N BARYONS
($S = 0$, $I = 1/2$)

p, $N^+ = uud$; n, $N^0 = udd$

NODE=BXXX005

p

$I(J^P) = \frac{1}{2}(\frac{1}{2}^+)$

NODE=S016

Mass $m = 1.0072764665789 \pm 0.0000000000083$ u NODE=S016AMU;DTYPE=M;OUR EVAL; → UNCHECKED ←

Mass $m = 938.27208943 \pm 0.00000029$ MeV [a] NODE=S016M;DTYPE=M;OUR EVAL; → UNCHECKED ←

$|m_p - m_{\overline{p}}|/m_p < 7 \times 10^{-10}$, CL = 90% [b] NODE=S016DM;DTYPE=z

$|\frac{q_{\overline{p}}}{m_{\overline{p}}}|/(\frac{q_p}{m_p}) = 1.000000000003 \pm 0.000000000016$ NODE=S016CMR;DTYPE=A

$|q_p + q_{\overline{p}}|/e < 7 \times 10^{-10}$, CL = 90% [b] NODE=S016DQ2;DTYPE=Y

$|q_p + q_e|/e < 1 \times 10^{-21}$ [c] NODE=S016DQ;DTYPE=Y

Magnetic moment $\mu = 2.7928473446 \pm 0.0000000008$ μ_N NODE=S016MM;DTYPE=m

$(\mu_p + \mu_{\overline{p}}) / \mu_p = (0.002 \pm 0.004) \times 10^{-6}$ NODE=S016MMD;DTYPE=x

Electric dipole moment $d < 0.021 \times 10^{-23}$ $e$cm NODE=S016EDM;DTYPE=e

Electric polarizability $\alpha = (11.5 \pm 0.4) \times 10^{-4}$ fm^3 (S = 1.1) NODE=S016EPL;DTYPE=A

Magnetic polarizability $\beta = (2.31 \pm 0.29) \times 10^{-4}$ fm^3 (S = 1.1) NODE=S016MPL;DTYPE=k

p SPIN POLARIZABILITY $\gamma_{E1E1} = (-3.0 \pm 0.7) \times 10^{-4}$ fm^4 NODE=S016A00;DTYPE=k

p SPIN POLARIZABILITY $\gamma_{M1M1} = (3.7 \pm 0.5) \times 10^{-4}$ fm^4 NODE=S016A01;DTYPE=k

p SPIN POLARIZABILITY $\gamma_{E1M2} = (-1.2 \pm 1.0) \times 10^{-4}$ fm^4 NODE=S016A02;DTYPE=k

p SPIN POLARIZABILITY $\gamma_{M1E2} = (2.0 \pm 0.8) \times 10^{-4}$ fm^4 NODE=S016A03;DTYPE=k

Charge radius, μp Lamb shift = 0.84075 ± 0.00064 fm [d] NODE=S016CRE;DTYPE=r;OUR EVAL; → UNCHECKED ←

Charge radius = 0.8407 ± 0.0006 fm [d] NODE=S016CR;DTYPE=r

Magnetic radius = 0.851 ± 0.026 fm [e] NODE=S016MCR;DTYPE=r

Mean life $\tau > 9 \times 10^{29}$ years, CL = 90% ($p \rightarrow$ invisible mode) NODE=S016T;DTYPE=T

See the "Note on Nucleon Decay" in our 1994 edition (Phys. Rev. **D50**, 1173) for a short review. NODE=S016225;NODE=S016

The "partial mean life" limits tabulated here are the limits on τ/B_i, where τ is the total mean life and B_i is the branching fraction for the mode in question. For N decays, p and n indicate proton and neutron partial lifetimes.

p DECAY MODES	Partial mean life (10^{30} years)	Confidence level	p (MeV/c)	
Antilepton + meson				NODE=S016;CLUMP=B
$N \rightarrow e^+ \pi$	> 5300 (n), > 24000 (p)	90%	459	DESIG=6;OUR LIM;→ UNCHECKED ←
$N \rightarrow \mu^+ \pi$	> 3500 (n), > 16000 (p)	90%	453	DESIG=7;OUR LIM;→ UNCHECKED ←
$N \rightarrow \nu \pi$	> 1100 (n), > 390 (p)	90%	459	DESIG=10;OUR LIM;→ UNCHECKED ←
$p \rightarrow e^+ \eta$	> 10000	90%	309	DESIG=22;OUR LIM;→ UNCHECKED ←
$p \rightarrow \mu^+ \eta$	> 4700	90%	297	DESIG=23;OUR LIM;→ UNCHECKED ←
$n \rightarrow \nu \eta$	> 158	90%	310	DESIG=24;OUR LIM;→ UNCHECKED ←
$N \rightarrow e^+ \rho$	> 217 (n), > 720 (p)	90%	149	DESIG=14;OUR LIM;→ UNCHECKED ←
$N \rightarrow \mu^+ \rho$	> 228 (n), > 570 (p)	90%	113	DESIG=15;OUR LIM;→ UNCHECKED ←
$N \rightarrow \nu \rho$	> 19 (n), > 162 (p)	90%	149	DESIG=25;OUR LIM;→ UNCHECKED ←
$p \rightarrow e^+ \omega$	> 1600	90%	143	DESIG=12;OUR LIM;→ UNCHECKED ←
$p \rightarrow \mu^+ \omega$	> 2800	90%	105	DESIG=13;OUR LIM;→ UNCHECKED ←
$n \rightarrow \nu \omega$	> 108	90%	144	DESIG=26;OUR LIM;→ UNCHECKED ←
$N \rightarrow e^+ K$	> 17 (n), > 1000 (p)	90%	339	DESIG=8;OUR LIM;→ UNCHECKED ←
$N \rightarrow \mu^+ K$	> 26 (n), > 4500 (p)	90%	329	DESIG=9;OUR LIM;→ UNCHECKED ←
$N \rightarrow \nu K$	> 86 (n), > 5900 (p)	90%	339	DESIG=11;OUR LIM;→ UNCHECKED ←
$n \rightarrow \nu K^0_S$	> 1560	90%	338	DESIG=99;OUR LIM;→ UNCHECKED ←
$p \rightarrow e^+ K^*(892)^0$	> 84	90%	45	DESIG=34;OUR LIM;→ UNCHECKED ←
$N \rightarrow \nu K^*(892)$	> 78 (n), > 51 (p)	90%	45	DESIG=18;OUR LIM;→ UNCHECKED ←

