Searching for the Gravific Photons

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It was shown 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 and is expected that they have frequencies greater than \( 10^{28} \text{ Hz} \). 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, \( 2f_{g} \approx 10^{8} \text{ Hz} \) (See Fig. 1).

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

\[
p + p \rightarrow p + p + \pi^{0}
\]

Neutral pions decay with a much shorter lifetime of \( 8.4 \times 10^{-17} \text{ seconds} \), producing 2 gamma rays.

\[
\pi^{0} \rightarrow \gamma + \gamma
\]

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

\[
E_{\pi^{0}} = \left( \frac{E_{\text{proton}}}{m_{0}(\text{proton})} \right)^{2} m_{\pi^{0}} c^{2}
\]

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

\[
f = \frac{1}{2h} \left( \frac{E_{\text{proton}}}{m_{0}(\text{proton})} \right)^{2} m_{\pi^{0}} c^{2} \approx
\]

\[
\approx 1.6 \times 10^{22} \left( \frac{E_{\text{proton}}}{m_{0}(\text{proton})c^{2}} \right)^{2}
\]

Note that, if \( E_{\text{proton}} > 10^{3} m_{0}(\text{proton})c^{2} \), then the produced gamma rays will have frequency greater than \( 10^{28} \text{ Hz} \). Therefore, by means of collision of ultra-relativistic protons it is possible to produce Gravific Photons \( (f > 2f_{g} \approx 10^{28} \text{ Hz}) \). 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.

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).
p + p → p + p + π^0

γ + γ

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
