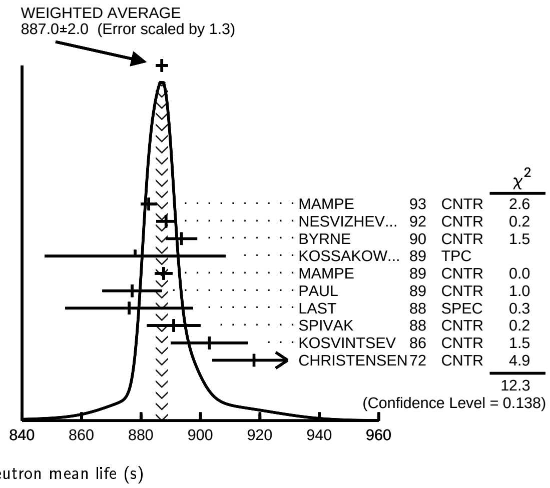

n MAGNETIC MOMENT

VALUE (μ_N)	DOCUMENT ID		TECN	COMMENT
−1.91304275±0.00000045	COHEN	87	RVUE	1986 CODATA value
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−1.91304277±0.00000048	[8] GREENE	82	MRS	

[8] GREENE 82 measures the moment to be $(1.04187564 \pm 0.00000026) \times 10^{-3}$ Bohr magnetons. The value above is obtained by multiplying this by $m_p/m_e = 1836.152701 \pm 0.000037$ (the 1986 CODATA value from COHEN 87).

n ELECTRIC DIPOLE MOMENT

A nonzero value is forbidden by both *T* invariance and *P* invariance. A number of early results have been omitted. See RAMSEY 90 for a review.

VALUE (10^{-26} ecm)	CL%	DOCUMENT ID		TECN	COMMENT
< 11	95	ALTAREV	92	MRS	$(+2.6 \pm 4.2 \pm 1.6) \times 10^{-26}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 12	95	SMITH	90	MRS	$d = (-3 \pm 5) \times 10^{-26}$
< 26	95	ALTAREV	86	MRS	$d = (-14 \pm 6) \times 10^{-26}$
3±48		PENDLEBURY	84	MRS	Ultracold neutrons
< 60	90	ALTAREV	81	MRS	$d = (21 \pm 24) \times 10^{-26}$
<160	90	ALTAREV	79	MRS	$d = (40 \pm 75) \times 10^{-26}$

n ELECTRIC POLARIZABILITY α_n

Following is the electric polarizability α_n defined in terms of the induced electric dipole moment by $\mathbf{D} = 4\pi\epsilon_0\alpha_n\mathbf{E}$. For a review, see SCHMIEDMAYER 89.

VALUE (10^{-3} fm^3)	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.16^{+0.19}_{-0.23}}$ **OUR AVERAGE**				
1.20±0.15±0.20	SCHMIEDM...	91	CNTR	*n* Pb transmission
$1.07^{+0.33}_{-1.07}$	ROSE	90B	CNTR	$\gamma d \rightarrow \gamma n p$
0.8 ±1.0	KOESTER	88	CNTR	*n* Pb, *n* Bi transmission
1.2 ±1.0	SCHMIEDM...	88	CNTR	*n* Pb, *n* C transmission
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.17^{+0.43}_{-1.17}$	ROSE	90	CNTR	See ROSE 90B

n CHARGE

See also "$|q_p + q_e|$ CHARGE MAGNITUDE DIFFERENCE" in the proton Listings.

VALUE (10^{-21} e)	DOCUMENT ID		TECN	COMMENT
− 0.4± 1.1	[9] BAUMANN	88		Cold *n* deflection
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−15 ±22	[10] GAEHLER	82	CNTR	Reactor neutrons

[9] The BAUMANN 88 error ±1.1 gives the 68% CL limits about the the value −0.4.
[10] The GAEHLER 82 error ±22 gives the 90% CL limits about the the value −15.

