GRAVITATIONAL WAVES STRAIN AMPLITUDE AND HYDROGEN ATOM SPECTRUM

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Abstract .

In this paper will introduce a numerical equivalence between the strain amplitude of a gravitational wave and the wavelength of a photon emited when an electron dropps from the energy level 2 to the ground state .

Keywords . *Gravitational wave ,strain amplitude ,hydrogen atom ,energy level ,photon wavelength .*

Write the simplified formula that describes the strain amplitude of a gravitational wave by means of the dimensionless parameter h

$$h \sim \frac{GM}{c^2}\frac{1}{r}\left(\frac{v}{c}\right)^2$$

$G = 6.674\ x\ 10^{-11}\ m^3\ kg^{-1}s^{-2}$ refers to Newtonian gravitational constant

M is the mass of the system involved

r is the distance to the system

$\frac{v}{c}$ is the ratio of the speeds of masses in the system to the speed of light

Write the Rydberg equation that defines the wavelength of a photon when the energy tansition occurs from the level n_2 to the ground state n_1

$$\frac{1}{\lambda} = R_H\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right) = R_H\frac{3}{4}$$

$R_H = 1.097373\ x\ 10^7 m^{-1}$ is the Rydberg constant for hydrogen

n_1 and n_2 refers to the energy levels 1 and 2 respectivelly

Therefore

$\lambda \sim 1.22\ x\ 10^{-7} m$ that is in the ultraviolet range of the spectrum

Will describe a numerical relationship between the gravitational wave emited by the proton – electron system and the wavelength of a photon when an electron dropps from the $n = 2$ level to the ground state level $n = 1$

$$\frac{Gm_p}{c^2}\frac{1}{L_P}\left(\frac{v}{c}\right)^2\frac{a_0}{\mathrm{e}}\frac{1}{1.22\,x\,10^{-7}m}= R_H\frac{3}{4}\frac{1}{\alpha}$$

$m_p = 1.673\,x\,10^{-27}kg$ refers to the proton mass

$L_P = 1.6162\,x\,10^{-35}m$ refers to the Planck's length

$a_0 = 5.291772\,x\,10^{-11}m$ is the Bohr radius

Set for the moment

$\frac{v}{c} \sim 1$

$\mathrm{e} = 4e^2\,x\,10^{-33}\,m$ it computes as an exponential parameter linked to the variation of the mass of the system : the greater the mass , the greater the value e

$e = 2.7182818 \ldots$

$\alpha = 0.0072973532 \ldots$ refers to the fine structure constant at zero energy