

A_q - The Universal Acceleration Constant.

By Craig M. Seavey

Author of The Modern Newtonian Framework



The Planck scales are dimensional artifacts rather than physical limits. The true minimum and maximum measurable spans of nature are **Tiny Length (ℓ)**, **Tiny Time (τ)**, **Maxi Density (ΩD)**, and **Maxi Energy (ΩE)** all derived from the mattergy–acceleration coupling constant **A_q**. We replace **G**, the **Universal Gravitational Constant**, with **A_q**, the **Universal Acceleration Constant**.

Mathematics operates only on scalar quantities. Simple numbers participate in addition, subtraction, multiplication, and division. A scalar must be dimensionally uniform. Mathematics is structurally scalar-dependent. Any constant used in fundamental equations must behave as a scalar.

G does not behave as a scalar though treated as such. The **Universal Law of Gravity** contains two masses, **m₁** and **m₂**. Any constant that appears in the law must be compatible with a **two-mass structure**. Although the law contains two masses, **G** carries only a **single inverse-mass factor**: $[G] = \text{m}^3 \cdot \text{kg}^{-1} \cdot \text{s}^{-2}$. **G** cancels only one of the two mass terms. The 2nd mass term is not canceled by the structure of **G**. instead canceled by **Frankenstein means** — a stitched-together combination of SI units that carry no ontological meaning.

A_q behaves as a proper scalar. **A_q** carries inherent, uniform, textbook-clean dimensions that arise directly from the mattergy–acceleration coupling:

$$[A_q] = \text{m}^3 \cdot \text{kg}^{-2} \cdot \text{s}^{-2}.$$

A_q carries **kg⁻²**. The **Law of Universal Acceleration** couples two mattergy terms directly to acceleration; a two-mass law requires a double inverse mass constant. **A_q** properly matches the two-mass structure of the **acceleration law**. The dimensional structure of **A_q** is uniform and inherent; **A_q** is not a composite product of unrelated units. **A_q** is a single, indivisible scalar quantity whose dimensions are natural to the coupling itself. **A_q** behaves as a scalar in algebraic operations without producing artifacts

Law of Universal Gravity:

$$F = G \frac{m_1 m_2}{r^2}$$

The gravitational constant G was first obtained experimentally by measuring the tiny attraction between known masses and solving by means of the Law of Universal Gravity.

The modern value of G is said to be $G \approx 6.674 \times 10^{-11} \text{ m}^3 \text{ kg}^{-1} \text{ s}^{-2}$, a quantity that is notoriously harder to pin down experimentally than π is to compute numerically. G is not a scalar. Since G is not a scalar, the Cavendish experiment is best understood as providing empirical calibration data rather than a fundamental constant. The same data can be used to compute the acceleration constant A_Q , which is scalar, invariant, and grounded in the full mattergy expression $(mc^2)^2 + (pc)^2$.

The Cavendish result uses only mass, which corresponds to only one component of the mattergy invariant $(mc^2)^2 + (pc)^2$. The acceleration constant A_Q is computed in the exact same way, using the exact same data. In Cavendish's static, low-velocity regime, the energy-momentum term $(pc)^2$ is effectively zero and can be neglected without loss of accuracy. Consequently, the computation produces the same value (or extremely close to the value) attributed to G .

Once the full invariant is taken into account—where $(pc)^2$ becomes significant—the value of A_Q reduces accordingly. This produces marked and physically meaningful changes in the values of **Tiny Length, Tiny Time, Maxi Density** and **Maxi Energy**.

Law of Universal Acceleration:
$$\mathbf{a} = \mathbf{A}_q \frac{M_1 M_2}{r^2}$$

A_q is a primitive scalar constant that defines the coupling between mattergy and acceleration.

Acceleration is: $\frac{m}{t^2} \dots \mathbf{a} = \mathbf{A}_q (\mathbf{M}) \rightarrow \mathbf{A}_q = \frac{m}{M} \dots$

A_q is primitive and not reducible like **G**; the dimensions of **A_q** are fixed entirely by the relation it enforces between mattergy and acceleration:

$$[\mathbf{A}_q] = \mathbf{m}^3 \mathbf{kg}^{-2} \mathbf{s}^{-2}.$$

Conclusion:

G is an empirical constant tied to macroscopic gravitational behavior, not a fundamental coupling. It does not appear in Special Relativity, Quantum Mechanics, or the invariant energy–momentum relation. Although Einstein himself noted that **G** was an unsatisfactory and non-fundamental constant, he retained it in the field equations because no alternative coupling was available at the time.

A_q couples **mattergy** to **acceleration** directly. **A_q** is QM compatible by construction. Replacing **G** with **A_q** removes the dimensional artifacts that produce the traditional Planck scales and yields invariant-defined **minimum** and **maximum** scale constants **Tiny Length (tl)**, **Tiny Time (tt)**, **Maxi Density (ΩD)**, and **Maxi Energy (ΩE)** without additional assumptions. In the acceleration-based formulation, all dimensional factors cancel cleanly, leaving **A_q** as the sole scalar coupling between two mattergy invariants; this is precisely what makes the Modern Newtonian Framework fundamentally different from Newton’s force-based formulation.

The invariant **mattergy** expression $(\mathbf{mc}^2)^2 + (\mathbf{pc})^2$ defines the **Tiny** and **Maxi** constants through the acceleration coupling **A_q**. The traditional Planck constants do not arise from the SR invariant; those constants are dimensional constructs formed only from **G**, \hbar , and **c**. The contrast shown next demonstrates that replacing **G** with **A_q** shifts the **minimum** and **maximum** measurable spans from pre-relativistic dimensional artifacts to proper scalars.

Mattergy is invariant. $(mc^2)^2 + (pc)^2$

Minimum Scale

Planck Length $l_p = \sqrt{\frac{\hbar G}{c^3}} \rightarrow G = \frac{c^3}{\hbar} l_p^2$



Planck Time $t_p = \sqrt{\frac{\hbar G}{c^5}} \rightarrow G = \frac{c^5}{\hbar} t_p^2$

Tiny Length $l = \hbar^2 A_q \rightarrow A_q = \frac{l}{\hbar^2}$

Tiny Time $l t = \frac{\hbar^2 A_q}{c} \rightarrow A_q = \frac{c l t}{\hbar^2}$

These are minimum scale constants where:

G is the Universal Gravitational Constant.

A_q is the Universal Acceleration Constant.

ħ (h-bar) is the reduced Planck Constant.

c is the speed of light in vacuum.

Mattergy is invariant. $(mc^2)^2 + (pc)^2$

Maximum Scale

Planck Density $D_p = \frac{c^5}{\hbar G^2} \rightarrow G = \sqrt{\frac{c^5}{D_p \hbar}}$



Planck Energy $E_p = \sqrt{\frac{\hbar c^5}{G}} \rightarrow G = \frac{\hbar c^5}{E_p^2}$

Maxi Density $\Omega D = \frac{\hbar A_q^4}{c^9} \rightarrow A_q = \left(\frac{\Omega D c^9}{\hbar} \right)^{1/4}$

Maxi Energy $\Omega E = \frac{\hbar A_q}{c} \rightarrow A_q = \frac{c \Omega E}{\hbar}$

These are maximum scale constants where:

G is the Universal Gravitational Constant.

A_q is the Universal Acceleration Constant.

ħ (h-bar) is the reduced Planck Constant.

c is the speed of light in vacuum.

For the full experience of modernized Newtonian Physics, see:
The Modern Newtonian Framework @ www.newearthinvest.com