Page 181 [Giunti and Kim, 2007]: It is also important to note that the presence of sterile right-handed neutrino fields is totally irrelevant for the cancellation of quantum anomalies [31, 201], which constrain the properties of the other elementary fermion fields [268, 572, 517, 516, 606, 805, 915, 551, 459, 692]. As a consequence, the number of sterile right-handed neutrino fields is not constrained by the theory, and the introduction of three right- handed neutrino fields, one for each generation, is not even the minimal extension of the SM, because the presence of only one right-handed neutrino field cannot be excluded.

What are the quantum anomalies referring to?

The it is impossible to find a transformation that leaves both the diagonalized Higgs-lepton Yukawa Lagrangian and the right-handed neutrino fields invariant under global U(1) symmetry. So flavour lepton number is broken by sterile neutrinos? Obviously flavour is not conserved, but I thought that this was due to the introduction of mass, not the introduction of right-handed neutrinos.

CP and T violations depend on the Dirac phases, and if neutrino experiments are independent of the Majorana phases, what is their significance?

"We will show that these flavor states reduce to the stan- dard ones in eqn (7.4) in the case of experiments which are not sensitive to the differences of the contributions of the different neutrino masses to the production and detection processes. This is the case for all neutrino oscillation experiments." Is this "differences of the contributions" referring to Δm^2_{kj} or just m^2_{kj}?

Can IceCube detect CP asymmetry? I.e. is it sensitive to the oscillations of the flavor transition probabilities.

References

[Giunti and Kim, 2007] Giunti, C. and Kim, C. W. (2007). *Fundamentals of Neutrino Physics and Astrophysics*. Oxford University Press. Publication Title: Fundamentals of Neutrino Physics and Astrophysics.