

Fine Structure Constant

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|--|---|---|
| (1) $\alpha = e^2 / \hbar c$ (known) | (28) $\alpha = 2\pi e^2 / c^2 \phi$ | (55) $\alpha = c^2 e^2 / \wp E_{PL}^2$ |
| (2) $\alpha = e^2 / 2q^2 L^{*4}$ | (29) $\alpha = e^2 \hbar / c^3 L^{*2} M_{PL}^2$ | (56) $\alpha = m_e c r_c / \hbar$ |
| (3) $\alpha = e\pi / \phi$ | (30) $\alpha = \gamma_o e^2 / \hbar c^2 L^{*2}$ | (57) $\alpha = e^2 / E r_s$ |
| (4) $\alpha = r_{se} / a_o$ | (31) $\alpha = \wp^2 e^2 / G L^{*2}$ | (58) $\alpha = m_e a_o e^4 / \hbar^3 c$ |
| (5) $\alpha = \lambda_c / 2\pi a_o$ | (32) $\alpha = \gamma_o e / 2\phi c L^{*2}$ | (59) $\alpha = e\phi c / 2\phi \hbar$ |
| (6) $\alpha = (4\pi r_{se} R_\infty)^{1/2}$ | (33) $\alpha = \wp \hbar e / 2\phi c L^{*2}$ | (60) $\alpha = L^{*2} / \wp m_e a_o$ |
| (7) $\alpha = (2\lambda_c R_\infty)^{1/2}$ | (34) $\alpha = e^2 \lambda_{PL}^2 / \gamma_o \hbar$ | (61) $\alpha = L^{*2} c^2 / G m_e a_o$ |
| (8) $\alpha = 4\pi R_\infty a_o$ | (35) $\alpha = 2\pi e^2 / E \lambda$ | (62) $\alpha = \hbar / m_e a_o c$ |
| (9) $\alpha = r_c / r_{se}$ | (36) $\alpha = e^2 / m_p r_{sp} c^2$ | (63) $\alpha = e^2 / F_s r_p r_{sp}$ |
| (10) $\alpha = (r_c / a_o)^{1/2}$ | (37) $\alpha = 2\pi e^2 c / \gamma_o A$ | (64) $\alpha = 2\pi e^2 / \lambda_p r_p F_s$ |
| (11) $\alpha = e^2 / A L^{*2}$ | (38) $\alpha = 2\pi e^2 T^* / \gamma_o M_{PL}$ | (65) $\alpha = 2\pi e^2 / m_p \lambda_p c^2$ |
| (12) $\alpha = \wp e^2 / L^{*2} c^2$ | (39) $\alpha = \gamma_o e^2 / \hbar L^{*2} c^2$ | (66) $\alpha = e^2 V_o / F_g r_p r_{sp}$ |
| (13) $\alpha = A e^2 / E_{PL}^2$ | (40) $\alpha = \pi^2 \hbar c / \phi^2$ | (67) $\alpha = \wp \phi e / 2\phi L^{*2}$ |
| (14) $\alpha = e^2 / E_{PL} L^*$ | (41) $\alpha = 2\pi \wp e^2 / \phi G$ | (68) $\alpha = \wp e^3 / 2\mu_p m_p G$ |
| (15) $\alpha = e^2 / G M_{PL}^2$ | (42) $\alpha = \wp e^2 c / \hbar G$ | (69) $\alpha = e^3 / 2\mu_p m_p c^2$ |
| (16) $\alpha = \wp \hbar^2 / 4\phi^2 L^{*2}$ | (43) $\alpha = L^* c e^2 / M_{PL} \hbar G$ | (70) $\alpha = A \pi^2 L^{*2} / \phi^2$ |
| (17) $\alpha = \hbar^2 c^2 / 4\phi^2 M_{PL}^2 G$ | (44) $\alpha = \hbar c \pi / 2\phi^2$ | (71) $\alpha = A \gamma_o \pi / 2c \phi^2$ |
| (18) $\alpha = \hbar^2 / 4\wp \phi^2 M_{PL}^2$ | (45) $\alpha = 2\pi \mu_e / \phi r_{se}$ | (72) $\alpha = \gamma_o M_{PL} c \pi / 2L^* \phi^2$ |
| (19) $\alpha = \hbar^2 c^2 / 4\phi^2 L^{*2} A$ | (46) $\alpha = 4\pi^2 \mu_e / \lambda_c \phi$ | (73) $\alpha = e^2 / A V_o r_p r_{sp}$ |
| (20) $\alpha = \hbar^2 / 4\phi^2 M_{PL} L^*$ | (47) $\alpha = 2\pi e^2 G / \gamma_o c^3$ | (74) $\alpha = 2\mu_e / a_o e$ |
| (21) $\alpha = \pi \hbar^2 / 2\phi^2 \phi$ | (48) $\alpha = 2\pi e^2 / E_p \lambda_p$ | (75) $\alpha = e^3 \wp / 2\mu_e m_e G$ |
| (22) $\alpha = e \lambda / 2r_s \phi$ | (49) $\alpha = 2\pi e^2 \wp / \gamma_o c$ | (76) $\alpha = e^3 \wp / 2\mu m G$ |
| (23) $\alpha = G \hbar^2 / 4\phi^2 c^2 L^{*2}$ | (50) $\alpha = e^2 \wp / r_{se} m_e G$ | (77) $\alpha = e^3 L^* / 2\mu_e m_e M_{PL} G$ |
| (24) $\alpha = G e^2 / L^{*2} c^4$ | (51) $\alpha = e^2 / r_{se} m_e c^2$ | (78) $\alpha = e^3 / 2\mu E$ |
| (25) $\alpha = e^2 T^* / L^{*2} M_{PL} c$ | (52) $\alpha = e^3 \phi / \pi L^{*2} E_{PL}^2$ | (79) $\alpha = G M_{PL} e^2 / \hbar L^* c^3$ |
| (26) $\alpha = 2\pi e^2 / \hbar c$ | (53) $\alpha = \hbar c e^2 / L^{*2} E_{PL}^2$ | (80) $\alpha = V_o e^2 / L^{*2} F_{STRONG}$ |
| (27) $\alpha = \phi G e / 2\phi L^{*2} c^2$ | (54) $\alpha = e^2 / E_{PL} M_{PL} \wp$ | (81) $\alpha = V_o^2 e^2 / L^{*2} F_{GRAVITY}$ |

