A Different Look at the Power of the Sun

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Abstract

Many philosophers believe that our world can only be described accurately using mathematical equations. Mathematical equations allow a strictly defined interpretation that can serve as a reflection, or picture, of reality in the Universe, and it is supposed that this is the only possible and allowed view of our world. However, it is possible to find mathematical equations that allow the calculation of certain numerical values related to our physical world, not found, however, in physics or astrophysics books. These equations presumably allow for a new different interpretation of the reality of our Universe. But what should we think about it, if a single property, e.g. the gravitational force, could be calculated using different mathematical equations? Here a mathematical formula is presented from which it is possible to calculate the energy density of solar radiation on the surface of the Sun and thus the total power of the Sun and this without using the Solar Constant. There is as yet no theoretical model describing any physical phenomena from which this formula would follow. One possible conclusion from this formula is that physical constants like the Proton mass or the Gravitational Constant are not constants in the Universe and are not even constants in the Milky Way galaxy in which the Sun is located. I assume that the mathematical formulae presented here are understandable to most people interested in physics. At the same time it is one of the following three works („*A Different Look at the Power of the Sun*„, „*A Different Look at the Hydrogen Atom*„ and „*A Different Look at Gravity*„)

allowing to explain, with the help of simple mathematical equations of classical physics, the reality in our Universe more simply and comprehensibly, assuming that new models of physical phenomena will arise, from which the mathematical solutions presented here result. This document can be found in the German[5] version and the Polish[6] version on my website (meinuniversum.de).

1 Introduction

The value of the Sun's total power allows the energy density of solar radiation to be calculated using a simple formula. The energy density of solar radiation is calculated here using only physical constants such as the mass of the Proton, the Elementary charge, the Gravitational constant and the Compton wavelength for the Proton. It is amazing that this formula eventually leads to a new formula that only includes constants describing the electromagnetic properties of the vacuum (electrical resistance), as if there were no mass and gravity or the electromagnetic force were not real. However, based on the current state of knowledge, this is not possible.
In the first place, the total energy output of the Sun and the radiation energy density at its surface have been calculated below using the Solar Constant.

2 Calculations

2.1 Radiant energy density of the Sun at its surface resulting from measurements of the Solar Constant

The physical constants from the CODATA Committee on Data for Science and Technology table were used for the calculations[1]. First, below, the Sun's power was calculated using the Solar Constant determined by satellite measurements around the Earth. The average value of the Sun's power, which was calculated from the value of the Solar Constant, is given here. ($E_0 = 1361\,\frac{W}{m^2}$) [2]). The following data was used for the calculation:
$\hat{r_s} = 6.96342 \cdot 10^8$m - mean radius of the Sun[3],
$AE = \hat{R} = 1.495978707 10^{11}$ m - average distance of the Earth's orbit from the Sun[4].

$$\hat{\Phi}_s = 4\pi \hat{R}^2 \cdot \hat{E}_0 = 3.82753 \cdot 10^{26}\,\frac{\mathrm{J}}{\mathrm{s}} \tag{1}$$

On the surface of the Sun the average power per unit area is:

$$\hat{\phi}_s = \frac{\hat{\Phi}_s}{4\,\pi\,r_s^2} = 6.28151 \cdot 10^7 \frac{\mathrm{W}}{\mathrm{m}^2} \tag{2}$$

The radiation of the Sun propagates uniformly in all directions of space in a vacuum at the speed of light. $c = 299\,792\,458 \frac{m}{s}$. **From this it follows that one cubic metre of space on the surface of the Sun has the following average energy**

$$\hat{\rho}_s = \frac{\hat{\phi}_s}{c} = \mathbf{0.20953}\,\frac{\mathrm{J}}{\mathrm{m}^3} \tag{3}$$

The solar radiant energy density $\hat{\rho}_s$ calculated here can be accepted as a measurement result, since it is based on the average value of the Solar Constant measurements. Next comes a calculation that has nothing to do with the Solar Constant but nevertheless must be in some causal relationship with the value calculated above.

2.2 Energy density of the photon whose energy is equal to the rest energy of the Proton

The rest energy of the Proton E_p is:

$$E_p = m_p c^2 = 1.50327 \cdot 10^{-10}\mathrm{J} \tag{4}$$

The energy of this photon corresponds to the following frequency:

$$f_p = \frac{E_p}{h} \tag{5}$$

and the wavelength of this photon is:

$$\lambda_p = \frac{c}{f_p} = \frac{c\,h}{E_p} = \frac{h}{m_p c} = 1.32141 \cdot 10^{-15}\mathrm{m}. \tag{6}$$

The energy density of this photon can be estimated using the following equation:

$$\rho_p = \frac{E_p}{\lambda_p \left(\frac{\lambda_p}{2}\right)^2} = 2.60603 \cdot 10^{35}\,\frac{\mathrm{J}}{\mathrm{m}^3} \tag{7}$$

This assumes that the photon occupies a volume in space $\lambda_p \cdot \frac{\lambda_p}{2} \cdot \frac{\lambda_p}{2}$. (There is no model of the photon in classical physics, but this formula with the wavelength – $\lambda < 2a$, which cannot move in a hollow conductor (a long box with thin walls) of width a, allows us to suppose that the photon at least in the direction perpendicular to the direction of its movement can interact no further than $\frac{\lambda}{2}$, which gives an interaction plane equal to squared $\frac{\lambda}{2} \cdot \frac{\lambda}{2}$ perpendicular to the direction of the photon's movement).

