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Green science: Decoding dark photon structure to produce clean energy

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A B S T R A C T

To produce energy from dark photon $\bar{\gamma}$, I have proposed it to collide with Higgs-boson BR(H→ $\gamma\bar{\gamma}$) quantum under extreme relativistic condition (ERC). Just because Higgs-boson, BR(H→ $\gamma\bar{\gamma}$) quantum get excited at extreme relativistic condition and its quantum field get extreme short-range week force to create electromagnetic field. Thus, I have assumed that the results of electrically charged particles of dark photon $\bar{\gamma}$ (non-energy level photon) into the extreme relativistic condition shall indeed create energy level photon, here named as *Hossain Dark Photon* (HdP^-). To confirm this HdP^- transformation by Higgs boson BR(H→ $\gamma\bar{\gamma}$) quantum interaction, I have performed series of mathematical modeling by using MATLAB software. Interestingly, the mathematical calculation revealed that the presence of an extra relativistic condition does transform dark photon $\bar{\gamma}$ into HdP^- at $N_{eff} = 4.08^{+0.71}_{-0.68}$ at 95% level l.c. (confidence limit) respectively dark photon's speed c_{eff} and viscosity c_{vis} parameters as d $c^2_{eff=}0.312 \pm 0.026$ and $c^2_{vis}=^{+0.21}_{-0.16}$, consistent with the expectations of a relativistic free streaming component$\left(c^2_{eff=}c^2_{vis} = 1/3\right)$. With the presence of N_{eff}, the HdP^- photon transformation dynamics was also modeled at *nano* scale by cavity waveguides circuit considering atomic spectra contour maps of Hamiltonian ($H = \sum \omega_{ci} a_i^\dagger a_i + \sum_K \omega_k b_k^\dagger b_k + \sum_{ik}\left(V_{ik} a^\dagger b_k + V_{ik}^* b_k^\dagger a_i\right)$) embedded in a semiconductor. The result revealed that the transformation of *Hossain Dark Photons* (HdP^-) by Higgs-boson [BR(H→ $\gamma\bar{\gamma}$] particle reaction under extreme relativistic condition (ERC) are very much energy level to produce the electricity.

1. Introduction

The solar system mainly consists of dark photons (axions, neutralinos, photinos, and fifth force) which sums up to 80% of the mass present in the solar system and they are comprised of weakly interacting massive particles (WIMPs) that has nearly four times higher energy force as compared to that of light photon (Celik and Acikgoz, 2007; Robyns et al., 2012). In order to analyze the ability of the dark photon to create energy, I have presented a mass constraints modeling along with key systematics parameters and Planck priors, constrains masses to $\sum m\nu = 0.041$ eV at 1-σ level, comparable to constraints expected from Stage 4 CMB by using MATLAB software [1.8]. Having marginalized over many relativistic degrees of freedom (N_{eff}), these constraints are derived which is, in a way, degenerate with the neutrino mass (Gupta et al., 2011; Hossain, 2016). Therefore, I have explored the ability of LSST-era test "standard" models for Hossain dark photon activation by using the same datasets in MATLAB software. After obtaining evidence from N_{eff} measurements for HdP^-, the mass of the HdP^- radiation for fermionic dark photon can be measured at 1-σ level of 0.162 eV and 0.137 eV for dark radiation considering the following theoretical predictions at extreme relativistic condition, (Boukhezzar and Siguerdidjane, 2009):

$$\rho_{rad} = \left[1 + \frac{7}{8}\left(\frac{4}{11}\right)^{4/3} N_{eff}\right] T_\gamma \tag{1}$$

where, ρ_γ denotes the dark photon energy density under the extreme temperature T_γ and effective number of relativistic degrees of freedom N_{eff}, non-instantaneous neutrino decoupling from the primordial photon–baryon plasma (see e.g. 1). Further these theoretical predictions were clarified by Higgs boson physical mechanism to confirm the HdP^- photon activation under extreme relativistic condition by following series of equations (Xiao et al., 2004; Tan et al., 2004; Zhu et al., 2014):

$$\dot{\delta}_v = \frac{\dot{a}}{a}\left(1 - 3C^2_{eff}\right)\left(\delta_v + 3\frac{\dot{a}}{a}\frac{q_v}{k}\right) - k\left(q_v + \frac{2}{3k}\dot{h}\right), \tag{2}$$

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$$\dot{q}_v = kC_{eff}^2 \left(\delta_v + 3\frac{\dot{a}}{a}\ \frac{q_v}{k}\right) - \frac{\dot{a}}{a} q_v - \frac{2}{3}\, k\pi_v \tag{3}$$

$$\dot{\pi}_v = 3c_{vis}^2 \left(\frac{2}{5} q_v + \frac{8}{15}\,\sigma\right) - \frac{3}{5}\, kF_v, 3, \tag{4}$$

$$\frac{2l+1}{k} \dot{F}_{v,l} - \ lF_{v,l-1} = -\left(l+1\right) F_{v,l+1},\ \ l \geq 3, \tag{5}$$

where c_{eff} is the speed of the photon and c_{vis} representing viscosity speed that is equivalent to $c_{eff=}^2 c_{vis}^2 = 1/3$. By carrying out this mathematical analysis by semiconductor at ultra-relativistic condition, I have proposed to utilize the dark photon transformation and convert it into electricity.

Since the dark photon electrons carry a unit negative charge, and via electromagnetic force, two electrons can interact with each other which therefore creates an electron–positron pairs by inducing relativistic ion–ion collisions (Reinhard, 2011; Belkacem et al., 1993) in the proposed extreme relativistic condition which is therefore, the emission of proposed Hossain dark photon shall get a momentum to convert it into energy.