Constants (cgs)

a	Fine structure constant	$(e\mathbf{p}/f)$	$7.29735288798 \times 10^{-3}$
e	Elementary Charge	$(hc/2\mathbf{f})$	$4.80323068796 \times 10^{-10}$ (g
$\text{cm}^3/\text{s}^2)^{1/2}$			
e²	Charge Squared	(AL^*r_{se}/a_o)	$23.0710250417 \times 10^{-20}$ g cm ³ /s ²
f	Magnetic Flux quantum	$(e\mathbf{p}a_o/r_{se})$	$2.06784493972 \times 10^{-7}$ (g cm ³ /s ²) ^{1/2}
R_∞	Rydberg Constant	$(e/4\mathbf{f}a_o)$	$1.09737314764 \times 10^5$ cm ⁻¹
I_c	Compton Wavelength of Electron	$(h/m_e c)$	$2.4263104709 \times 10^{-10}$ cm
r_{se}	Electron Spin Radius	$(I_c/2\mathbf{p})$ or $(\hbar/m_e c)$	$3.86159304919 \times 10^{-11}$ cm
m_l	Magnetic Moment of Electron (Bohr)	$(e r_{se}/2)$	$9.2740611191 \times 10^{-21}$ (g cm ⁵ /s ²) ^{1/2}
m_e	Electron Rest Mass	$(\hbar/c r_{se})$	$9.1094809529 \times 10^{-28}$ g
a_o	Bohr Radius	(r_{se}/\mathbf{a})	$5.2917723844 \times 10^{-9}$ cm
r_c	Classical Electron Radius	$(\mathbf{a}r_{se})$	$2.81794071897 \times 10^{-13}$ cm
h	Planck Constant	$(2e\mathbf{f}/c)$	$6.6261415238 \times 10^{-27}$ g cm ² /s
ħ	Planck Reduced Constant	$(h/2\mathbf{p})$	$1.05458317714 \times 10^{-27}$ g cm ² /s