Antilepton + mesons				NODE=S016;CLUMP=E
$p \rightarrow e^+ \pi^+ \pi^-$	> 82	90%	448	DESIG=56;OUR LIM;→ UNCHECKED ←
$p \rightarrow e^+ \pi^0 \pi^0$	> 147	90%	449	DESIG=57;OUR LIM;→ UNCHECKED ←
$n \rightarrow e^+ \pi^- \pi^0$	> 52	90%	449	DESIG=58;OUR LIM;→ UNCHECKED ←
$p \rightarrow \mu^+ \pi^+ \pi^-$	> 133	90%	425	DESIG=48;OUR LIM;→ UNCHECKED ←
$p \rightarrow \mu^+ \pi^0 \pi^0$	> 101	90%	427	DESIG=59;OUR LIM;→ UNCHECKED ←
$n \rightarrow \mu^+ \pi^- \pi^0$	> 74	90%	427	DESIG=60;OUR LIM;→ UNCHECKED ←
$n \rightarrow e^+ K^0 \pi^-$	> 18	90%	319	DESIG=61;OUR LIM;→ UNCHECKED ←
Lepton + meson				NODE=S016;CLUMP=F
$n \rightarrow e^- \pi^+$	> 65	90%	459	DESIG=29;OUR LIM;→ UNCHECKED ←
$n \rightarrow \mu^- \pi^+$	> 49	90%	453	DESIG=30;OUR LIM;→ UNCHECKED ←
$n \rightarrow e^- \rho^+$	> 62	90%	150	DESIG=31;OUR LIM;→ UNCHECKED ←
$n \rightarrow \mu^- \rho^+$	> 7	90%	115	DESIG=32;OUR LIM;→ UNCHECKED ←
$n \rightarrow e^- K^+$	> 32	90%	340	DESIG=33;OUR LIM;→ UNCHECKED ←
$n \rightarrow \mu^- K^+$	> 57	90%	330	DESIG=35;OUR LIM;→ UNCHECKED ←
Lepton + mesons				NODE=S016;CLUMP=G
$p \rightarrow e^- \pi^+ \pi^+$	> 30	90%	448	DESIG=47;OUR LIM;→ UNCHECKED ←
$n \rightarrow e^- \pi^+ \pi^0$	> 29	90%	449	DESIG=39;OUR LIM;→ UNCHECKED ←
$p \rightarrow \mu^- \pi^+ \pi^+$	> 17	90%	425	DESIG=49;OUR LIM;→ UNCHECKED ←
$n \rightarrow \mu^- \pi^+ \pi^0$	> 34	90%	427	DESIG=40;OUR LIM;→ UNCHECKED ←
$p \rightarrow e^- \pi^+ K^+$	> 75	90%	320	DESIG=41;OUR LIM;→ UNCHECKED ←
$p \rightarrow \mu^- \pi^+ K^+$	> 245	90%	279	DESIG=42;OUR LIM;→ UNCHECKED ←
Antilepton + photon(s)				NODE=S016;CLUMP=C
$p \rightarrow e^+ \gamma$	> 670	90%	469	DESIG=3;OUR LIM;→ UNCHECKED ←
$p \rightarrow \mu^+ \gamma$	> 478	90%	463	DESIG=4;OUR LIM;→ UNCHECKED ←
$n \rightarrow \nu \gamma$	> 550	90%	470	DESIG=5;OUR LIM;→ UNCHECKED ←
$p \rightarrow e^+ \gamma \gamma$	> 100	90%	469	DESIG=54;OUR LIM;→ UNCHECKED ←
$n \rightarrow \nu \gamma \gamma$	> 219	90%	470	DESIG=93;OUR LIM;→ UNCHECKED ←
Antilepton + single massless				NODE=S016;CLUMP=H
$p \rightarrow e^+ X$	> 790	90%	–	DESIG=194;OUR LIM;→ UNCHECKED ←
$p \rightarrow \mu^+ X$	> 410	90%	–	DESIG=195;OUR LIM;→ UNCHECKED ←
Three (or more) leptons				NODE=S016;CLUMP=D
$p \rightarrow e^+ e^+ e^-$	> 34000	90%	469	DESIG=16;OUR LIM;→ UNCHECKED ←
$p \rightarrow e^+ \mu^+ \mu^-$	> 9200	90%	457	DESIG=45;OUR LIM;→ UNCHECKED ←
$p \rightarrow e^+ \nu \nu$	> 170	90%	469	DESIG=36;OUR LIM;→ UNCHECKED ←
$n \rightarrow e^+ e^- \nu$	> 257	90%	470	DESIG=27;OUR LIM;→ UNCHECKED ←
$n \rightarrow \mu^+ e^- \nu$	> 83	90%	464	DESIG=37;OUR LIM;→ UNCHECKED ←
$n \rightarrow \mu^+ \mu^- \nu$	> 79	90%	458	DESIG=28;OUR LIM;→ UNCHECKED ←
$p \rightarrow \mu^+ e^+ e^-$	> 23000	90%	463	DESIG=55;OUR LIM;→ UNCHECKED ←
$p \rightarrow \mu^- e^+ e^+$	> 19000	90%	463	DESIG=196;OUR LIM;→ UNCHECKED ←
$p \rightarrow \mu^+ \mu^+ \mu^-$	> 10000	90%	439	DESIG=17;OUR LIM;→ UNCHECKED ←
$p \rightarrow \mu^+ \nu \nu$	> 220	90%	463	DESIG=38;OUR LIM;→ UNCHECKED ←
$p \rightarrow e^- \mu^+ \mu^+$	> 11000	90%	457	DESIG=46;OUR LIM;→ UNCHECKED ←
$n \rightarrow 3\nu$	$> 5 \times 10^{-4}$	90%	470	DESIG=21;OUR LIM;→ UNCHECKED ←
Inclusive modes				NODE=S016;CLUMP=A
$N \rightarrow e^+$ anything	> 0.6 (n, p)	90%	–	DESIG=1;OUR LIM;→ UNCHECKED ←
$N \rightarrow \mu^+$ anything	> 12 (n, p)	90%	–	DESIG=2;OUR LIM;→ UNCHECKED ←
$N \rightarrow e^+ \pi^0$ anything	> 0.6 (n, p)	90%	–	DESIG=19;OUR LIM;→ UNCHECKED ←

$\Delta B = 2$ dinucleon modes

NODE=S016;CLUMP=I

The following are lifetime limits per iron nucleus.

NODE=S016

$pp \to \pi^+\pi^+$	> 72.2	90%	–	DESIG=62;OUR LIM;→ UNCHECKED ←
$pn \to \pi^+\pi^0$	> 170	90%	–	DESIG=63;OUR LIM;→ UNCHECKED ←
$nn \to \pi^+\pi^-$	> 0.7	90%	–	DESIG=64;OUR LIM;→ UNCHECKED ←
$nn \to \pi^0\pi^0$	> 404	90%	–	DESIG=65;OUR LIM;→ UNCHECKED ←
$pp \to K^+K^+$	> 170	90%	–	DESIG=193;OUR LIM;→ UNCHECKED ←
$pp \to e^+e^+$	> 5.8	90%	–	DESIG=66;OUR LIM;→ UNCHECKED ←
$pp \to e^+\mu^+$	> 3.6	90%	–	DESIG=67;OUR LIM;→ UNCHECKED ←
$pp \to \mu^+\mu^+$	> 1.7	90%	–	DESIG=68;OUR LIM;→ UNCHECKED ←
$pn \to e^+\overline{\nu}$	> 260	90%	–	DESIG=69;OUR LIM;→ UNCHECKED ←
$pn \to \mu^+\overline{\nu}$	> 200	90%	–	DESIG=70;OUR LIM;→ UNCHECKED ←
$pn \to \tau^+\overline{\nu}_\tau$	> 29	90%	–	DESIG=192;OUR LIM;→ UNCHECKED ←
$nn \to$ invisible	> 1.4	90%	–	DESIG=199;OUR LIM;→ UNCHECKED ←
$nn \to \nu_e\overline{\nu}_e$	> 1.4	90%	–	DESIG=71;OUR LIM;→ UNCHECKED ←
$nn \to \nu_\mu\overline{\nu}_\mu$	> 1.4	90%	–	DESIG=72;OUR LIM;→ UNCHECKED ←
$pn \to$ invisible	> 0.06	90%	–	DESIG=101;OUR LIM;→ UNCHECKED ←
$pp \to$ invisible	> 0.11	90%	–	DESIG=100;OUR LIM;→ UNCHECKED ←

