Standalone package example

Overleaf

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1 First section

Keystone Derivations in the Vortex Æther Model (VAM) Omar Iskandarani June 2025 Independent Researcher, Groningen, The Netherlands ORCID: 0009-0006-1686-3961 info@omariskandarani.com

Appendix A
Keystone Constant Relations in VAM

Throughout the main text we defined the three primitive æther parameters

$$F_{\max}, \qquad r_c, \qquad C_e, \tag{1}$$

and showed how they fix all familiar quantum and gravitational constants. For completeness we collect here the four one-line identities that anchor $\hbar$, $E = h\nu$, the Bohr radius a_0 and Newton's constant G in terms of (1). All algebra employs only dimensional relations, the fine-structure constant $\alpha = 2C_e/c$, and the Planck time $t_P \equiv \sqrt{\hbar G/c^5}$. Figures quoted use the canonical numerics of Tab. 1.

A.1 Planck's Constant from Æther Tension

A photon of Compton frequency ν_e wraps two half-wavelength helical arcs ($n = 2$) around the electron vortex. Matching angular momenta and adopting a Hookean core gives

$$h = \frac{4\pi F_{\max} r_c^2}{C_e} = 6.626\,070 \times 10^{-34}\ \mathrm{J\,s}\,; \tag{2}$$

see Sec. 3.1.

A.2 Photon Energy: $E = h\nu$

Treating the helical photon as a parallel-plate capacitor of plate area $A = \lambda^2$ and spacing $d = \lambda/2$ yields

$$C = 2\varepsilon_0\,\lambda, \qquad E = \frac{Q^2}{2C} = \frac{e^2}{4\varepsilon_0 C_e}\,\nu = h\nu, \tag{3}$$

where $e^2/4\varepsilon_0 C_e = h$ follows from Eq. (2) plus $\alpha = 2C_e/c$.

A.3 Bohr (or Sommerfeld) Radius

Combining Eq. (2) with $\alpha = 2C_e/c$ gives

$$a_0 = \frac{\hbar}{m_e c\alpha} = \frac{F_{\max} r_c^2}{m_e C_e^2} = 5.291\,772 \times 10^{-11}\ \mathrm{m}. \tag{4}$$

All hydrogenic orbital radii then follow the textbook $r_n = n^2 a_0/Z$ scaling with no further parameters.

A.4 Newton's Constant

Eliminating $\hbar$ between Eq. (2) and the Planck-time identity $t_P^2 = \hbar G/c^5$ yields

$$G = F_{\max}\,\alpha\,\frac{(ct_P)^2}{m_e^2} = \frac{C_e c^5 t_P^2}{2F_{\max} r_c^2} = 6.674\,30 \times 10^{-11}\ \mathrm{m^3\,kg^{-1}\,s^{-2}}. \tag{5}$$

Either form in Eq. (5) matches all laboratory and astronomical measurements within the quoted CODATA uncertainty.

A.5 Consequences

A single triad $(F_{\max}, r_c, C_e)$ locks $\hbar, a_0, h\nu$, and G. Any independent experimental change to one of the three primitives would break *all* four constants simultaneously—making the VAM framework highly falsifiable.

Numerical Inputs (taken from Tab. 1): $F_{\max} = 29.053507\,\mathrm{N}$, $r_c = 1.40897017 \times 10^{-15}\,\mathrm{m}$, $C_e = 1.09384563 \times 10^6\,\mathrm{m\,s^{-1}}$, $m_e = 9.10938356 \times 10^{-31}\,\mathrm{kg}$, $t_P = 5.391247 \times 10^{-44}\,\mathrm{s}$.

2 Second section

Appendix: The Role of C_e^2 in VAM Dynamics

In the Vortex Æther Model (VAM), the constant C_e — the core tangential swirl velocity — plays a role analogous to the speed of light c in relativity. It governs the scale at which internal vortex motion couples to inertial effects, mass, and time evolution. Its square, C_e^2, appears throughout the theory as a natural denominator wherever kinetic, energetic, or gravitational effects emerge.

1. Interpretation of C_e^2

- **Inertia Coupling:** Swirl-induced mass depends on energy-like terms normalized by C_e^2, mirroring $E = mc^2$ in special relativity.
- **Time Dilation:** Local time is modified by swirl velocity as:

$$d\tau = dt \cdot \sqrt{1 - \frac{\omega^2 r^2}{C_e^2}}$$

- **Swirl Mass Generation:** Energy per unit volume from vortex motion ($\sim \frac{1}{2}\rho v^2$) is converted to mass via C_e^2.

- **Gravitational Coupling:** Appears in the VAM expression for G, derived from vortex coupling:

$$G \sim \frac{C_e c^5 t_p^2}{2F_{\max} r_c^2}$$

Thus, C_e^2 is fundamental to scaling rotational energy into inertial and gravitational analogues in the VAM framework.

2. Table of Expressions Involving C_e^2

Expression	**Physical Meaning**	**VAM Role**
$\frac{r_c}{C_e^2}$	Core radius over swirl velocity squared	Temporal inertia scaling
$\frac{F_{\max}}{C_e^2}$	Max force per swirl energy unit	Force–mass–energy coupling
$\frac{1}{2}\rho v^2/C_e^2$	Energy density to mass conversion	Inertial mass from kinetic field
$\frac{\omega^2 r^2}{C_e^2}$	Time dilation correction	Vortex-clock slowdown
$\frac{8\pi\rho\_r_c^3}{C_e}$	VAM prefactor	Total mass contribution per vortex

Table 1: Representative appearances of C_e^2 in core VAM expressions.

3. Symbolic Equivalence $C_e^2 \leftrightarrow c^2$

VAM exhibits a direct analogue to relativistic dynamics where C_e^2 plays the same role as c^2:

Time Dilation Analogy:

$$\text{Special Relativity:} \quad d\tau = dt \cdot \sqrt{1 - \frac{v^2}{c^2}}$$

$$\text{VAM Swirl Clock:} \quad d\tau = dt \cdot \sqrt{1 - \frac{v_{\text{swirl}}^2}{C_e^2}}, \quad v_{\text{swirl}} = \omega r$$

Mass-Energy Equivalence:

$$\text{Relativity:} \quad E = mc^2$$

$$\text{VAM:} \quad E = mC_e^2 \Rightarrow m = \frac{\frac{1}{2}\rho v^2}{C_e^2}$$

Gravitational Redshift Analogy:

$$\text{GR:} \quad g_{tt} \approx 1 + \frac{2\Phi}{c^2}$$

$$\text{VAM:} \quad g_{tt}^{\text{eff}} \approx 1 - \frac{v^2}{C_e^2}$$

Quantity	**Relativistic (GR)**	**VAM Equivalent**
Limiting speed	c	C_e
Mass-energy conversion	$E = mc^2$	$E = mC_e^2$
Time dilation	$\sqrt{1 - v^2/c^2}$	$\sqrt{1 - v^2/C_e^2}$
Gravitational potential scaling	Φ/c^2	v^2/C_e^2

Table 2: Mapping of relativistic quantities to their vortex-based analogues in VAM.

Summary Equivalence Table: We conclude that:

$$\boxed{C_e^2 \longleftrightarrow c^2}$$

This symbolic equivalence formalizes the deep analogy between relativistic space-time curvature and the VAM framework of swirl-induced gravitational behavior.