	$\pi^- p \to \Lambda K^0$
1710	[1] BAKER	77	DPWA	$\pi^- p \to \Lambda K^0$
1750	[2] LONGACRE	77	IPWA	$\pi N \to N\pi\pi$
1850	KNASEL	75	DPWA	$\pi^- p \to \Lambda K^0$
1720	[3] LONGACRE	75	IPWA	$\pi N \to N\pi\pi$

$N(1720)$ WIDTH

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
100 to 200 (≈ 150) OUR ESTIMATE				
380±180	MANLEY	92	IPWA	$\pi N \to \pi N$ & $N\pi\pi$
125± 70	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
190± 30	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
200	LI	93	IPWA	$\gamma N \to \pi N$
308	CRAWFORD	80	DPWA	$\gamma N \to \pi N$
120	SAXON	80	DPWA	$\pi^- p \to \Lambda K^0$
447	BAKER	79	DPWA	$\pi^- p \to n\eta$
300 to 400	BAKER	78	DPWA	$\pi^- p \to \Lambda K^0$
285	BARBOUR	78	DPWA	$\gamma N \to \pi N$
200± 50	[1] BAKER	77	IPWA	$\pi^- p \to \Lambda K^0$
500	[1] BAKER	77	DPWA	$\pi^- p \to \Lambda K^0$
130	[2] LONGACRE	77	IPWA	$\pi N \to N\pi\pi$
327	KNASEL	75	DPWA	$\pi^- p \to \Lambda K^0$
150	[3] LONGACRE	75	IPWA	$\pi N \to N\pi\pi$

$N(1720)$ POLE POSITION

REAL PART

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1686	[4] HOEHLER	93	SPED	$\pi N \to \pi N$
1675	ARNDT	91	DPWA	$\pi N \to \pi N$ Soln SM90
1680±30	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1705	ARNDT	85	DPWA	See ARNDT 91
1716 or 1716	[5] LONGACRE	78	IPWA	$\pi N \to N\pi\pi$
1745 or 1748	[2] LONGACRE	77	IPWA	$\pi N \to N\pi\pi$

−2×IMAGINARY PART

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
187	[4] HOEHLER	93	SPED	$\pi N \to \pi N$
114	ARNDT	91	DPWA	$\pi N \to \pi N$ Soln SM90
120±40	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
80	ARNDT	85	DPWA	See ARNDT 91
124 or 126	[5] LONGACRE	78	IPWA	$\pi N \to N\pi\pi$
135 or 123	[2] LONGACRE	77	IPWA	$\pi N \to N\pi\pi$

$N(1720)$ ELASTIC POLE RESIDUE

MODULUS $|r|$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
15	HOEHLER	93	SPED	$\pi N \to \pi N$
11	ARNDT	91	DPWA	$\pi N \to \pi N$ Soln SM90
8±2	CUTKOSKY	80	IPWA	$\pi N \to \pi N$

PHASE θ

VALUE (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
−130	ARNDT	91	DPWA	$\pi N \to \pi N$ Soln SM90
−160±30	CUTKOSKY	80	IPWA	$\pi N \to \pi N$

$N(1720)$ DECAY MODES

The following branching fractions are our estimates, not fits or averages.

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\pi$	10–20 %
Γ_2	$N\eta$	
Γ_3	ΛK	1–15 %
Γ_4	ΣK	
Γ_5	$N\pi\pi$	>70 %
Γ_6	$\Delta\pi$	
Γ_7	$\Delta(1232)\pi$, P-wave	
Γ_8	$N\rho$	70–85 %
Γ_9	$N\rho$, S=1/2, P-wave	
Γ_{10}	$N\rho$, S=3/2, P-wave	
Γ_{11}	$N(\pi\pi)^{I=0}_{S\text{-wave}}$	
Γ_{12}	$p\gamma$	0.01–0.06 %
Γ_{13}	$p\gamma$, helicity=1/2	
Γ_{14}	$p\gamma$, helicity=3/2	
Γ_{15}	$n\gamma$	
Γ_{16}	$n\gamma$, helicity=1/2	
Γ_{17}	$n\gamma$, helicity=3/2	

$N(1720)$ BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{\text{total}}$ — Γ_1/Γ

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.10 to 0.20 OUR ESTIMATE				
0.13±0.05	MANLEY	92	IPWA	$\pi N \to \pi N$ & $N\pi\pi$
0.10±0.04	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
0.14±0.03	HOEHLER	79	IPWA	$\pi N \to \pi N$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\pi \to N(1720) \to N\eta$ — $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.08	BAKER	79	DPWA	$\pi^- p \to n\eta$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\pi \to N(1720) \to \Lambda K$ — $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
−0.14 to −0.06 OUR ESTIMATE				
−0.09	BELL	83	DPWA	$\pi^- p \to \Lambda K^0$
−0.11	SAXON	80	DPWA	$\pi^- p \to \Lambda K^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.09	[6] BAKER	78	DPWA	See SAXON 80
−0.06±0.02	[1] BAKER	77	IPWA	$\pi^- p \to \Lambda K^0$
−0.09	[1] BAKER	77	DPWA	$\pi^- p \to \Lambda K^0$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\pi \to N(1720) \to \Sigma K$ — $(\Gamma_1\Gamma_4)^{1/2}/\Gamma$

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.051 to 0.087	[7] DEANS	75	DPWA	$\pi N \to \Sigma K$

Note: Signs of couplings from $\pi N \to N\pi\pi$ analyses were changed in the 1986 edition to agree with the baryon-first convention; the overall phase ambiguity is resolved by choosing a negative sign for the $\Delta(1620)$ S_{31} coupling to $\Delta(1232)\pi$.

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\pi \to N(1720) \to \Delta(1232)\pi$, P-wave — $(\Gamma_1\Gamma_7)^{1/2}/\Gamma$

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
±0.27 to ±0.37 OUR ESTIMATE				
−0.17	[2] LONGACRE	77	IPWA	$\pi N \to N\pi\pi$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\pi \to N(1720) \to N\rho$, S=1/2, P-wave — $(\Gamma_1\Gamma_9)^{1/2}/\Gamma$

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
+0.34±0.05	MANLEY	92	IPWA	$\pi N \to \pi N$ & $N\pi\pi$
−0.26	[2] LONGACRE	77	IPWA	$\pi N \to N\pi\pi$
+0.40	[3] LONGACRE	75	IPWA	$\pi N \to N\pi\pi$