$\overline{p}$ DECAY MODES

NODE=S016;CLUMP=M
NODE=S016

$\overline{p}$ DECAY MODES	Partial mean life (years)	Confidence level	p (MeV/c)	
$\overline{p} \to e^-\gamma$	$> 7 \times 10^5$	90%	469	DESIG=81;OUR LIM;→ UNCHECKED ←
$\overline{p} \to \mu^-\gamma$	$> 5 \times 10^4$	90%	463	DESIG=87;OUR LIM;→ UNCHECKED ←
$\overline{p} \to e^-\pi^0$	$> 4 \times 10^5$	90%	459	DESIG=82;OUR LIM;→ UNCHECKED ←
$\overline{p} \to \mu^-\pi^0$	$> 5 \times 10^4$	90%	453	DESIG=88;OUR LIM;→ UNCHECKED ←
$\overline{p} \to e^-\eta$	$> 2 \times 10^4$	90%	309	DESIG=83;OUR LIM;→ UNCHECKED ←
$\overline{p} \to \mu^-\eta$	$> 8 \times 10^3$	90%	297	DESIG=89;OUR LIM;→ UNCHECKED ←
$\overline{p} \to e^-K^0_S$	> 900	90%	337	DESIG=84;OUR LIM;→ UNCHECKED ←
$\overline{p} \to \mu^-K^0_S$	$> 4 \times 10^3$	90%	326	DESIG=90;OUR LIM;→ UNCHECKED ←
$\overline{p} \to e^-K^0_L$	$> 9 \times 10^3$	90%	337	DESIG=85;OUR LIM;→ UNCHECKED ←
$\overline{p} \to \mu^-K^0_L$	$> 7 \times 10^3$	90%	326	DESIG=91;OUR LIM;→ UNCHECKED ←
$\overline{p} \to e^-\gamma\gamma$	$> 2 \times 10^4$	90%	469	DESIG=94;OUR LIM;→ UNCHECKED ←
$\overline{p} \to \mu^-\gamma\gamma$	$> 2 \times 10^4$	90%	463	DESIG=92;OUR LIM;→ UNCHECKED ←
$\overline{p} \to e^-\omega$	> 200	90%	143	DESIG=96;OUR LIM;→ UNCHECKED ←

n

$I(J^P) = \frac{1}{2}(\frac{1}{2}^+)$

NODE=S017

Mass $m = 1.0086649161 \pm 0.0000000004$ u — NODE=S017AMU;DTYPE=M

Mass $m = 939.5654219 \pm 0.0000005$ MeV [a] — NODE=S017M;DTYPE=M

$(m_n - m_{\overline{n}})/\ m_n = (9 \pm 5) \times 10^{-5}$ — NODE=S017DMM;DTYPE=D;OUR EVAL; → UNCHECKED ←

$m_n - m_p = 1.2933325 \pm 0.0000004$ MeV — NODE=S017D;DTYPE=D

$= 0.0013884495 \pm 0.0000000004$ u

Mean life $\tau = 878.3 \pm 0.4$ s (S = 1.8) — NODE=S017DX;DTYPE=D;OUR EST; → UNCHECKED ← NODE=S017T;DTYPE=T

$c\tau = 2.6332 \times 10^8$ km — NODE=S017CTA;DTYPE=C;OUR EVAL

Magnetic moment $\mu = -1.9130428 \pm 0.0000005\ \mu_N$ — NODE=S017MM;DTYPE=m

Electric dipole moment $d < 0.18 \times 10^{-25}$ $e$cm, CL = 90% — NODE=S017EDM;DTYPE=e

Mean-square charge radius $\langle r_n^2 \rangle = -0.1155 \pm 0.0017$ fm^2 — NODE=S017MCR;DTYPE=r

Magnetic radius $\sqrt{\langle r_M^2 \rangle} = 0.864^{+0.009}_{-0.008}$ fm — NODE=S017MRD;DTYPE=r

Electric polarizability $\alpha = (11.8 \pm 1.1) \times 10^{-4}$ fm^3 — NODE=S017EPL;DTYPE=A

Magnetic polarizability $\beta = (3.7 \pm 1.2) \times 10^{-4}$ fm^3 — NODE=S017MPL;DTYPE=k

Charge $q = (-0.2 \pm 0.8) \times 10^{-21}$ e — NODE=S017Q;DTYPE=Y

Mean $n\overline{n}$-oscillation time $> 8.6 \times 10^7$ s, CL = 90% (free n) — NODE=S017NAN;DTYPE=N

Mean $n\overline{n}$-oscillation time $> 4.7 \times 10^8$ s, CL = 90% [f] (bound n) — NODE=S017NAX;DTYPE=N;OUR LIM; → UNCHECKED ←

Mean nn'-oscillation time > 448 s, CL = 90% [g] — NODE=S017NOS;DTYPE=o

$pe^-\nu_e$ decay parameters [h]

CLUMP=D

$\lambda \equiv g_A / g_V = -1.2753 \pm 0.0013$ (S = 2.7)

NODE=S017AV;DTYPE=d;CLUMP=D

$A = -0.11958 \pm 0.00021$ (S = 1.2)

NODE=S017BA;DTYPE=d;CLUMP=D

$B = 0.9807 \pm 0.0030$

NODE=S017NA;DTYPE=d;CLUMP=D

$C = -0.2377 \pm 0.0026$

NODE=S017APC;DTYPE=d;CLUMP=D

$a = -0.1044 \pm 0.0007$

NODE=S017BNC;DTYPE=d;CLUMP=D

$\phi_{AV} = (180.017 \pm 0.026)^\circ$ [i]

NODE=S017F;DTYPE=d;CLUMP=D

$D = (-1.2 \pm 2.0) \times 10^{-4}$ [j]

NODE=S017D1;DTYPE=d;CLUMP=D

$R = 0.004 \pm 0.013$ [j]

NODE=S017TCC;DTYPE=d;CLUMP=D

Fierz interference term $b = 0.017 \pm 0.020$

NODE=S017A00;DTYPE=d;CLUMP=D

See the proton listings for many other neutron decay modes.

NODE=S017245;NODE=S017

***n* DECAY MODES**		Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)	
$pe^-\overline{\nu}_e$		100 %		1	DESIG=1;OUR EVAL;→ UNCHECKED ←
$pe^-\overline{\nu}_e\gamma$	[k]	$(9.2\pm0.7) \times 10^{-3}$		1	DESIG=4
hydrogen-atom $\overline{\nu}_e$		$< 2.7 \times 10^{-3}$	95%	1.19	DESIG=3
Charge conservation (Q) violating mode					NODE=S017;CLUMP=A
$p\nu_e\overline{\nu}_e$	Q	$< 8 \times 10^{-27}$	68%	1	DESIG=2

$N(1440)\ 1/2^+$

$I(J^P) = \frac{1}{2}(\frac{1}{2}^+)$

NODE=B061

Re(pole position) = 1360 to 1380 (≈ 1370) MeV

NODE=B061RE;DTYPE=i;OUR EST; → UNCHECKED ←

-2Im(pole position) = 180 to 205 (≈ 190) MeV

NODE=B061IM;DTYPE=i;OUR EST; → UNCHECKED ←

Breit-Wigner mass = 1410 to 1470 (≈ 1440) MeV

NODE=B061M;DTYPE=M;OUR EST; → UNCHECKED ←

Breit-Wigner full width = 250 to 450 (≈ 350) MeV

NODE=B061W;DTYPE=G;OUR EST; → UNCHECKED ←

NODE=B061230;NODE=B061

***N*(1440) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	55–75 %	398	DESIG=1;OUR EST
$N\eta$	< 1 %	†	DESIG=2;OUR EST
$N\pi\pi$	17–50 %	347	DESIG=4;OUR EST
$\Delta(1232)\pi$	6–27 %	147	DESIG=5;OUR EST
$N\rho$	(18±6) %	†	DESIG=186
$N\rho$, S=1/2	(9±4) %	†	DESIG=187
$N\rho$, S=3/2	(9±4) %	†	DESIG=188
$N\sigma$	11–23 %	–	DESIG=8;OUR EST
$p\gamma$, helicity=1/2	0.035–0.048 %	414	DESIG=9;OUR EST
$n\gamma$, helicity=1/2	0.02–0.04 %	413	DESIG=10;OUR EST