2.3 Energy density on the surface of the Sun as a function of physical constants

The gravitational force F_G between two protons located at a distance r from each other is:

$$F_G = G\frac{m_p^2}{r^2} \tag{8}$$

where G is the gravitational constant. The electrostatic force between the two Protons F_E located at a distance r from each other is:

$$F_E = \frac{1}{4\pi\epsilon_0}\,\frac{e^2}{r^2} \tag{9}$$

Here e is the Elementary charge and ϵ_0 is the electric field constant.

For further calculations we need the value of the quotient of the gravitational force F_G to the Coulomb force F_E between these two Protons.

This quotient is:

$$\frac{F_G}{F_E} = 4\pi\epsilon_0 G\,\frac{m_p^2}{e^2} = 8.09355 \cdot 10^{-37} \tag{10}$$

It is worth noting that the following simple formula (consisting of (7), (8), (9) and (10)) allows the calculation of a value,

$$\rho_s = \frac{F_G}{F_E}\rho_p = 0.21092\frac{\mathrm{J}}{\mathrm{m}^3} \tag{11}$$

almost identical to the numerical value of $\hat{\rho}_s$ from equation (3).

2.4 Energy density of solar radiation at the solar surface as a function of the physical constants of the vacuum

Formula (11) is presented below taking into account all the physical constants and formulas leading above to obtain it:

$$\rho_s = 4\pi\epsilon_0\,\frac{G\,m_p^2}{e^2}\,\frac{m_p c^2}{\lambda_p\left(\frac{\lambda_p}{2}\right)^2} \tag{12}$$

The value of the gravitational force between two protons located at a distance λ_p from each other is almost equal to the value of the reduced Planck action quantum $\hbar$, but in Newtons, as shown below:

$$F_G(\lambda_p) = \frac{Gm_p^2}{\lambda_p^2} = 1.06936 \cdot 10^{-34}\mathrm{N} \approx \hbar \cdot k_0 \tag{13}$$

with the following variable k_0 as an auxiliary constant in SI units [MKS] to obtain the unit of force:

$$k_0 = \frac{1}{m \cdot s} \tag{14}$$

The value of the momentum of a photon whose energy would correspond to the rest energy of a Proton divided by π is:

$$p = \frac{m_p c}{\pi} = 1.59613 \cdot 10^{-19}\;\frac{kg \cdot m}{s} \approx e \cdot k_1 \tag{15}$$

and is almost equal to the value of the elementary charge e. It is necessary to include the following variable k_1 as an auxiliary constant to obtain the unit of measure for momentum:

$$k_1 = \frac{kg \cdot m}{C \cdot s} \tag{16}$$

Formula (12) has been modified taking into account formulas (13) and (15) – located on the left-hand side. Therefore, it was assumed that the following dependencies are true:

$$\frac{Gm_p^2}{\lambda_p^2} = \hbar \cdot k_0 \tag{17}$$

$$\frac{m_p c}{\pi} = e \cdot k_1 \tag{18}$$

In formula (12), one of the λ_p was replaced by (6) and slightly changed, after which the following formula was obtained:

$$\rho_s = 16\pi^3\epsilon_0\,c\,\frac{G\,m_p^2}{\lambda_p^2}\,\frac{1}{e^2}\,\frac{m_p^2\,c^2}{\pi^2\,h} \tag{19}$$

and using (17) and (18) we obtain:

$$\rho_s = 16\pi^3\epsilon_0\,c\,\frac{\hbar\,k_0}{e^2}\,\frac{e^2\,k_1^2}{h} \tag{20}$$

which reduces from $\hbar = \frac{h}{2\pi}$ to:

$$\rho_s = 8\pi^2\epsilon_0 \; c \; k_2 = 0.20959 \frac{\text{J}}{\text{m}^3} \tag{21}$$

Where:

$$k_2 = \; k_0 \; k_1^2 = \frac{N^2}{C^2} \frac{s}{m} \tag{22}$$

where C stands for Coulomb. Finally, this leads us to the unit $\frac{N}{m^2} \equiv \frac{J}{m^3}$ for energy density.
Given the following formula:

$$c^2 = \frac{1}{\epsilon_0 \mu_0} \tag{23}$$

the following equation (24) is obtained, where only two electromagnetic constants defining the vacuum properties ϵ_0 and μ_0 can be found.

$$\rho_s = 8\pi^2 \sqrt{\frac{\epsilon_0}{\mu_0}} \cdot k_2 = \frac{8\pi^2}{Z_0} \cdot k_2 = \mathbf{0.20959} \frac{\text{J}}{\text{m}^3} \tag{24}$$

The letter Z_0 here denotes the electrical resistance of the vacuum.
This time one cannot fail to notice the consistency of the value obtained in formula (3) up to four decimal places (0.2095).

3 Summary

It has been shown here that it is possible to calculate the total power of the Sun first using only some physical constants (excluding the Solar Constant), as in formulas (11) and (12), which eventually led to formula (24). From equation (24), it presumably follows that the electromagnetic radiation of the Sun is only a property of the vacuum. We should rethink the already forgotten concept of Aether.

It seems that Aether is simply a vacuum. Vacuum is Aether!

References

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