

$$1.39e+24 \text{ and The Pfund Mass } M_F = \sqrt{\frac{k_e^2 q_e^4 T}{c G M L^2}} = \sqrt{\frac{c \hbar^2 \alpha^2 T}{G M L^2}}$$

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March 17, 2022

I could go on about how some CFD software uses planck units to reduce computation by reducing the billions of multi-plications times the boltzman constant; but we need to reduce the number constants people have to know down to the 1 we don't (besides masses of subatomic particles).

$$\begin{aligned} \frac{\hbar}{c M_F} &= L_F = \frac{\hbar c}{E_F}; & \frac{\hbar}{c^2 M_F} &= T_F = \frac{\hbar}{E_F}; & q_e &= Q_F \\ k_e &= \alpha M_F^1 L_F^3 T_F^{-2} Q_F^{-2} & \hbar &= 1 M_F^1 L_F^2 T_F^{-1} \\ \mu_0 &= \alpha 4 \pi M_F^1 L_F^1 Q_F^{-2} & c &= 1 L_F^1 T_F^{-1} \\ \epsilon_0 &= \frac{1}{\alpha 4 \pi} M_F^{-1} L_F^{-3} T_F^2 Q_F^2 & N_A &= 1^{**} \\ R_\infty &= \frac{m_e}{M_F} \frac{\alpha^2}{4 \pi} L_F^{-1} & M_F c^2 &= E_F = 1 M_F^1 L_F^2 T_F^2 \\ & & \frac{2 \pi \hbar}{c q_e} &= k_b = 2 \pi M_F^1 L_F^1 Q_F^{-1} \end{aligned}$$

** only way to correct N_A being based on the Dalton = $\frac{1}{12}$ the mass of Carbon isotope C^{12} is to correct the periodic table to use the Pfund Mass = M_F like the example to the right.

1 Dimensionality

Stoney-Mass $M_S = \sqrt{\frac{\hbar \alpha c}{G}}$ dimensions are correct but $M_F = M_S \sqrt{\hbar \alpha}$ gives correct arithmetic for all the equations above to work but to correct dimensions, that's where the $M^{-1/2} L^{-2/2} T^{1/2} = \frac{1}{\sqrt{\frac{M^1 L^2}{T}}}$ comes from.

$$\alpha^2 \hbar = \alpha^2 \frac{M_F L_F^2}{T_F} = \frac{G}{M_F^3 L_F^{-1} T_F^{-2} Q_F^0}$$

but it comes back in the solution for G . However G is wrong to begin with, because with Relativity it doesn't really exist, as it is the curvature of space time. which leads us to our next question:

$$\begin{aligned} \frac{\mu_0 c q_e^2}{2 2 \pi \hbar} &= \frac{2 \pi 10^{-7} 299792458 (1.602176634 \times 10^{-19})^2}{6.62607015 \times 10^{-34}} = \alpha \\ \frac{\mu_0}{2} &= \frac{\hbar \alpha}{c q_e^2}; \quad \frac{\hbar \alpha c^2}{c q_e^2 2 \pi} = k_e; \quad \epsilon_0 = \frac{1}{\mu_0 c^2} \\ &\sqrt{\frac{T_F}{M_F L_F^2} \frac{G}{M_F^3 L_F^{-1} T_F^{-2} Q_F^0}} = \alpha \end{aligned}$$

= 0.00729735257 "It has been a mystery ever since it was discovered more than fifty years ago, and all good theoretical physicists put this number up on their wall and worry about it." [Feynman, 1985, p. 129]. **Let's put it everywhere.**

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2 Speed of Sound = c_0

Given $c_0 = \sqrt{\frac{\gamma_0 N_A k_B T}{M}}$ and $39.947 g \text{ mol}^{-1}$ = molar mass of the argon gas from the experiment measuring c_0 in a purified isotope of argon gas at the Triple-Point of water = 273.16K [dePodesta et al., 2013] Where $U_F = \frac{E_F}{k_b}$, $T = \frac{\text{Kelvin}}{U_F} U_F$, and $\gamma_0 = 5/3$ for monotonic gases. Let's see how that matches up with the $c_0^2 = 94756.245 m^2 s^{-2}$ from the experiment in 2013.

$$c_0 = \sqrt{\frac{\frac{5}{3} 1 k_B \frac{273.16 \text{ Kelvin}}{U_F} U_F}{40.671 M_F}} = 307.701 m s^{-1} \approx \sqrt{c_0^2}$$

$$**\text{adjusted argon gas molar mass} = 40.671 M_F = \frac{39.947}{M_F N_A}$$

3 Time is On Our Side(& Distance)

With a Sympathetic Constant = D_C = light-second / L_F to save our wallets, watches, measuring wheels, and road signage we can still use existing definitions of distance and time.

$$\frac{1.3899982e + 24 \approx \frac{c T_{SI}}{L_F} = D_C}{1.39e + 24} = 0.999998675$$

Perhaps one day for the sake of simplicity, Bureau international des poids et mesures might redefine the second and meter such the D_C is exactly 1.39e+24 rather than approx. 5 almost 6 nines.

