e

$J = \frac{1}{2}$

e MASS

The mass is known much more precisely in u (atomic mass units) than in MeV (see the footnote). The conversion from u to MeV, 1 u = 931.49432 ± 0.00028 MeV, involves the relatively poorly known electronic charge.

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
0.51099906±0.00000015	[1] COHEN	87	RVUE	1986 CODATA value
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.5110034 ±0.0000014	COHEN	73	RVUE	1973 CODATA value

[1] The mass is known much more precisely in u: $m = (5.48579903 \pm 0.00000013) \times 10^{-4}$ u.

$(m_{e^+} - m_{e^-}) / m_{average}$

A test of *CPT* invariance.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4 \times 10^{-8}$	90	CHU	84	CNTR	Positronium spectroscopy

$|q_{e^+} + q_{e^-}|/e$

A test of *CPT* invariance. See also similar tests involving the proton.

VALUE	DOCUMENT ID		TECN	COMMENT
$< 4 \times 10^{-8}$	[2] HUGHES	92	RVUE	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<10^{-18}$	[3] MUELLER	92	THEO	Vacuum polarization

[2] HUGHES 92 uses recent measurements of Rydberg-energy and cyclotron-frequency ratios.

[3] MUELLER 92 argues that an inequality of the charge magnitudes would, through higher-order vacuum polarization, contribute to the net charge of atoms.

e MAGNETIC MOMENT ANOMALY

$\mu_e/\mu_B = 1 \equiv (g-2)/2$

For the most accurate theoretical calculation, see KINOSHITA 81.

Some older results have been omitted.

VALUE (units 10^{-6})	DOCUMENT ID		TECN	CHG	COMMENT
1159.652193 ±0.000010	[4] COHEN	87	RVUE		1986 CODATA value
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1159.6521884±0.0000043	VANDYCK	87	MRS	−	Single electron
1159.6521879±0.0000043	VANDYCK	87	MRS	+	Single positron
1159.652200 ±0.000040	VANDYCK	86	MRS	−	Single electron
1159.652222 ±0.000050	SCHWINBERG	81	MRS	+	Single positron

[4] The COHEN 87 value assumes the $g/2$ values for e^+ and e^- are equal, as required by *CPT*.

$(g_{e^+} - g_{e^-}) / g_{average}$

A test of *CPT* invariance.

VALUE (units 10^{-12})	CL%	DOCUMENT ID		TECN	COMMENT
− 0.5± 2.1		[5] VANDYCK	87	MRS	Penning trap
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 12	95	[6] VASSERMAN	87	CNTR	Assumes $m_{e^+} = m_{e^-}$
22 ±64		SCHWINBERG	81	MRS	Penning trap

[5] VANDYCK 87 measured $(g_-/g_+)-1$ and we converted it.

[6] VASSERMAN 87 measured $(g_+ - g_-)/(g-2)$. We multiplied by $(g-2)/g = 1.2 \times 10^{-3}$.

*CITATION: L. Montanet et al., Physical Review D50, 1173 (1994) and 1995 off-year partial update for the 1996 edition (URL: http://pdg.lbl.gov/)

e ELECTRIC DIPOLE MOMENT

A nonzero value is forbidden by both T invariance and P invariance.

VALUE (10^{-26} e cm)	CL%	DOCUMENT ID		TECN	COMMENT
– 0.27± 0.83		[7] ABDULLAH	90	MRS	^{205}Tl beams
• • • We do not use the following data for averages, fits, limits, etc. • • •					
– 14 ± 24		CHO	89	NMR	Tl F molecules
– 1.5 ± 5.5 ±1.5		MURTHY	89		Cesium, no B field
– 50 ±110		LAMOREAUX	87	NMR	^{199}Hg
190 ±340	90	SANDARS	75	MRS	Thallium
70 ±220	90	PLAYER	70	MRS	Xenon
< 300	90	WEISSKOPF	68	MRS	Cesium

[7] ABDULLAH 90 uses the relativistic enhancement of a valence electron's electric dipole moment in a high-Z atom.

e MEAN LIFE / BRANCHING FRACTION

A test of charge conservation. See the "Note on Testing Charge Conservation and the Pauli Exclusion Principle" following this section in our 1992 edition (Physical Review **D45**, 1 June, Part II (1992), p. VI.10). We use the best "disappearance" limit for the Summary Tables. The best limit for the specific channel $e^- \to \nu\gamma$ is much better.