$N(1520)\ 3/2^-$

$I(J^P) = \frac{1}{2}(\frac{3}{2}^-)$

NODE=B062

Re(pole position) = 1505 to 1515 (≈ 1510) MeV

NODE=B062RE;DTYPE=i;OUR EST; → UNCHECKED ←

-2Im(pole position) = 105 to 120 (≈ 110) MeV

NODE=B062IM;DTYPE=i;OUR EST; → UNCHECKED ←

Breit-Wigner mass = 1510 to 1520 (≈ 1515) MeV

NODE=B062M;DTYPE=M;OUR EST; → UNCHECKED ←

Breit-Wigner full width = 100 to 120 (≈ 110) MeV

NODE=B062W;DTYPE=G;OUR EST; → UNCHECKED ←

NODE=B062225;NODE=B062

***N*(1520) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	55–65 %	453	DESIG=1;OUR EST
$N\eta$	0.07–0.09 %	142	DESIG=2;OUR EST
$N\pi\pi$	25–35 %	410	DESIG=4;OUR EST
$\Delta(1232)\pi$	22–34 %	225	DESIG=181;OUR EST
$\Delta(1232)\pi$, S-wave	15–23 %	225	DESIG=5;OUR EST
$\Delta(1232)\pi$, D-wave	7–11 %	225	DESIG=6;OUR EST
$N\rho$	10–16 %	†	DESIG=186;OUR EVAL
$N\rho$, S=1/2	0.2–0.4 %	†	DESIG=188
$N\rho$, S=3/2 , S-wave	10–16 %	†	DESIG=187
$N\rho$, S=3/2 , D-wave	<1 %	†	DESIG=189
$N\sigma$	<10 %	–	DESIG=10
$p\gamma$	0.31–0.52 %	467	DESIG=184;OUR EST
$p\gamma$, helicity=1/2	0.01–0.02 %	467	DESIG=11;OUR EST
$p\gamma$, helicity=3/2	0.30–0.50 %	467	DESIG=12;OUR EST
$n\gamma$	0.30–0.53 %	466	DESIG=185;OUR EST
$n\gamma$, helicity=1/2	0.04–0.10 %	466	DESIG=13;OUR EST
$n\gamma$, helicity=3/2	0.25–0.45 %	466	DESIG=14;OUR EST

N(1535) 1/2⁻

$I(J^P) = \frac{1}{2}(\frac{1}{2}^-)$

NODE=B063

Re(pole position) = 1500 to 1520 (≈ 1510) MeV
−2Im(pole position) = 80 to 130 (≈ 110) MeV
Breit-Wigner mass = 1515 to 1545 (≈ 1530) MeV
Breit-Wigner full width = 125 to 175 (≈ 150) MeV

NODE=B063RE;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B063IM;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B063M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B063W;DTYPE=G;OUR EST;
→ UNCHECKED ←
NODE=B063225;NODE=B063

***N*(1535) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	32–52 %	464	DESIG=1
$N\eta$	30–55 %	176	DESIG=2
$N\pi\pi$	4–31 %	422	DESIG=4;OUR EST
$\Delta(1232)\pi$	1–4 %	240	DESIG=5
$N\rho$	2–17 %	†	DESIG=188;OUR EST
$N\rho$, S=1/2	2–16 %	†	DESIG=189
$N\rho$, S=3/2	<1 %	†	DESIG=190
$N\sigma$	2–10 %	–	DESIG=8
$N(1440)\pi$	5–12 %	†	DESIG=11
$p\gamma$, helicity=1/2	0.15–0.30 %	477	DESIG=9;OUR EST
$n\gamma$, helicity=1/2	0.01–0.25 %	477	DESIG=10;OUR EST

N(1650) 1/2⁻

$I(J^P) = \frac{1}{2}(\frac{1}{2}^-)$

NODE=B066

Re(pole position) = 1650 to 1680 (≈ 1665) MeV
−2Im(pole position) = 100 to 170 (≈ 135) MeV
Breit-Wigner mass = 1635 to 1665 (≈ 1650) MeV
Breit-Wigner full width = 100 to 150 (≈ 125) MeV

NODE=B066RE;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B066IM;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B066M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B066W;DTYPE=G;OUR EST;
→ UNCHECKED ←

NODE=B066225;NODE=B066

***N*(1650) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	50–70 %	547	DESIG=1;OUR EST
$N\eta$	15–35 %	348	DESIG=2;OUR EST
ΛK	5–15 %	169	DESIG=3;OUR EST
$N\pi\pi$	20–58 %	514	DESIG=5;OUR EST
$\Delta(1232)\pi$	6–18 %	345	DESIG=6;OUR EST
$N\rho$	12–22 %	†	DESIG=188;OUR EST
$N\rho$, S=1/2	<4 %	†	DESIG=189;OUR EST
$N\rho$, S=3/2	12–18 %	†	DESIG=190;OUR EST
$N\sigma$	2–18 %	–	DESIG=9;OUR EST
$N(1440)\pi$	6–26 %	150	DESIG=10;OUR EST
$p\gamma$, helicity=1/2	0.04–0.20 %	558	DESIG=11;OUR EST
$n\gamma$, helicity=1/2	0.003–0.17 %	557	DESIG=12;OUR EST

N(1675) 5/2$^-$

$I(J^P) = \frac{1}{2}(\frac{5}{2}^-)$

NODE=B064

Re(pole position) = 1650 to 1660 ($\approx$ 1655) MeV
-2Im(pole position) = 120 to 150 ($\approx$ 135) MeV
Breit-Wigner mass = 1665 to 1680 ($\approx$ 1675) MeV
Breit-Wigner full width = 130 to 160 ($\approx$ 145) MeV

NODE=B064RE;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B064IM;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B064M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B064W;DTYPE=G;OUR EST;
→ UNCHECKED ←
NODE=B064225;NODE=B064

***N*(1675) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	38–42 %	564	DESIG=1;OUR EST
$N\eta$	< 1 %	376	DESIG=2;OUR EST
ΛK	<0.04 %	216	DESIG=186
$N\pi\pi$	25–45 %	532	DESIG=5;OUR EST
$\Delta(1232)\pi$	(19±4) %	366	DESIG=190
$\Delta(1232)\pi$, D-wave	23–37 %	366	DESIG=6;OUR EST
$N\rho$	0.1–0.9 %	†	DESIG=187;OUR EST
$N\rho$, S=1/2	<0.2 %	†	DESIG=188
$N\rho$, S=3/2 , D-wave	0.1–0.7 %	†	DESIG=189
$N\sigma$	3–7 %	–	DESIG=11;OUR EST
$p\gamma$	0–0.02 %	575	DESIG=184;OUR EST
$p\gamma$, helicity=1/2	0–0.01 %	575	DESIG=13;OUR EST
$p\gamma$, helicity=3/2	0–0.01 %	575	DESIG=14;OUR EST
$n\gamma$	0–0.15 %	574	DESIG=185;OUR EST
$n\gamma$, helicity=1/2	0–0.05 %	574	DESIG=15;OUR EST
$n\gamma$, helicity=3/2	0–0.10 %	574	DESIG=16;OUR EST

N(1680) 5/2$^+$

$I(J^P) = \frac{1}{2}(\frac{5}{2}^+)$

NODE=B065

Re(pole position) = 1660 to 1680 ($\approx$ 1670) MeV
-2Im(pole position) = 110 to 135 ($\approx$ 120) MeV
Breit-Wigner mass = 1680 to 1690 ($\approx$ 1685) MeV
Breit-Wigner full width = 115 to 130 ($\approx$ 120) MeV