PLANCK STATE

E_{PL}	Planck Energy	$(\hbar c^5/G)^{1/2}$	$1.95635619513 \times 10^{16}$ g cm ² /s ²
M_{PL}	Planck Mass	$(\hbar c/G)^{1/2}$	$2.17673983018 \times 10^{-5}$ g
L*	Planck Length	$(\hbar G/c^3)^{1/2}$ or $(\mathbf{p}/1944 \times 10^{30} \text{ cm}^{-1})$	$1.61604560369 \times 10^{-33}$ cm
T*	Planck Time	$(\hbar G/c^5)^{1/2}$	$5.3905478959 \times 10^{-44}$ s
I_{PL}	Planck Wavelength	$(h/M_{PL}c)$ or $(2\mathbf{p}L^*)$	$1.01539139928 \times 10^{-32}$ cm
Ā	Length-Mass Conversion	(L^*/M_{PL}) or (G/c^2) or (c^2/A)	$7.42415598449 \times 10^{-29}$ cm/g
G	Gravitational Constant	$(c^2\tilde{A})$ or $(L^3/T^{*2}M_{PL})$	$6.6724986388 \times 10^{-8}$ cm ³ /gs ²
A	Planck, Cosmic Force	(E_{PL}/L^*) or (c^4/G) or $(\hbar c/L^{*2})$	$1.21058229462 \times 10^{49}$ g cm/s ²
j	Wave-Particle Duality	$(M_{PL}I_{PL})$ or (h/c) or any (mI)	$2.21024290204 \times 10^{-37}$ g cm
g_o	Ulton Boson	(L^*cI_{PL}) or (Gh/c^2) or $(\tilde{A}h)$	$4.9193508248 \times 10^{-55}$ cm ³ /s
q	Kursunoglu Constant	$(M_{PL}/2L^*T^{*2})^{1/2}$ or $(A/2L^{*2})^{1/2}$	$1.52239920674 \times 10^{57}$ (g/cm s ²) ^{1/2}

PROTON

E_p	Proton Rest Energy	$(m_p c^2)$	$1.50330143403 \times 10^{-3}$ g cm ² /s ²
m_p	Proton Mass	(E_p/c^2)	$1.67264842484 \times 10^{-24}$ g
r_p	Proton Radius	$(\mathbf{z}m_p)^{1/4}$	$7.37888575156 \times 10^{-14}$ cm
z	Zeta, Radius ⁴ /Mass of Spin 1/2 Particle	$(r_p^3 c^2/F_s)$ or $(3L^{*3}/2\mathbf{j})$	$1.77238668483 \times 10^{-29}$ cm ⁴ /g
I_p	Wavelength of Proton	$(h/m_p c)$	$1.32140315276 \times 10^{-13}$ cm
r_{sp}	Proton Spin Off Radius	$(\hbar/m_p c)$	$2.10307843578 \times 10^{-14}$ cm
m_p	Magnetic Moment of Proton	$(e r_{sp}/2)$	$5.05078544095 \times 10^{-24}$ (g
$\text{cm}^5/\text{s}^2)^{1/2}$			
V_o	Displaced Volume (Hole in S-T)	$(m_p G/r_p c^2)$ or $(4\mathbf{p}r_p^3/3)$	$1.68291029719 \times 10^{-39}$ pure
F_s	Proton Strong Force	(E_p/r_p) or (AV_o)	$2.03730140924 \times 10^{10}$ g cm/s ²
F_g	Gravity of Proton Pair at r _p	(Gm_p^2/r_p^2) or (AV_o^2)	$3.42859552005 \times 10^{-29}$ g cm/s ²