2. Methods and materials

2.1. Dark photon modeling

In this model, I have initially compared fifth-dimensional standard set parameters of density of dark photons, Ω_b and Ω_c considering the angular distance at uncoupling θ at optic intensity to re-ionization τ. Furthermore, at $k = 0.002$ MPC^{-1}, the average normalized spectrum A_S and scalar spectral index n_s were also calculated. Hence, the functional number for relativistic degrees of freedom of photon N_{eff} and the functional speed c_{eff}^2 and viscosity c_{vis}^2 have been identified to confirm the emission of dark photon as $N_V^S = N_{eff}$ with respect perturbation parameters c_{vis} and c_{eff} for extreme relativistic condition by calculating $c_{eff=}^2 c_{vis}^2 = 1/3$ (Faida and Saadi, 2010; Park et al., 2014; Yang et al., 2011). Also, for releasing the dark photon force energy, I have marginalized the input of point sources of ACT and SPT by considering the SZ amplitude A_{SZ}, the amplitude of clustered point sources A_C and the amplitude of Poisson distributed point sources A_p. These were obtained from the calculation of the modified Newton's kinetic energy equation using MATLAB software and expressed as below:

$$\begin{aligned} T_{k.e} &= \int_0^v F \cdot ds = \int_0^v \frac{dp}{dt} \cdot ds = \int_0^v \frac{ds}{dt} dp = \int_0^v v dp \\ &= \int_0^v d\left(pv\right) - \int_0^v p dv. \end{aligned}$$

Since $d(pv) = vdp + pdv$, by differentials

$$\Longrightarrow vdp = d\left(pv\right) - pdv$$

$$\begin{aligned} \Longrightarrow T_{k.e} &= \int_0^v vdp = \int_0^v d\left(pv\right) - \int_0^v pdv, \\ &= \int_0^v vdp = \int_0^v d\left(pv\right) - \int_0^v \left(mv\right) dv, \textit{ definition of momentum} \\ &= pv - \int_0^v \left(\frac{m_0 v}{\sqrt{1-\frac{v^2}{c^2}}}\right) dv, \textit{ anti} - \textit{derivative} \\ &\quad \textit{and relativistic momentum} \\ &= \left(mv\right) v - m_0 \int_0^v \left(\frac{v}{\sqrt{1-\frac{v^2}{c^2}}}\right) dv, \ m_0 \textit{rest mass is constant} \\ &= mv^2 - m_0 \int_0^v \left(\frac{v}{\sqrt{1-\frac{v^2}{c^2}}}\right) dv \\ &= mv^2 - m_0 \cdot \frac{c}{c} \int_0^v \frac{v}{\sqrt{1-\frac{v^2}{c^2}}} dv, \ c = \textit{speed of light is a} \\ &\quad \textit{universal constant} \\ &= mv^2 - m_0 c \int_0^v \frac{v}{\sqrt{1-\frac{v^2}{c^2}}} dv, \textit{ moving constant c inside} \\ &\quad \textit{integral} \end{aligned}$$

$$T_{k.e} = mv^2 - m_0 c \int_0^v \frac{v}{c^2 - v^2} dv, \textit{ moving constant c inside radical.}$$

Furthermore, the SZ oscillation at WMAP, SPT and ACT template has identified the combination of oscillation for the measurable factors for each component (clustered and Poisson distributed) of dark photons modeling identified by using (Benavides and Chapman, 2008; Valluri et al., 1984) MATLAB software with the adaptation of newton work–energy equation. To create energy by transferring dark photon into HdP^- has been described by the following equation where mass of m_0 is at the origin of x axis which is at rest.

$$\begin{aligned} \varDelta K = W &= \int_{r_0}^{r_1} F \cdot dr \\ &= \int_{t_0}^{t_1} \frac{d}{dt} \left(\gamma m\mathbf{v}\right) \cdot \mathbf{v} dt \\ &= \gamma m\mathbf{v} \cdot \mathbf{v} \Big|_{\boldsymbol{t_0}}^{\boldsymbol{t_1}} - \int_{t_0}^{t_1} \gamma m\mathbf{v} \cdot \frac{d\mathbf{v}}{dt} dt \\ &= \gamma m v^2 \Big|_{\boldsymbol{t_0}}^{\boldsymbol{t_1}} - m \int_{v_0}^{v_1} \gamma v dv \\ &= m\left(\gamma v^2 \Big|_{t_0}^{t_1} - c^2 \int_{v_0}^{v_1} \frac{2v/c^2}{2\sqrt{1 - v^2/c^2}} dv\right) \\ &= m\left(\frac{v^2}{\sqrt{1 - v^2/c^2}} + c^2\sqrt{1 - v^2/c^2}\right) \Big|_{t_0}^{t_1} \\ &= \frac{mc^2}{\sqrt{1 - v^2/c^2}} \Big|_{t_0}^{t_1} \\ &= \gamma mc^2 \Big|_{t_0}^{t_1} \\ &= \gamma_1 mc^2 - \gamma_0 mc^2 \\ &= \gamma_1 mc^2 - 0 \quad (\gamma_0 \textit{ is equal to } 0 \textit{ since at time } t_0 \\ &\quad \textit{no energy production}) \\ &= \gamma_1 mc^2. \end{aligned} \tag{6}$$

2.2. Dark photon transformation

Further, to determine the transformation of HdP^-, at a condition of extreme relativistic I have proposed the dark photon dynamics at the *nano* scale through point break waveguides embedded in semiconductor circuit. The reservoirs of photons for this calculation, I have considered both semiconductor and point break as waveguides. Therefore, the *nano* point break defects in the semiconductor panel satisfy purely electron dynamics for continuous states of photon with the adaptation of newton work–energy equation by considering the atomic spectra and contour maps