Note that we use the mean life rather than what is often reported, the half life.

VALUE (yr)	CL%	DOCUMENT ID		TECN	COMMENT
>2.7 x 10^{23}	68	REUSSER	91	CNTR	Ge K-shell disappearance
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>2.35 x 10^{25}	68	BALYSH	93	CNTR	$e^- \to \nu_e\gamma$, ^{76}Ge detector
>1.5 x 10^{25}	68	AVIGNONE	86	CNTR	$e^- \to \nu\gamma$
>1 x 10^{39}	[8]	ORITO	85	ASTR	Astrophysical argument
>3 x 10^{23}	68	BELLOTTI	83B	CNTR	$e^- \to \nu\gamma$
>2 x 10^{22}	68	BELLOTTI	83B	CNTR	Ge K-shell disappearance
>3.5 x 10^{23}	68	KOVALCHUK	79	CNTR	$e^- \to \nu\gamma$
>2 x 10^{22}	68 [9]	KOVALCHUK	79	CNTR	Disappearance
>5.3 x 10^{21}	[9]	STEINBERG	75	CNTR	Disappearance
>2 x 10^{21}	[9,10]	MOE	65	CNTR	Disappearance
>4 x 10^{22}		MOE	65	CNTR	$e^- \to \nu\gamma$

[8] ORITO 85 assumes that electromagnetic forces extend out to large enough distances and that the age of our galaxy is 10^{10} years.

[9] These limits are for all modes in which decay particles escape from the detector without depositing energy.

[10] The MOE 65 limit is re-estimated by STEINBERG 75 to be 10^{20} years.

e REFERENCES

BALYSH	93	PL B298 278	+Beck, Belyaev, Bensch+	(KIAE, MPIH, SASSO)
HUGHES	92	PRL 69 578	+Deutch	(LANL, AARH)
MUELLER	92	PRL 69 3432	+Thoma	(DUKE)
PDG	92	PR D45, 1 June, Part II	Hikasa, Barnett, Stone+	(KEK, LBL, BOST+)
REUSSER	91	PL B255 143	+Treichel, Boehm, Broggini+	(NEUC, CIT, VILL)
ABDULLAH	90	PRL 65 2347	+Carlberg, Commins, Gould, Ross	(LBL, UCB)
CHO	89	PRL 63 2559	+Sangster, Hinds	(YALE)
MURTHY	89	PRL 63 965	+Krause, Li, Hunter	(AMHT)
COHEN	87	RMP 59 1121	+Taylor	(RISC, NBS)
LAMOREAUX	87	PRL 59 2275	+Jacobs, Heckel, Raab, Fortson	(WASH)
VANDYCK	87	PRL 59 26	Van Dyck, Schwinberg, Dehmelt	(WASH)
VASSERMAN	87	PL B198 302	+Vorobyov, Gluskin+	(NOVO)
Also	87B	PL B187 172	Vasserman, Vorobyov, Gluskin+	(NOVO)
AVIGNONE	86	PR D34 97	+Brodzinski, Hensley, Miley, Reeves+	(PNL, SCUC)
VANDYCK	86	PR D34 722	Van Dyck, Schwinberg, Dehmelt	(WASH)
ORITO	85	PRL 54 2457	+Yoshimura	(TOKY, KEK)
CHU	84	PRL 52 1689	+Mills, Hall	(BELL, NBS, COLO)
BELLOTTI	83B	PL 124B 435	+Corti, Fiorini, Liguori, Pullia+	(MILA)
KINOSHITA	81	PRL 47 1573	+Lindquist	(CORN)
SCHWINBERG	81	PRL 47 1679	+Van Dyck, Dehmelt	(WASH)
KOVALCHUK	79	JETPL 29 145	+Pomansky, Smolnikov	(INRM)
		Translated from ZETFP 29 163.		
SANDARS	75	PR A11 473	+Sternheimer	(OXF, BNL)
STEINBERG	75	PR D12 2582	+Kwiatkowski, Maenhaut+	(UMD)
COHEN	73	JPCRD 2 663	+Taylor	(RISC, NBS)
PLAYER	70	JPB 3 1620	+Sandars	(OXF)
WEISSKOPF	68	PRL 21 1645	+Carrico, Gould, Lipworth+	(BRAN)
MOE	65	PR 140B 992	+Reines	(CASE)