The Origin of the Unidentified Emission Line Characteristic for the Dark Matter

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Abstract: Here, applying the lacking part of ultimate theory i.e. the Scale-Symmetric Theory, I proved that the unidentified emission line approximately 3.56 keV follows from the weak and electromagnetic interactions in plasma composed of fully ionized atoms of iron (the atomic nuclei of iron) and of free electrons. Temperature of the plasma is adequate for the captures of the free electrons by the ions in their n = 1 state, where n is the principal quantum number. Next, there are the transitions of the emitted X-rays/photons into electromagnetic-type or weak-type weak condensates inside protons. The energy of the weak condensates leaks from protons and again transforms into electromagnetic energy. Such two succeeding transitions via the electromagnetic-type weak condensate decrease the initial energy to 3.5566 keV - it is some analogy to the phenomenon dominating in a LASER, i.e. the wave amplification by stimulated emission of radiation. The obtained theoretical result (3.5566 keV) is consistent with the MOS and PN (they are the two different CCD detectors on XMM-Newton) observations. Probability of creation of the weak-type weak condensates is very low – their production decreases the initial energy to 3.5157 keV.

1. Introduction

The Scale-Symmetric Theory [1], [2] starts from the expansion of the cracked space (it is the inflation of the Higgs field) which leads to the Einstein spacetime. There appear the four succeeding phase transitions of the Higgs field and the atom-like structure of baryons.

The dark matter consists of the additional Einstein-spacetime components entangled with baryonic matter. It appeared due to the evolution of the cosmic structure (the Protoworld) which appeared after the inflation described within the Scale-Symmetric Theory but before the observed expansion of our Universe.

Here, applying the lacking part of ultimate theory i.e. the Scale-Symmetric Theory, I proved that the unidentified emission line ~3.56 keV [3] follows from the weak and electromagnetic interactions in plasma composed of fully ionized atoms of iron (the atomic nuclei of iron) and of free electrons. Temperature of the plasma is adequate for the captures of the free electrons by the ions in their n = 1 state, where n is the principal quantum number. Next, there are the transitions of the emitted X-rays/photons into electromagnetic-type or weak-type additional weak condensates inside protons. The energy of the weak condensates leaks from protons (due to the gluon→photon transitions on the boundary of the strong field of proton, there as well leaks the internal structure of proton which leads to the Feigenbaum constant 4.6692016..

applied in the Chaos Theory [1] – Chapter "Proton and Loops as Foundations of Theory of Chaos") and again transforms into electromagnetic energy. Such two succeeding transitions via the electromagnetic-type weak condensate decrease the initial energy to 3.5566 keV - it is some analogy to the phenomenon dominating in a LASER, i.e. the wave amplification by stimulated emission of radiation. The obtained theoretical result (3.5566 keV) is consistent with the MOS and PN (they are the two different CCD detectors on XMM-Newton) observations [3]. Probability of creation of the weak-type weak condensates is very low – their production decreases the initial energy to 3.5157 keV.

An additional weak condensate overlaps with the weak-type weak condensate in centre of the core of proton [1]. There are two possibilities: the spins of the entangled and confined Einstein-spacetime components an additional weak condensate consists of rotate (it is the additional electromagnetic-type weak condensate) or do not rotate (it is the additional weak-type weak condensate). Since mass (not massless energy) of the weak condensate of the core of proton for defined speed of it is strictly determined so there dominates the production of the additional electromagnetic-type weak condensates i.e. the flux (photons cm^{-2} s^{-1}) is much higher than for the weak-type one – a flux associated with production of the additional weak-type weak condensates can be too low to be measured.

2. Calculations

Most important is the fact that the coupling constant of weak interactions for the weak condensate of the core of baryons, calculated within the Scale-Symmetric Theory, is $\alpha_{W(proton)}$ = 0.0187229 = 1/53.411 [1]. The calculated fine-structure constant is α_{em} = 1/137.036 [1]. Such values lead to hundreds theoretical results consistent or very close to experimental data [1], [2].

Consider a transition of an electromagnetic energy E into an additional electromagnetic-type weak condensate overlapping with the weak-type weak condensate in the centre of the core of protons. In an additional electromagnetic-type weak condensate the spins of the entangled and confined Einstein-spacetime components (they are the carriers of gluons and photons) rotate – gluons and photons are the rotational energies. Creation of such additional weak condensate causes emission of energy equal to $E\alpha_{em}$. Outside protons, the additional weak condensates transform again into electromagnetic energy so there appears the factor $f = \alpha_{em} / \alpha_{W(proton)}$. Due to the electromagnetic→weak transition and the return weak→electromagnetic transition, the initial energy E is reduced to

$$E_{o,em} = E\,(1 - \alpha_{em})\,\alpha_{em} / \alpha_{W(proton)} = 0.38691\ E. \quad (1)$$

In an additional weak-type weak condensate, the spins of the entangled and confined Einstein-spacetime components do not rotate. Creation of such additional condensate causes emission of energy equal to $E\alpha_{W(proton)}$. Due to the two succeeding transitions, the initial energy E is reduced to (probability of emission of such energy is very low)

$$E_{o,W} = E\,(1 - \alpha_{W(proton)})\,\alpha_{em} / \alpha_{W(proton)} = 0.38246\ E. \quad (2)$$

Due to the captures of the free electrons by the fully ionized Fe atoms in their n = 1 states (the n is the principal quantum number), there are emitted X-rays/photons which energy is

$$E_{Fe,n=1} = Z^2\,E_{H,n=1} = 9.19225\ keV. \quad (3)$$

where Z = 26 is the atomic/proton number whereas $E_{H,n=1}$ = 13.598 eV [4] is the energy of electron in the n = 1 state in hydrogen atom.

