Searching for the Gravific Photons

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It was show that the linear *momentum* transported by electromagnetic waves has a *negative* component, in such way that, when a radiation incides on a surface, it is exerted a pressure on opposite direction to the direction of propagation of the radiation. In addition, it was predicted the existence of photons in which the *negative* component of the *momentum* is greater than the positive one. These photons were called attractive photons or *gravific photons*. Here, we show how to produce and to detect this type of photons.

Key words: Gravity, Gravitation, Electromagnetic Waves, Radiation Pressure.

1. Introduction

Electromagnetic waves transport energy as well as linear *momentum*. Then, if this *momentum* is absorbed by a surface, pressure is exerted on the surface. In a previous paper [1] we shown that this pressure has a *negative* component (*opposite to the direction of propagation of the photons*) due to the existence of the negative linear *momentum* transported by the photons. Then, it was predicted the existence of photons in which the *negative* component of the *momentum* is greater than the positive one. These photons were called *gravific photons*[1] and is expected that they have frequencies greater than $10^{28}\,Hz$. In addition, it was shown that the limit between the spectrum of the gravific photons and the gamma ray spectrum is defined by a characteristic frequency, $2f_g \approx 10^{28} Hz$ (See Fig. 1).

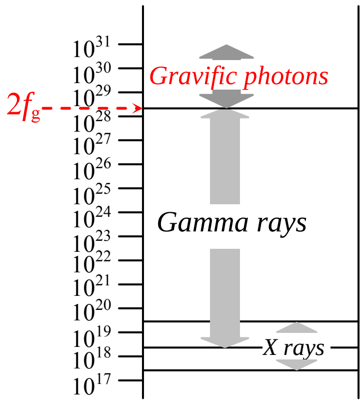

Fig. 1 – The *Gravific Photons* Spectrum (above $2f_g \approx 10^{28} Hz$).

Here, we show how to produce and to detect gravific photons. We start with the well-know process of production of *neutral pions* (Mesons π^0), by means of the collision of high-speed protons. i.e.,

$$p + p \rightarrow p + p + \pi^0 \qquad (1)$$

Neutral pions decay with a much shorter lifetime of 8.4×10^{-17} seconds, producing 2 gamma rays.

$$\pi^0 \rightarrow \gamma + \gamma \qquad (2)$$

When the velocities of the protons are *ultra-relativistic* the energy of the neutral pion, E_{π^0}, is given by [2]

$$E_{\pi^0} = \left(\frac{E_{proton}}{m_{i0(proton)}}\right)^2 m_{\pi^0} c^2 \qquad (3)$$

Neutral pions have rest inertial mass, m_{π^0} equal to $264 m_e$. Thus, the frequency of the gamma rays is

$$f = \frac{1}{2h}\left(\frac{E_{proton}}{m_{i0(proton)}}\right)^2 m_{\pi^0} c^2 \cong$$
$$\cong 1.6\times10^{22}\left(\frac{E_{proton}}{m_{i0(proton)}c^2}\right)^2 \qquad (4)$$

Note that, if $E_{proton} > 10^3 m_{i0(proton)} c^2$, then the produced gamma rays will have frequency $> 10^{28} Hz$. Therefore, by means of collision of *ultra-relativistic* protons it is possible to produce Gravific Photons $\left(f > 2f_g \approx 10^{28} Hz\right)$ [2]. In the system shown in Fig. 2, when the Gravific Photons strike on a plate, it is exerted a pressure on opposite direction to the direction of propagation of the radiation. By measuring the pressure on the plate it is then possible to confirm the existence of the Gravific Photons.

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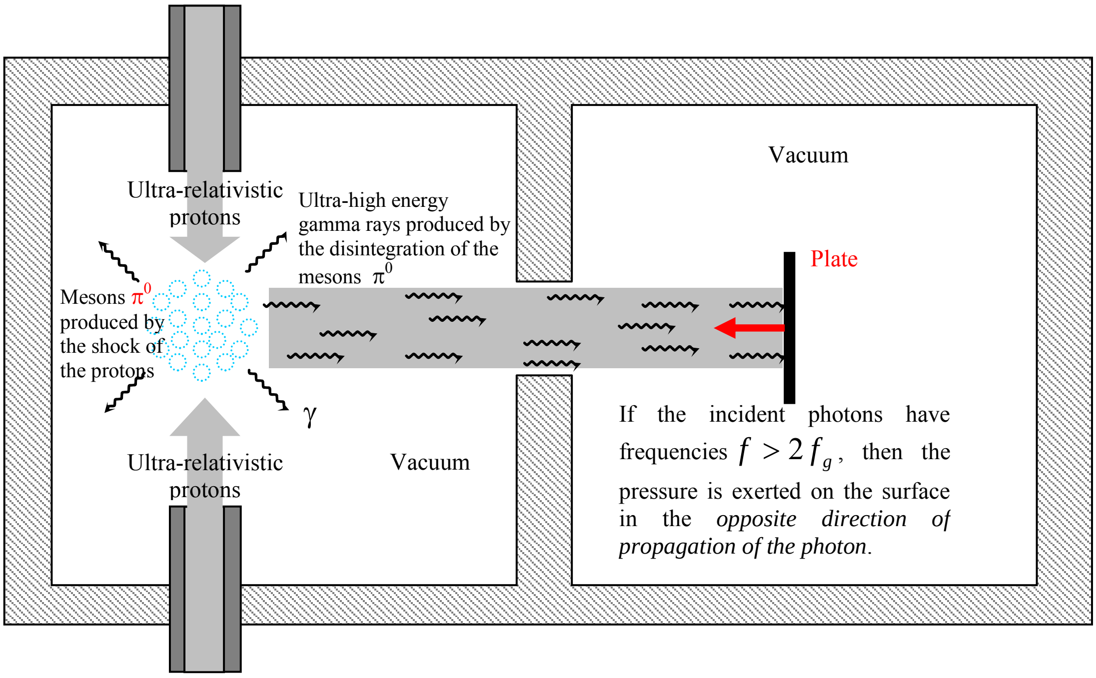
[1] *Gravific* Radiation is electromagnetic radiation and cannot be confused with *gravitational* radiation or *gravitational* waves, which are *ripples* on the space-time (predicted by the Einstein Theory).

[2] At the *Large Hadron Collider* (LHC) the protons each have an energy of 6.5 TeV, giving a total collision energy of 13 TeV. At this energy the protons move at about 0.999999990 *c*. Then the frequency of the gamma rays produced by the disintegration of the neutral pions can reach about 10^{30}Hz.



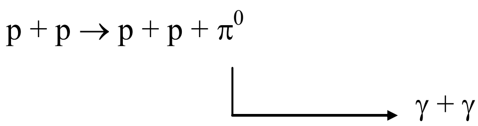


Fig. 2 – If the photons have frequencies $f > 2f_g$ the resultant *momentum* transported by the photon is *negative*. If this *momentum* is absorbed by a surface, pressure is exerted on the surface, in the *opposite direction of propagation of the photon*. This special type of photon is denominated of *attractive photon or Gravific Photons*.

References

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[2] Boldt, E. (1969) *Cosmic Rays Photons*, chap. 4, p.49, in Lectures in High-Energy Astrophysics, STID, NASA, Washington, DC.