Contribution ID: **76** Type: **not specified**

# CNB assisted DE model

Neutrino oscillations require massive neutrinos and therefore some new physics beyond the Standard Model of Particle Physics. The most stringent upper bound on the sum of neutrino masses comes from the cosmological observations. Assuming the hierarchical mass spectrum, this upper bound in the case of normal ordering is about 0.06 eV and in the case of inverted ordering it is around 0.01 eV. On the other hand, the present CNB temperature is estimated to be of the order of 10−4 eV. Thus, one may conclude that one or two neutrino species of CNB are going to be non-relativistic at present. In natural units c = $\hbar$ = 1, the energy scale associated to the present DE density, (ρ0 DE )1/4, is quite close to the heaviest neutrino mass. This fact may look suggestive to consider the coupling between the DE and neutrinos in the hope that one may naturally address the present DE density and matter density coincidence issue. The mechanism is based on the the possible back-reaction of CNB on the quintessence field when neutrinos enter the non-relativistic regime. Because of this back-reaction the scalar field rolling down the effective potential slows down and effectively plays the role of the cosmological constant. Since this transition to the non-relativistic regime of CNB took place just in the resent past one may associate this time-scale to the activation of DE and this way resolve the coincidence issue. This crude statement is usually argued by saying that the factor ρν − 3pν in the equations of motion is almost vanishing for ultra-relativistic neutrinos while it becomes appreciable once neutrinos become non-relativistic. Thus one may expect to have a natural trigger of new dynamics that gets activated once the CνB temperature drops below the scale mν . In most models, however, the effective potential (that the field $\phi$ experiences) develops a minimum which evolves adiabatically and thereby provides us with an approximate solution. This minimum may capture the field much before the neutrinos enter the non-relativistic regime indicating the failure of this argument. We are looking for the model that would allow us a natural realization of the above idea.

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