A Curious Identity Involving G, Electric Permittivity, Botlzmann Constant

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1 Abstract

There seems to be an identity that relates certain universal constants:

$$k = \sqrt{4\pi\epsilon G} = 8.617(22023) \times 10^{-11}$$

k = Boltzmann Constant; ϵ = Electric Permittivity; G = Gravitational Constant.

There is no real physics that establishes it; it is only discovered accidentally when an attempt is made to combine the two inverse square laws of electrostatic and gravity into one complex inverse square law with complex-valued fundamental particles. The identity may be a clue that relates the forces of gravity, electromagnetism and the nuclear forces.

1.1 keywords :

unified grand theory; Boltzmann constant;unification of forces;

2 Complex inverse-square force law.

Although it is possible to introduce complex charge and mass, a simpler option is to define a complex elementary particle as:

$Z = e + ikm$; e is electric charge, m is mass.

The inverse square law then is:

$Force = 1/4\pi\epsilon \times Z_1 Z_2 / r^2.$

As the electric and gravitational inverse square laws have to hold:

$k = \sqrt{4\pi\epsilon G} = 8.617(22023) \times 10^{-11}$; note that G is only accurate to about 4 significant figures.

Coincidentally, its value to 4 significant figure is the same as that of Boltzmann constant.

Boltzmann constant $= 8.6173324 \times 10^{-11} MevK^{-1}$

Conclusion

The fact that k is equal to Boltzmann constant (and not other universal constant) is interesting. G and permittivity relate to gravitational and electrical forces. Boltzmann constant relates to the internal energy of matter and this ultimately relates to forces within the nucleus of atoms. The internal energy of matter would best be represented as the kinetic energy of the protons and neutrons if we know the form of the nuclear forces. So Boltzmann constant may be a clue as to how the nuclear forces may be unified with the gravitational and electrical forces.