LIMIT ON $n\overline{n}$ OSCILLATIONS

Mean Time for $n\overline{n}$ Transition in Vacuum

A test of ΔB=2 baryon number nonconservation. MOHAPATRA 80 and MOHAPATRA 89 discuss the theoretical motivations for looking for $n\overline{n}$ oscillations. DOVER 83 and DOVER 85 give phenomenological analyses. The best limits come from looking for the decay of neutrons bound in nuclei. However, these analyses require model-dependent corrections for nuclear effects. See KABIR 83, DOVER 89, and ALBERICO 91 for discussions. Direct searches for $n \rightarrow \overline{n}$ transitions using reactor neutrons are cleaner but give poorer limits.

VALUE (s)	CL%	DOCUMENT ID		TECN	COMMENT
>1.2 × 10^8	90	BERGER	90	FREJ	*n* bound in iron
>1.2 × 10^8	90	TAKITA	86	CNTR	Kamiokande
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>1 × 10^7	90	BALDO-...	90	CNTR	Reactor neutrons
>4.9 × 10^5	90	BRESSI	90	CNTR	Reactor neutrons
>4.7 × 10^5	90	BRESSI	89	CNTR	See BRESSI 90
>1 × 10^6	90	FIDECARO	85	CNTR	Reactor neutrons
>8.8 × 10^7	90	PARK	85B	CNTR	
>3 × 10^7		BATTISTONI	84	NUSX	
> 2.7 × 10^7–1.1 × 10^8		JONES	84	CNTR	
>2 × 10^7		CHERRY	83	CNTR	

n DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1	$p e^- \overline{\nu}_e$	100 %	
Γ_2	hydrogen-atom $\overline{\nu}_e$		
	Charge conservation (*Q*) violating mode		
Γ_3	$p \nu_e \overline{\nu}_e$	*Q* < 9×10^{-24}	90%

n BRANCHING RATIOS

$\Gamma(\text{hydrogen-atom}\,\overline{\nu}_e)/\Gamma_{\text{total}}$ — Γ_2/Γ

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<3	95	[11] GREEN	90	RVUE

[11] GREEN 90 infers that $\tau(\text{hydrogen-atom}\,\overline{\nu}_e) > 3 \times 10^4$ s by comparing neutron lifetime measurements made in storage experiments with those made in β-decay experiments. However, the result depends sensitively on the lifetime measurements, and does not of course take into account more recent measurements of same.

$\Gamma(p \nu_e \overline{\nu}_e)/\Gamma_{\text{total}}$ — Γ_3/Γ

Forbidden by charge conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<9 × 10^{-24}	90	BARABANOV	80	CNTR	^{71}Ga → ^{71}GeX
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<9.7 × 10^{-18}	90	ROY	83	CNTR	^{113}Cd → ^{113m}In neut.
<7.9 × 10^{-21}		VAIDYA	83	CNTR	^{87}Rb → ^{87m}Sr neut.
<3 × 10^{-19}		NORMAN	79	CNTR	^{87}Rb → ^{87m}Sr neut.

NOTE ON BARYON DECAY PARAMETERS

(by E.D. Commins, University of California, Berkeley)

Baryon semileptonic decays

The typical baryon semileptonic decay is described by a matrix element, the hadronic part of which may be written as:

$$\overline{B}_f \left[f_1(q^2)\gamma_\lambda + i\, f_2(q^2)\sigma_{\lambda\mu}q^\mu + g_1(q^2)\gamma_\lambda\gamma_5 + g_3(q^2)\gamma_5 q_\lambda \right] B_i \,.$$

Here B_i and $\overline{B}_f$ are spinors describing the initial and final baryons and $q = p_i - p_f$, while the terms in f_1, f_2, g_1, and g_3 account for vector, induced tensor ("weak magnetism"), axial vector, and induced pseudoscalar contributions [1]. Second-class current contributions are ignored here. In the limit of zero momentum transfer, f_1 reduces to the vector coupling constant g_V, and g_1 reduces to the axial-vector coupling constant g_A. The latter coefficients are related by Cabibbo's theory [2], generalized to six quarks (and three mixing angles) by Kobayashi and Maskawa [3]. The g_3 term is negligible for transitions in which an $e^\pm$ is emitted, and gives a very small correction, which can be estimated by PCAC [4], for $\mu^\pm$ modes. Recoil effects include