NODE=B065RE;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B065IM;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B065M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B065W;DTYPE=G;OUR EST;
→ UNCHECKED ←

NODE=B065225;NODE=B065

***N*(1680) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	60–70 %	571	DESIG=1;OUR EST
$N\eta$	<1 %	386	DESIG=2;OUR EST
$N\pi\pi$	28–53 %	539	DESIG=5
$\Delta(1232)\pi$	11–23 %	374	DESIG=181;OUR EST
$\Delta(1232)\pi$, P-wave	4–10 %	374	DESIG=6;OUR EST
$\Delta(1232)\pi$, F-wave	1–13 %	374	DESIG=7;OUR EST
$N\rho$	8–11 %	†	DESIG=187;OUR EST
$N\rho$, S=3/2 , P-wave	6–8 %	†	DESIG=188
$N\rho$, S=3/2 , F-wave	2–3 %	†	DESIG=189
$N\sigma$	9–19 %	–	DESIG=11;OUR EST
$p\gamma$	0.21–0.32 %	581	DESIG=184;OUR EST
$p\gamma$, helicity=1/2	0.001–0.011 %	581	DESIG=12;OUR EST
$p\gamma$, helicity=3/2	0.20–0.32 %	581	DESIG=13;OUR EST
$n\gamma$	0.021–0.046 %	581	DESIG=185;OUR EST
$n\gamma$, helicity=1/2	0.004–0.029 %	581	DESIG=14;OUR EST
$n\gamma$, helicity=3/2	0.01–0.024 %	581	DESIG=15;OUR EST

N(1700) 3/2$^-$

$I(J^P) = \frac{1}{2}(\frac{3}{2}^-)$

NODE=B018

Re(pole position) = 1650 to 1750 (≈ 1700) MeV
−2Im(pole position) = 100 to 300 (≈ 200) MeV
Breit-Wigner mass = 1650 to 1800 (≈ 1720) MeV
Breit-Wigner full width = 100 to 300 (≈ 200) MeV

NODE=B018RE;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B018IM;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B018M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B018W;DTYPE=G;OUR EST;
→ UNCHECKED ←
NODE=B018225;NODE=B018

***N*(1700) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	7–17 %	594	DESIG=1;OUR EST
$N\eta$	1–2 %	422	DESIG=2
$N\omega$	10–34 %	†	DESIG=186;OUR EST
ΛK	1–2 %	283	DESIG=187
$N\pi\pi$	>89 %	564	DESIG=171;OUR EST
$\Delta(1232)\pi$	55–85 %	402	DESIG=181;OUR EST
$\Delta(1232)\pi$, S-wave	50–80 %	402	DESIG=5;OUR EST
$\Delta(1232)\pi$, D-wave	4–14 %	402	DESIG=6;OUR EST
$N\rho$	(21 ±9) %	75	DESIG=192
$N\rho$, S=1/2	(5.0±3.0) %	75	DESIG=188
$N\rho$, S=3/2 , S-wave	32–44 %	75	DESIG=8;OUR EST
$N\rho$, S=3/2 , D-wave	(16 ±8) %	75	DESIG=189
$N\sigma$	2–14 %	–	DESIG=10;OUR EST
$N(1440)\pi$	3–11 %	225	DESIG=15;OUR EST
$N(1520)\pi$	<4 %	145	DESIG=16;OUR EST
$N(1535)\pi$	< 1 %	126	DESIG=191
$p\gamma$	0.01–0.05 %	604	DESIG=184;OUR EST
$p\gamma$, helicity=1/2	0.0–0.024 %	604	DESIG=11;OUR EST
$p\gamma$, helicity=3/2	0.002–0.026 %	604	DESIG=12;OUR EST
$n\gamma$	0.01–0.13 %	603	DESIG=185;OUR EST
$n\gamma$, helicity=1/2	0.0–0.09 %	603	DESIG=13;OUR EST
$n\gamma$, helicity=3/2	0.01–0.05 %	603	DESIG=14;OUR EST

N(1710) 1/2$^+$

$I(J^P) = \frac{1}{2}(\frac{1}{2}^+)$

NODE=B014

Re(pole position) = 1650 to 1750 (≈ 1700) MeV
−2Im(pole position) = 80 to 160 (≈ 120) MeV
Breit-Wigner mass = 1680 to 1740 (≈ 1710) MeV
Breit-Wigner full width = 80 to 200 (≈ 140) MeV

NODE=B014RE;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B014IM;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B014M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B014W;DTYPE=G;OUR EST;
→ UNCHECKED ←

NODE=B014225;NODE=B014

***N*(1710) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	5–20 %	588	DESIG=1;OUR EST
$N\eta$	10–50 %	412	DESIG=2;OUR EST
$N\omega$	1–5 %	†	DESIG=12;OUR EST
ΛK	5–25 %	269	DESIG=3;OUR EST
ΣK	seen	138	DESIG=4;OUR EST
$N\pi\pi$	14–48 %	557	DESIG=5;OUR EST
$\Delta(1232)\pi$	3–9 %	394	DESIG=6
$N\rho$	(17 ± 4) %	†	DESIG=192
$N\rho$, S=1/2	11–23 %	†	DESIG=7
$N\rho$, S=3/2	(11.0± 3.0) %	†	DESIG=189
$N\sigma$	<16 %	–	DESIG=188
$N(1440)\pi$	(22 ±12) %	215	DESIG=190
$N(1520)\pi$	< 2 %	133	DESIG=191
$N(1535)\pi$	9–21 %	113	DESIG=187;OUR EST
$p\gamma$, helicity=1/2	0.002–0.08 %	598	DESIG=10;OUR EST
$n\gamma$, helicity=1/2	0.0–0.02%	597	DESIG=11;OUR EST

N(1720) 3/2$^+$

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

NODE=B015

Re(pole position) = 1660 to 1710 (≈ 1680) MeV
−2Im(pole position) = 150 to 300 (≈ 200) MeV
Breit-Wigner mass = 1680 to 1750 (≈ 1720) MeV
Breit-Wigner full width = 150 to 400 (≈ 250) MeV

NODE=B015RE;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B015IM;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B015M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B015W;DTYPE=G;OUR EST;
→ UNCHECKED ←
NODE=B015225;NODE=B015

***N*(1720) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	8–14 %	594	DESIG=1;OUR EST
$N\eta$	1–5 %	422	DESIG=2;OUR EST
$N\omega$	12–40 %	†	DESIG=187;OUR EST
ΛK	4–19 %	283	DESIG=3
$N\pi\pi$	>50 %	564	DESIG=5
$\Delta(1232)\pi$	47–89 %	402	DESIG=181;OUR EST
$\Delta(1232)\pi$, P-wave	47–77 %	402	DESIG=6;OUR EST
$\Delta(1232)\pi$, F-wave	<12 %	402	DESIG=14;OUR EST
$N\rho$	(29 ±8) %	75	DESIG=182
$N\rho$, S=1/2	1–2 %	75	DESIG=7;OUR EST
$N\rho$, S=3/2 , P-wave	(17 ±6) %	75	DESIG=188
$N\sigma$	2–14 %	–	DESIG=9;OUR EST
$N(1440)\pi$	<2 %	225	DESIG=15;OUR EST
$N(1520)\pi$, S-wave	1–5 %	145	DESIG=16;OUR EST
$N(1535)\pi$	(4.0±2.0) %	126	DESIG=189
$p\gamma$	0.05–0.25 %	604	DESIG=184;OUR EST
$p\gamma$, helicity=1/2	0.05–0.15 %	604	DESIG=10;OUR EST
$p\gamma$, helicity=3/2	0.002–0.16 %	604	DESIG=11;OUR EST
$n\gamma$	0.0–0.016 %	603	DESIG=185;OUR EST
$n\gamma$, helicity=1/2	0.0–0.01 %	603	DESIG=12;OUR EST
$n\gamma$, helicity=3/2	0.0–0.015 %	603	DESIG=13;OUR EST