4 Conclusion

Remember all wallets, watches, measuring wheels, and road signage are already calibrated to D_C and After the dust settles and all scales and ammeter are calibrated, all that will have to be remembered besides preserving dimensionality when doing calculations is the following:

$$\begin{aligned} \frac{\hbar}{c^2 M_F} \frac{c T_{SI}}{L_F} &= T_F D_C & &= 1 \text{ Second} \\ \frac{\hbar}{c M_F} \frac{\frac{c T_{SI}}{L_F}}{299792458} &= L_F \frac{D_C}{299792458} & &= 1 \text{ Meter} \\ \frac{c T_{SI}}{L_F} q_e &= Q_F D_C & &\approx 222702.257 \text{ Coulombs} \\ \text{Pfund Mass } \frac{c T_{SI}}{L_F} &= M_F D_C & &\approx 2.267061 \text{ grams} \end{aligned}$$



5 Constants

Avogadro constant $N_A = 6.02214076 \times 10^{26} \frac{\text{atoms per kg}}{\text{molar mass}}$

Planck constant $h = 6.62607015 \times 10^{-34} \text{ kg m}^2 \text{ s}^{-1}$

lightspeed constant $c = 299792458 \text{ m s}^{-1}$

electron charge $q_e = 1.602176634 \times 10^{-19} \text{ Coulombs}$

gravity constant $G = 6.67430 \times 10^{-11} \text{ kg}^{-1} \text{ m}^3 \text{ s}^{-2}$

On May 20, 2019 the values of N_A , $\hbar = \frac{h}{2\pi}$, and h , were fixed to the Dalton = $\frac{1}{12}$ the mass of Carbon isotope C^{12} [Bettin]. s = “duration of 9192631770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium 133 atom” [SI, 1968] to finish the definition of c . An international agreement in Paris on Oct. 20 1983 defines the meter as $\frac{1}{299792458}$ the distance light travels in a vacuum in 1 second [Times, 1983].

[Tiesinga et al., 2021] gives us q_e , and G . Just don’t forget Milikan’s Oil Drop or the Cavendish Mitchell Device.

5.1 How the Avogadro constant was measured for the last time

N_A and h were measured using a incredibly round & pure ball of Si^{28} and a Kibble balance and the equations basically verbatim from [Bettin] and [Wood and Bettin, 2019] Where $\alpha^2 m_e c / 2 h = R_\infty$ is the Rydberg constant, $\sum_{i=28}^{30} x_i A_r(^iSi) = A_r(Si)$ average molar mass of a silicon atom in the crystal is calculated using the proportions x_i of the various isotopes iSi , V is Volume of Silicon Sphere, a Lattice parameter of the silicon crystal, 8 is the number of atoms in an elementary cell of the lattice (cube with edge length a). M Molar mass of silicon contained in sphere. m mass of sphere.

$$N = \frac{8 V}{a^3} = \text{Number of atoms in silicon sphere}$$

$$N_A = \frac{M 8 V}{m a^3} = \text{Avogadro constant}$$

$$m(Si) = \frac{m}{N} = \frac{m a^3}{8 V} = m(e) \frac{A_r(Si)}{A_r(e)}$$

$$m(e) = \frac{2 h R_\infty}{c \alpha^2} = \frac{2 (2\pi \hbar) R_\infty}{c \alpha^2}$$

$$h = \frac{c \alpha^2 m a^3}{2 R_\infty 8 V} \frac{A_r(e)}{\sum_{i=28}^{30} x_i A_r(^iSi)}$$

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Supplementary Materials

Only reason I found this was for some reason or another I had just looked at $\sqrt{\hbar \alpha}$, and I had Avogadro constant for Stoney-Mass $M_S = \sqrt{\frac{\hbar \alpha c}{G}}$ mass popping up in a script I had running with some notes to see how the Planck-Units, and the Stoney-Units [Stoney, 1883], baked out the need for certain constants. But when I had left the speed of sound calc to see how the planck units canceled out the Boltzman constant, and the Avogadro constant for M_S also popped up, not exact match but so close I had to do more tests.