For $E = E_{Fe,n=1}$, from formulae (1) and (2) we obtain respectively 3.5566 keV and 3.5157 keV (very low flux or lack of it) whereas for nickel (Z = 28) is 4.1248 keV and 4.0774 keV (very low flux or lack of it) but the flux for nickel (~8%) should be about one order of magnitude lower than for iron (~92%).

We can see that most important is the emission line with calculated energy 3.5566 keV.

3. Summary

Here, applying the lacking part of ultimate theory i.e. the Scale-Symmetric Theory, I proved that the unidentified emission line ~3.56 keV follows from the weak and electromagnetic interactions in plasma composed of fully ionized atoms of iron (the atomic nuclei of iron) and of free electrons. Temperature of the plasma is adequate for the captures of the free electrons by the ions in their n = 1 state, where n is the principal quantum number. Next, there are the transitions of the emitted X-rays/photons into electromagnetic-type or weak-type additional weak condensates inside protons. The energy of the weak condensates leaks from protons and again transforms into electromagnetic energy. Such two succeeding transitions via the electromagnetic-type weak condensate decrease the initial energy to 3.5566 keV - it is some analogy to the phenomenon dominating in a LASER, i.e. the wave amplification by stimulated emission of radiation.

For nickel we obtain 4.1248 keV but the flux for nickel (~8%) should be about one order of magnitude lower than for iron (~92%).

We can see that most important is the emission line of calculated energy 3.5566 keV. The energy 3.5566 keV is consistent with the energy of line detected in MOS and PN observations [3].

A higher accuracy for the energy of the detected unidentified emission line characteristic for the very hot plasma (~3.56 keV → 3.5566 keV) and existence or not of very weak line of calculated energy 4.1248 keV should confirm or deny correctness of presented here model.

There are phenomena associated with the expressions which appear in formulae (1) and (2) i.e. $E\alpha_{em}$, $E\alpha_{W(proton)}$ and the ratio $\alpha_{em} / \alpha_{W(proton)} = 0.38976 \approx 0.39$. The energy $E\alpha_{em}$ for the weak condensate inside the core of proton (mass of this condensate E = 424.12 MeV) is 3.095 MeV and leads to mass of the Higgs boson equal to ~124.9 GeV [1], [5], [6], [7] whereas the energy $E\alpha_{W(proton)}$ is 7.94 MeV and leads to mass of the very unstable sham Higgs boson equal to 320.5 GeV [7]. It as well indirectly proves that presented here theory is correct.

The Planck-spacecraft 2013 results via the mainstream neutrino-like physics lead to neutrino species equal to 3.39 i.e. there appears an unidentified fractional value 0.39. On the other hand, the Scale-Symmetric Theory leads to two different species of neutrinos i.e. the electron- and muon-neutrinos and their anti-neutrinos i.e. to four different neutrinos. There can be in existence a third “neutrino” composed of entangled three different neutrinos listed above (in assumption it is the tau-neutrino). The new neutrino-like physics described within the Scale-Symmetric Theory [8] is consistent with the Planck-spacecraft 2013 results for $N_{effective} = 3$ i.e. there does not appear the unidentified fractional value 0.39. Notice that the value 0.39 is equal to the ratio $\alpha_{em} / \alpha_{W(proton)} \approx 0.39$ which appears in formulae (1) and (2) in this paper.

References

[1] Sylwester Kornowski (1 March 2015). “The Scale-Symmetric Physics”
http://vixra.org/abs/1203.0021 .
[2] Sylwester Kornowski (2012 – 2015).
http://vixra.org/author/sylwester_kornowski .
[3] Esra Bulbul, Maxim Markevitch, Adam Foster, Randall K. Smith, Michael Loewenstein, Scott W. Randall (9 June 2014). “Detection of An Unidentified Emission Line in the Stacked X-ray spectrum of Galaxy Clusters”.
arXiv:1402.2301v2 [astro-ph.CO], now accepted in ApJ.
[4] Sylwester Kornowski (7 November 2013). “Derivation of the Pauli Exclusion Principle and Meaning Simplification of the Dirac Theory of the Hydrogen Atom”.
http://vixra.org/abs/1304.0081 .
[5] Sylwester Kornowski (7 January 2013). ”Mass of Higgs Boson, Branching Ratios and Holographic Principle”.
http://vixra.org/abs/1212.0104 .
[6] Sylwester Kornowski (23 September 2013). ”The Complete Mass Spectrum of the Higgs Boson with a Mass of 125 GeV”.
http://vixra.org/abs/1309.0157 .
[7] Sylwester Kornowski (14 October 2013). ”The Different Sequels to the Higgs Mechanism”.
http://vixra.org/abs/1310.0094 .
[8] Sylwester Kornowski (9 July 2013). ”Cosmic Neutrino Background”.
http://vixra.org/abs/1307.0048 .