N(1875) 3/2$^-$

$I(J^P) = \frac{1}{2}(\frac{3}{2}^-)$

NODE=B016

was $N(2080)$

Re(pole position) = 1850 to 1950 (≈ 1900) MeV
−2Im(pole position) = 100 to 220 (≈ 160) MeV
Breit-Wigner mass = 1850 to 1920 (≈ 1875) MeV
Breit-Wigner full width = 120 to 250 (≈ 200) MeV

NODE=B016RE;DTYPE=p;OUR EST;
→ UNCHECKED ←
NODE=B016IM;DTYPE=p;OUR EST;
→ UNCHECKED ←
NODE=B016M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B016W;DTYPE=G;OUR EST;
→ UNCHECKED ←

***N*(1875) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	3–11 %	695	NODE=B016225;DESIG=1;OUR EST
$N\eta$	3–16 %	559	DESIG=2
$N\omega$	15–25 %	371	DESIG=12;OUR EST
ΛK	1–2 %	454	DESIG=3
ΣK	0.3–1.1 %	384	DESIG=4
$N\pi\pi$	>56 %	670	DESIG=5;OUR EST
$\Delta(1232)\pi$	4–44 %	520	DESIG=14;OUR EST
$\Delta(1232)\pi$, S-wave	2–21 %	520	DESIG=21
$\Delta(1232)\pi$, D-wave	2–23 %	520	DESIG=22
$N\rho$, S=3/2, S-wave	36–56 %	379	DESIG=23
$N\sigma$	16–60 %	–	DESIG=24
$N(1440)\pi$	2–8 %	365	DESIG=11;OUR EST
$N(1520)\pi$	<2 %	301	DESIG=13;OUR EST
$N(1535)\pi$	(2.0±2.0) %	288	DESIG=179
$\Lambda K^*(892)$	<0.2 %	†	DESIG=178
$p\gamma$	0.001–0.025 %	703	DESIG=10;OUR EST
$p\gamma$, helicity=1/2	0.001–0.021 %	703	DESIG=6;OUR EST
$p\gamma$, helicity=3/2	<0.003 %	703	DESIG=7;OUR EST
$n\gamma$	<0.040 %	702	DESIG=15;OUR EST
$n\gamma$, helicity=1/2	<0.007 %	702	DESIG=8;OUR EST
$n\gamma$, helicity=3/2	<0.033 %	702	DESIG=9;OUR EST

$N(1880)\ 1/2^+$

$I(J^P) = \frac{1}{2}(\frac{1}{2}^+)$

NODE=B087

Re(pole position) = 1820 to 1900 (≈ 1860) MeV
−2Im(pole position) = 180 to 280 (≈ 230) MeV
Breit-Wigner mass = 1830 to 1930 (≈ 1880) MeV
Breit-Wigner full width = 200 to 400 (≈ 300) MeV

NODE=B087RE;DTYPE=r;OUR EST;
→ UNCHECKED ←
NODE=B087IM;DTYPE=r;OUR EST;
→ UNCHECKED ←
NODE=B087M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B087W;DTYPE=G;OUR EST;
→ UNCHECKED ←

***N*(1880) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	3–31 %	698	NODE=B087225;DESIG=1
$N\eta$	1–55 %	563	DESIG=2
$N\omega$	12–28 %	377	DESIG=13
ΛK	1–3 %	459	DESIG=3
ΣK	10–24 %	389	DESIG=4
$N\pi\pi$	>32 %	673	DESIG=12;OUR EST
$\Delta(1232)\pi$	5–42 %	524	DESIG=5
$N\rho$	(28 ±7) %	385	DESIG=17
$N\rho$, S=1/2	19–45 %	385	DESIG=15
$N\rho$, S=3/2	(8.0±3.0) %	385	DESIG=16
$N\sigma$	8–40 %	539	DESIG=7
$N(1535)\pi$	4–12 %	293	DESIG=10
$N a_0(980)$	1–5 %	†	DESIG=11
$\Lambda K^*(892)$	0.5–1.1 %	†	DESIG=14
$p\gamma$, helicity=1/2	seen	706	DESIG=8;OUR EST
$n\gamma$, helicity=1/2	0.002–0.63 %	705	DESIG=9;OUR EST

$N(1895)\ 1/2^-$

$I(J^P) = \frac{1}{2}(\frac{1}{2}^-)$

NODE=B004

was $N(2090)$

Re(pole position) = 1890 to 1930 (≈ 1910) MeV
−2Im(pole position) = 80 to 140 (≈ 110) MeV
Breit-Wigner mass = 1870 to 1920 (≈ 1895) MeV
Breit-Wigner full width = 80 to 200 (≈ 120) MeV

NODE=B004RE;DTYPE=r;OUR EST;
→ UNCHECKED ←
NODE=B004IM;DTYPE=r;OUR EST;
→ UNCHECKED ←
NODE=B004M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B004W;DTYPE=G;OUR EST;
→ UNCHECKED ←

***N*(1895) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	2–18 %	707	NODE=B004225;DESIG=1
$N\eta$	15–45 %	575	DESIG=11
$N\eta'$	10–40 %	†	DESIG=17
$N\omega$	16–40 %	395	DESIG=15
ΛK	3–23 %	473	DESIG=2
ΣK	6–20 %	405	DESIG=12
$N\pi\pi$	17–74 %	683	DESIG=3;OUR EST
$\Delta(1232)\pi$	3–11 %	535	DESIG=5
$N\rho$	14–50 %	403	DESIG=6;OUR EST
$N\rho$, S=1/2	<18 %	403	DESIG=7
$N\rho$, S=3/2	14–32 %	403	DESIG=8
$N\sigma$	<13 %	–	DESIG=9
$N(1440)\pi$	2–12 %	382	DESIG=10
$\Lambda K^*(892)$	4–9 %	†	DESIG=16
$p\gamma$, helicity=1/2	0.01–0.06 %	715	DESIG=13;OUR EST
$n\gamma$, helicity=1/2	0.003–0.05 %	715	DESIG=14;OUR EST

***N*(1900) 3/2$^+$**

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

NODE=B144

Re(pole position) = 1900 to 1940 (≈ 1920) MeV NODE=B144RE;DTYPE=p;OUR EST; → UNCHECKED ←
−2Im(pole position) = 90 to 160 (≈ 130) MeV NODE=B144IM;DTYPE=p;OUR EST; → UNCHECKED ←
Breit-Wigner mass = 1890 to 1950 (≈ 1920) MeV NODE=B144M;DTYPE=M;OUR EST; → UNCHECKED ←
Breit-Wigner full width = 100 to 320 (≈ 200) MeV NODE=B144W;DTYPE=G;OUR EST; → UNCHECKED ←

