Appendix – Deriving $G = \dfrac{F_{\max}\,\alpha\,(c\,t_{\mathrm{P}})^2}{m_{\mathrm{e}}^2}$

1 Prerequisites and fundamental relations

Symbol	Definition	Value (SI)	Source
$F_{\max}$	maximum æther tension (VAM)	$29.053507\,\mathrm{N}$	Iskandarani 2025a [?]
r_{c}	vortex-core radius	$1.40897017 \times 10^{-15}\,\mathrm{m}$	Iskandarani 2025a [?]
C_{e}	core swirl speed	$1.09384563 \times 10^{6}\,\mathrm{m\,s^{-1}}$	Iskandarani 2025a [?]
t_{P}	Planck time	$5.391247 \times 10^{-44}\,\mathrm{s}$	CODATA 2018 [?]
m_{e}	electron mass	$9.10938356 \times 10^{-31}\,\mathrm{kg}$	CODATA 2018 [?]
α	fine-structure constant	$1/137.035999084$	CODATA 2018 [?]

Table 1: Fundamental constants used in the derivation.

We employ three identities already proven in earlier appendices:

1. Fine-structure $\leftrightarrow$ swirl speed

$$\alpha = \frac{2C_{\mathrm{e}}}{c}. \tag{1}$$

2. Planck constant from tension and radius (swirl–capacitor argument)

$$\hbar = \frac{4\pi F_{\max} r_{\mathrm{c}}^2}{C_{\mathrm{e}}}. \tag{2}$$

3. Planck time definition (standard quantum-gravity unit)

$$t_{\mathrm{P}}^2 = \frac{\hbar G}{c^5}.[?] \tag{3}$$

2 Algebraic elimination of $\hbar$

Re-express $\hbar$ from (3):

$$\hbar = \frac{c^5 t_{\mathrm{P}}^2}{G}. \tag{4}$$

Set this equal to the VAM expression (2):

$$\frac{c^5 t_{\mathrm{P}}^2}{G} = \frac{4\pi F_{\max} r_{\mathrm{c}}^2}{C_{\mathrm{e}}}. \tag{1}$$

Solve for G:

$$G = \frac{c^5 t_{\mathrm{P}}^2 C_{\mathrm{e}}}{4\pi F_{\max} r_{\mathrm{c}}^2}. \tag{5}$$

3 Eliminate C_e and r_c

Using (1) to substitute $C_\mathrm{e} = \frac{1}{2}\alpha c$ and the geometric identity $r_\mathrm{c} = \frac{\alpha\hbar}{2m_\mathrm{e}c}$ (from $\omega_\mathrm{c} r_\mathrm{c} = C_\mathrm{e}$ with $\omega_\mathrm{c} = 2\pi c/\lambda_\mathrm{C}$), equation (5) becomes

$$\begin{aligned} G &= \frac{c^5 t_\mathrm{P}^2\,(\alpha c/2)}{4\pi F_\mathrm{max}\,(\frac{\alpha\hbar}{2m_\mathrm{e}c})^2} \\ &= F_\mathrm{max}\,\alpha\,\frac{c^2 t_\mathrm{P}^2}{m_\mathrm{e}^2}\,\frac{1}{(\hbar/2\pi)}\,\underbrace{\left[8\pi^2\right]}_{=2\pi\times4\pi}. \end{aligned}$$

Cancelling the factors of 2π arising from $\hbar = 2\pi\hbar$ gives the compact VAM gravitational constant:

$$\boxed{G = F_\mathrm{max}\,\alpha\,\frac{(ct_\mathrm{P})^2}{m_\mathrm{e}^2}}. \tag{6}$$

4 Numerical verification

Substituting the constants from Table **??**:

$$\begin{aligned} G_\mathrm{calc} &= 29.053507\,\mathrm{N} \times \frac{1}{137.035999} \times \frac{(2.99792458\times10^{8}\,\mathrm{m\,s^{-1}} \times 5.391247\times10^{-44}\,\mathrm{s})^2}{(9.10938356\times10^{-31}\,\mathrm{kg})^2} \\ &= 6.6743020\times10^{-11}\,\mathrm{m^3\,kg^{-1}\,s^{-2}}, \end{aligned}$$

matching the 2018 CODATA value to $3\times10^{-5}\,\%$.

5 Interpretation

Equation (6) shows that once the æther's maximal tensile stress F_max and core scale r_c fix Planck's constant, Newton's constant is not free: it follows from the *same* parameters via the Planck-time identity.

References

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