Direct Detection of Relic Neutrino Background remains impossible: A review of more recent arguments

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Abstract

The existence of big bang relic neutrinos—exact analogues of the big bang relic photons comprising the cosmic microwave background radiation—is a basic prediction of standard cosmology. The standard big bang theory predicts the existence of 10^{87} neutrinos per flavour in the visible universe. This is an enormous abundance unrivalled by any other known form of matter, falling second only to the cosmic microwave background (CMB) photon. Yet, unlike the CMB photon which boasts its first (serendipitous) detection in the 1960s and which has since been observed and its properties measured to a high degree of accuracy in a series of airborne/satellite and ground based experiments, the relic neutrino continues to be elusive in the laboratory. The chief reason for this is of course the feebleness of the weak interaction.

At present, the observational evidence for their existence rests entirely on cosmological measurements, such as the light elemental abundances, anisotropies in the cosmic microwave background, and the large-scale matter power spectrum.

In this paper we argue that Direct Detection of relic neutrino background is indeed impossible by any means, because of two chief reasons: (a) there was no such thing of cosmic singularity, hence the hot big bang/primeval atom model was based on false premises (quantum birth assumption); (b) the neutrino existence itself is not unquestionable, in particular if we consider a realism view of vector potential, A, in classical electrodynamics.

Keywords: relic neutrino background, direct detection, hot big bang, neutrino existence, Pauli's hypothesis.

Introduction

The existence of big bang relic neutrinos—exact analogues of the big bang relic photons comprising the cosmic microwave background radiation—is a basic prediction of standard cosmology. The standard big bang theory predicts the existence of 10^{87} neutrinos per flavour in the visible universe. This is an enormous abundance unrivalled by any other known form of matter, falling second only to the cosmic microwave background (CMB) photon. Yet, unlike the CMB photon which boasts its first (serendipitous) detection in the 1960s and which has since been

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observed and its properties measured to a high degree of accuracy in a series of airborne/satellite and ground based experiments, the relic neutrino continues to be elusive in the laboratory. The chief reason for this is of course the feebleness of the weak interaction.[1]

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In this paper we review some recent arguments, both on pros and cons aspects of direct detection of relic neutrino, and we shall conclude that such a direct detection remains impossible.

Is it possible to directly detect relic neutrino background?

The ideas of detecting CνB have been discussed since the 1960s. However the direct observations of the relic neutrinos is a great challenge to present experimental techniques due to the very low energy ($\sim 10^{-4}$ eV) of relic neutrinos at the present epoch.[5]

It is therefore natural to ask: what are the prospects of a more direct, weak interaction based relic neutrino detection, sensitive in particular to the CνB in the present epoch. It is known, that all the existing measurements probe only the presence of the relic neutrinos at early stages in the cosmological evolution, and this often in a rather indirect way.[2]

It is obvious that either WIMP or hot model of dark matter has not been observed yet. One of the most promising laboratory search, based on neutrino capture on beta decaying nuclei, may be done in future experiments designed to measure the neutrino mass through decay kinematics. [3]

Another method is still underway, i.e. using PTolemy. According to Cocco:

> "The PTolemy project aim at the direct detection of the Cosmological Relic Neutrino background by the use of a Tritium target. Cosmological Relic Neutrino produced in the early stage of the Big Bang are predicted to have thermally decoupled from other forms of matter at approximately 1 second after the Big Bang; they represent the oldest detectable Big Bang relics and as such they carry an invaluable content of information about the genesis and evolution of our Universe. …In particular Tritium is among the nuclei having the most favorable detection conditions." [4]

For a recent discussion on possible measurement of relic neutrino, see [6].

Discussion and an alternative view

Despite all of those progress in developing measures to directly detect relic neutrino background, there is one possibility why such a direct detection remains elusive: because there was no such thing as cosmic singularity. In other words, while we accept such an initial point of creation of the Universe, its beginning came through from a *non-singular origin.*

In two recent papers, we have outlined how a non-singular origin of the Universe is possible, if we consider a turbulence model of Early Universe, because the model includes nonlinear Ermakov equation instead of Friedman equation as usual [8-9].

Taking into considerations two other findings in recent years: (a) Earth Microwave Background by P-M. Robitaille (see [10]-[13]), and (b) theories which suggest that cosmic singularity can be removed; then I submit the following hypothesis: *Direct detection of Cosmic Neutrino Background is impossible because there is no such thing as Cosmic Singularity.*

There are two more arguments, which seem to support our argument as outlined above: i.e. neutrino does not really exist, as well as quark matter does not exist in nature.

According to Yu Baurov:

> "The analysis based on a new hypothesis that the observed physical space is formed from a finite set of *byuons*, "one-dimensional vectorial objects". It is shown in the article that the hypothesis for existence of neutrinos advanced by Pauli on the basis of an analysis of the conservation laws, is not unquestionable since the fulfillment of these laws may be secured by the physical space itself (physical vacuum) being the lowest energy state of a discrete oscillating system originating in the course of *byuon* interaction. This effect is analogous to that of Mossbauer. The direct experiments on detecting neutrinos are explained from the existence of a new information channel due to the uncertainty interval for coordinate of the four-contact *byuon* interaction forming the interior geometry of elementary particles and their properties."[7]

In conclusion, Baurov suggests that "according to the conception being developed on formation of physical space from a finite set of byuons, the invoking the *Pauli's hypothesis on the existence of neutrino is by no means necessary to explanation of weak interactions*." [7]

Concluding remarks

According to standard cosmology, neutrinos should be the most abundant particles in the Universe, after CMB photons. The CMB neutrino is the oldest relic, present since BBN era. However, in the past 5 decades or so, attempts to directly detect Cosmic Neutrino Background have never been succeeded. Taking into considerations two other findings in recent years: (a) Earth Microwave Background by P-M. Robitaille, and (b) theories which suggest that cosmic singularity can be removed; then we submit the following hypothesis: *Direct detection of Cosmic Neutrino Background is impossible because there is no such thing as Cosmic Singularity.*
In other words, we arrive to a conclusion that the Big Bang Standard Cosmology fails completely.

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