***N*(1900) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	1–20 %	723	NODE=B144215;DESIG=1
$N\eta$	2–14 %	595	DESIG=4;OUR EST
$N\eta'$	4–8 %	151	DESIG=20
$N\omega$	7–13 %	424	DESIG=5;OUR EST
ΛK	2–20 %	495	DESIG=6;OUR EST
ΣK	3–7 %	431	DESIG=7;OUR EST
$N\pi\pi$	>56 %	699	DESIG=2;OUR EST
$\Delta(1232)\pi$	30–70 %	553	DESIG=3;OUR EST
$\Delta(1232)\pi$, P-wave	9–25 %	553	DESIG=18;OUR EST
$\Delta(1232)\pi$, F-wave	21–45 %	553	DESIG=17;OUR EST
$N\rho$	(46 ±13) %	432	DESIG=26
$N\rho$, S=1/2	25–40 %	432	DESIG=22
$N\rho$, S=3/2 , P-wave	(9.0± 3.0) %	432	DESIG=23
$N\rho$, S=3/2 , F-wave	(30 ±12) %	432	DESIG=24
$N\sigma$	1–7 %	–	DESIG=16;OUR EST
$N(1440)\pi$	(9 ± 6) %	403	DESIG=25
$N(1520)\pi$, S-wave	7–23 %	341	DESIG=15;OUR EST
$N(1535)\pi$	4–10 %	328	DESIG=14;OUR EST
$\Lambda K^*(892)$	< 0.2 %	†	DESIG=19
$p\gamma$	0.001–0.025 %	731	DESIG=8;OUR EST
$p\gamma$, helicity=1/2	0.001–0.021 %	731	DESIG=9;OUR EST
$p\gamma$, helicity=3/2	<0.003 %	731	DESIG=10;OUR EST
$n\gamma$	<0.040 %	730	DESIG=11;OUR EST
$n\gamma$, helicity=1/2	<0.007 %	730	DESIG=12;OUR EST
$n\gamma$, helicity=3/2	<0.033 %	730	DESIG=13;OUR EST

***N*(2060) 5/2$^-$**

$I(J^P) = \frac{1}{2}(\frac{5}{2}^-)$

NODE=B005

was $N(2200)$

Re(pole position) = 2020 to 2130 (≈ 2070) MeV NODE=B005RE;DTYPE=r;OUR EST; → UNCHECKED ←
−2Im(pole position) = 350 to 430 (≈ 400) MeV NODE=B005IM;DTYPE=r;OUR EST; → UNCHECKED ←
Breit-Wigner mass = 2030 to 2200 (≈ 2100) MeV NODE=B005M;DTYPE=M;OUR EST; → UNCHECKED ←
Breit-Wigner full width = 300 to 450 (≈ 400) MeV NODE=B005W;DTYPE=G;OUR EST; → UNCHECKED ←

***N*(2060) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	7–12 %	834	NODE=B005225;DESIG=1;OUR EST
$N\eta$	2–38 %	729	DESIG=2
$N\omega$	1–7 %	600	DESIG=21;OUR EST
ΛK	10–20 %	644	DESIG=3
ΣK	1–5 %	593	DESIG=4;OUR EST
$N\pi\pi$	12–52 %	814	DESIG=5;OUR EST
$\Delta(1232)\pi$	(12.0±3.0) %	680	DESIG=26
$\Delta(1232)\pi$, D-wave	4–10 %	680	DESIG=7
$N\rho$	5–33 %	605	DESIG=8;OUR EST
$N\rho$, S=3/2 , D-wave	5–23 %	605	DESIG=23
$N\sigma$	3–9 %	–	DESIG=17;OUR EST
$N(1440)\pi$	4–14 %	544	DESIG=18;OUR EST
$N(1520)\pi$, P-wave	9–21 %	490	DESIG=19;OUR EST
$N(1680)\pi$, S-wave	8–22 %	353	DESIG=20;OUR EST
$\Lambda K^*(892)$	0.3–1.3 %	306	DESIG=22
$p\gamma$	0.03–0.19 %	840	DESIG=11;OUR EST
$p\gamma$, helicity=1/2	0.02–0.08 %	840	DESIG=12;OUR EST
$p\gamma$, helicity=3/2	0.01–0.10 %	840	DESIG=13;OUR EST
$n\gamma$	0.003–0.07 %	840	DESIG=14;OUR EST
$n\gamma$, helicity=1/2	0.001–0.02 %	840	DESIG=15;OUR EST
$n\gamma$, helicity=3/2	0.002–0.05 %	840	DESIG=16;OUR EST

N(2100) 1/2$^+$

$I(J^P) = \frac{1}{2}(\frac{1}{2}^+)$

NODE=B132

Re(pole position) = 2050 to 2150 (≈ 2100) MeV
−2Im(pole position) = 240 to 340 (≈ 300) MeV
Breit-Wigner mass = 2050 to 2150 (≈ 2100) MeV
Breit-Wigner full width = 200 to 320 (≈ 260) MeV

NODE=B132RE;DTYPE=r;OUR EST;
→ UNCHECKED ←
NODE=B132IM;DTYPE=r;OUR EST;
→ UNCHECKED ←
NODE=B132M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B132W;DTYPE=G;OUR EST;
→ UNCHECKED ←

***N*(2100) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	8–32 %	834	NODE=B132225;DESIG=1
$N\eta$	5–45 %	729	DESIG=4
$N\eta'$	5–11 %	451	DESIG=14
$N\omega$	10–25 %	600	DESIG=12
ΛK	<1.0 %	644	DESIG=5
$N\pi\pi$	>55 %	814	DESIG=3;OUR EST
$\Delta(1232)\pi$	6–14 %	680	DESIG=2
$N\rho$	(17 ±6) %	605	DESIG=18
$N\rho$, S=1/2	35–70 %	605	DESIG=6
$N\rho$, S=3/2	(5.0±3.0) %	605	DESIG=16
$N\sigma$	14–35 %	–	DESIG=7
$N(1535)\pi$	26–34 %	478	DESIG=8
$N(1520)\pi$, D-wave	< 2 %	490	DESIG=17
$\Lambda K^*(892)$	3–11 %	306	DESIG=13
$p\gamma$, helicity=1/2	0.001–0.13 %	840	DESIG=11;OUR EST
$n\gamma$, helicity=1/2	0.004–0.09 %	840	DESIG=15;OUR EST

N(2120) 3/2$^-$

$I(J^P) = \frac{1}{2}(\frac{3}{2}^-)$

NODE=B024

Re(pole position) = 2050 to 2150 (≈ 2100) MeV
−2Im(pole position) = 200 to 360 (≈ 280) MeV
Breit-Wigner mass = 2060 to 2160 (≈ 2120) MeV
Breit-Wigner full width = 260 to 360 (≈ 300) MeV

NODE=B024RE;DTYPE=r;OUR EST;
→ UNCHECKED ←
NODE=B024IM;DTYPE=r;OUR EST;
→ UNCHECKED ←
NODE=B024M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B024W;DTYPE=G;OUR EST;
→ UNCHECKED ←

***N*(2120) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	5–15 %	846	NODE=B024225;DESIG=1
$N\eta$	1–5 %	743	DESIG=18
$N\eta'$	2–6 %	474	DESIG=16
$N\omega$	4–20 %	617	DESIG=14
ΛK	6–11 %	660	DESIG=17
$N\pi\pi$	>27 %	827	DESIG=6;OUR EST
$\Delta(1232)\pi$	>23 %	693	DESIG=7;OUR EST
$\Delta(1232)\pi$, S-wave	15–70 %	693	DESIG=4
$\Delta(1232)\pi$, D-wave	8–45 %	693	DESIG=5
$N\rho$	(28 ±6) %	622	DESIG=25
$N\rho$, S=1/2	(4.0±2.0) %	622	DESIG=21
$N\rho$, S=3/2 , S-wave	< 3 %	622	DESIG=20
$N\rho$, S=3/2 , D-wave	(5.0±3.0) %	622	DESIG=22
$N\sigma$	4–15 %	–	DESIG=3
$N(1440)\pi$	(6 ±6) %	559	DESIG=24
$N(1520)\pi$, P-wave	(10 ±5) %	505	DESIG=23
$N(1535)\pi$	7–23 %	494	DESIG=2
$\Lambda K^*(892)$	< 0.2 %	339	DESIG=15
$p\gamma$	0.16–2.1 %	852	DESIG=8;OUR EST
$p\gamma$, helicity=1/2	0.07–0.80 %	852	DESIG=9;OUR EST
$p\gamma$, helicity=3/2	0.09–1.3 %	852	DESIG=10;OUR EST
$n\gamma$	0.04–0.72 %	852	DESIG=11;OUR EST
$n\gamma$, helicity=1/2	0.04–0.60 %	852	DESIG=12;OUR EST
$n\gamma$, helicity=3/2	0.001–0.12 %	852	DESIG=13;OUR EST

