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
0.51099907±0.00000015	[1] FARNHAM	95	CNTR	Penning
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.51099906±0.00000015	[2] COHEN	87	RVUE	1986 CODATA value
0.5110034 ±0.0000014	COHEN	73	RVUE	1973 CODATA value

[1] FARNHAM 95 compares cyclotron frequency of trapped electrons with that of a single trapped $^{12}C^{+6}$ ion. The result is m_e = 0.0005485799111(12)u, where the figure in parenthesis is the 1σ uncertainty in the last digit. The uncertainty after conversion to MeV is dominated by the uncertainty in the electron charge.

[2] COHEN 87 (1986 CODATA) value in atomic mass units is 0.000548579903(13). See footnote on FARNHAM 95.

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

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

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

[4] 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

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

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	[5] 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

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

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

A test of CPT invariance.

VALUE (units 10^{-12})	CL%	DOCUMENT ID		TECN	COMMENT
− 0.5± 2.1		[6] VANDYCK	87	MRS	Penning trap
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 12	95	[7] VASSERMAN	87	CNTR	Assumes $m_{e^+} = m_{e^-}$
22 ±64		SCHWINBERG	81	MRS	Penning trap

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

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

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		[8] 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

[8] 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
>4.3 × 10^{23}	68	AHARONOV	95B	CNTR	Ge K-shll disappearance
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>3.7 × 10^{25}	68	AHARONOV	95B	CNTR	$e^- \to \nu\gamma$
>2.35 × 10^{25}	68	BALYSH	93	CNTR	$e^- \to \nu\gamma$, ^{76}Ge detector
>2.7 × 10^{23}	68	REUSSER	91	CNTR	Ge K-shell disappearance
>1.5 × 10^{25}	68	AVIGNONE	86	CNTR	$e^- \to \nu\gamma$
>1 × 10^{39}		[9] ORITO	85	ASTR	Astrophysical argument
>3 × 10^{23}	68	BELLOTTI	83B	CNTR	$e^- \to \nu\gamma$
>2 × 10^{22}	68	BELLOTTI	83B	CNTR	Ge K-shell disappearance

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

e REFERENCES

AHARONOV	95B	PR D52 3785	+Avignon, Brodzinski, Collar+	(SCUC, PNL, ZAGR, TELA)
Also	95	PL B353 168	Aharonov, Avignone+	(SCUC, PNL, ZAGR, TELA)
FARNHAM	95	PRL 75 3598	+Van Dyck, Schwinberg	(WASH)
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, PSI)
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)
SANDARS	75	PR A11 473	+Sternheimer	(OXF, BNL)
COHEN	73	JPCRD 2 663	+Taylor	(RISC, NBS)
PLAYER	70	JPB 3 1620	+Sandars	(OXF)
WEISSKOPF	68	PRL 21 1645	+Carrico, Gould, Lipworth+	(BRAN)