***N*(2190) 7/2$^-$**

$I(J^P) = \frac{1}{2}(\frac{7}{2}^-)$

NODE=B071

Re(pole position) = 1950 to 2150 (≈ 2050) MeV
−2Im(pole position) = 300 to 500 (≈ 400) MeV
Breit-Wigner mass = 2140 to 2220 (≈ 2180) MeV
Breit-Wigner full width = 300 to 500 (≈ 400) MeV

NODE=B071RE;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B071IM;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B071M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B071W;DTYPE=G;OUR EST;
→ UNCHECKED ←
NODE=B071225;NODE=B071

***N*(2190) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	10–20 %	882	DESIG=1
$N\eta$	1–5 %	785	DESIG=2
$N\omega$	8–20 %	667	DESIG=178
ΛK	0.2–0.8 %	705	DESIG=3
$N\pi\pi$	22–51 %	864	DESIG=5;OUR EST
$\Delta\pi$	(4.0±2.0) %	734	DESIG=180
$\Delta(1232)\pi$, D-wave	19–31 %	734	DESIG=17
$N\rho$	(8 ±7) %	672	DESIG=181
$N\rho$, S=3/2, D-wave	<11 %	672	DESIG=6
$N\sigma$	3–9 %	–	DESIG=16
$\Lambda K^*(892)$	0.2–0.8 %	423	DESIG=179
$p\gamma$	<0.08 %	888	DESIG=11;OUR EST
$p\gamma$, helicity=1/2	<0.06 %	888	DESIG=7;OUR EST
$p\gamma$, helicity=3/2	<0.02 %	888	DESIG=8;OUR EST
$n\gamma$	<0.04 %	888	DESIG=19;OUR EST
$n\gamma$, helicity=1/2	<0.01 %	888	DESIG=9;OUR EST
$n\gamma$, helicity=3/2	<0.03 %	888	DESIG=10;OUR EST

***N*(2220) 9/2$^+$**

$I(J^P) = \frac{1}{2}(\frac{9}{2}^+)$

NODE=B090

Re(pole position) = 2130 to 2200 (≈ 2150) MeV
−2Im(pole position) = 360 to 480 (≈ 400) MeV
Breit-Wigner mass = 2200 to 2300 (≈ 2250) MeV
Breit-Wigner full width = 350 to 500 (≈ 400) MeV

NODE=B090RE;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B090IM;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B090M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B090W;DTYPE=G;OUR EST;
→ UNCHECKED ←

NODE=B090225;NODE=B090

***N*(2220) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	15–30 %	924	DESIG=1;OUR EST
$\Delta\pi$	(15±10) %	780	DESIG=9
$\Delta\pi$, F-wave	(15±10) %	780	DESIG=5
$N\rho$	(10±10) %	727	DESIG=10
$N\rho$, S=3/2 , F-wave	(10±10) %	727	DESIG=11
$N\sigma$	(5± 5) %	–	DESIG=7

***N*(2250) 9/2⁻** $I(J^P) = \frac{1}{2}(\frac{9}{2}^-)$

NODE=B113

Re(pole position) = 2100 to 2200 (≈ 2150) MeV
−2Im(pole position) = 350 to 500 (≈ 420) MeV
Breit-Wigner mass = 2250 to 2320 (≈ 2280) MeV
Breit-Wigner full width = 300 to 600 (≈ 500) MeV

NODE=B113RE;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B113IM;DTYPE=i;OUR EST;
→ UNCHECKED ←
NODE=B113M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B113W;DTYPE=G;OUR EST;
→ UNCHECKED ←
NODE=B113225;NODE=B113

***N*(2250) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	5–15 %	941	DESIG=1
$N\eta$	<5 %	852	DESIG=4
ΛK	1–3 %	777	DESIG=5
$\Delta\pi$	(10±7) %	800	DESIG=10
$\Delta\pi$, G-wave	(10±7) %	800	DESIG=7
$N\rho$	(11±7) %	750	DESIG=11
$N\rho$, S=1/2	(5±5) %	750	DESIG=8
$N\rho$, S=3/2 , G-wave	(6±4) %	750	DESIG=9

***N*(2600) 11/2⁻** $I(J^P) = \frac{1}{2}(\frac{11}{2}^-)$

NODE=B120

Breit-Wigner mass = 2550 to 2750 (≈ 2600) MeV
Breit-Wigner full width = 500 to 800 (≈ 650) MeV

NODE=B120M;DTYPE=M;OUR EST;
→ UNCHECKED ←
NODE=B120W;DTYPE=G;OUR EST;
→ UNCHECKED ←

***N*(2600) DECAY MODES**	Fraction (Γ_i/Γ)	p (MeV/c)	
$N\pi$	3–8 %	1126	NODE=B120215;DESIG=1;OUR EST

NOTES

[a] The masses of the p and n are most precisely known in u (unified atomic mass units). The conversion factor to MeV, 1 u = 931.494 103 72(29) MeV, is less well known than are the masses in u. LINKAGE=SEB

[b] The $|m_p - m_{\overline{p}}|/m_p$ and $|q_p + q_{\overline{p}}|/e$ are not independent, and both use the more precise measurement of $|q_{\overline{p}}/m_{\overline{p}}|/(q_p/m_p)$. LINKAGE=MQ

[c] The limit is from neutrality-of-matter experiments; it assumes $q_n = q_p + q_e$. See also the charge of the neutron. LINKAGE=SS

[d] The μp and $e p$ values for the charge radius are much too different to average them. The disagreement is not yet understood. LINKAGE=CHR

[e] There is a lot of disagreement about the value of the proton magnetic charge radius. See the Listings. LINKAGE=MCR

[f] There is some controversy about whether nuclear physics and model dependence complicate the analysis for bound neutrons (from which the best limit comes). The first limit here is from reactor experiments with free neutrons. LINKAGE=SNN

[g] Lee and Yang in 1956 proposed the existence of a mirror world in an attempt to restore global parity symmetry—thus a search for oscillations between the two worlds. Oscillations between the worlds would be maximal when the magnetic fields B and B' were equal. The limit for any B' in the range 0 to 12.5 μT is >12 s (95% CL). LINKAGE=NOS

[h] The parameters g_A, g_V, and g_{WM} for semileptonic modes are defined by $\overline{B}_f[\gamma_\lambda(g_V + g_A\gamma_5) + i(g_{WM}/m_{B_i})\ \sigma_{\lambda\nu}\ q^\nu]B_i$, and ϕ_{AV} is defined by $g_A/g_V = |g_A/g_V|e^{i\phi_{AV}}$. See the "Note on Baryon Decay Parameters" in the neutron Particle Listings. LINKAGE=SBD

[i] Time-reversal invariance requires this to be 0° or 180°. LINKAGE=CR

[j] This coefficient is zero if time invariance is not violated. LINKAGE=TVC

[k] This limit is for γ energies between 0.4 and 782 keV. LINKAGE=GL