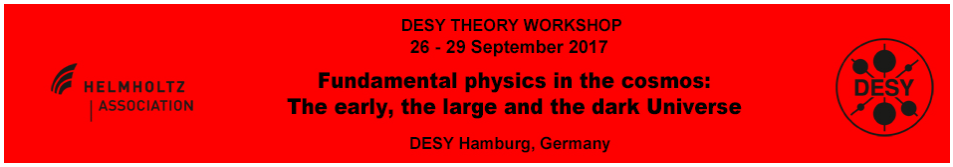

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Testing the low scale seesaw and leptogenesis

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Heavy neutrinos with masses below the electroweak scale can simultaneously generate the light neutrino masses via the seesaw mechanism and the baryon asymmetry of the universe via leptogenesis. The requirement to explain these phenomena imposes constraints on the mass spectrum of the heavy neutrinos, their flavour mixing pattern and their CP properties. We first combine bounds from different experiments in the past to map the viable parameter regions in which the minimal low scale seesaw model can explain the observed neutrino oscillations, while being consistent with the negative results of past searches for physics beyond the Standard Model. We then study which additional predictions for the properties of the heavy neutrinos can be made based on the requirement to explain the observed baryon asymmetry of the universe. Finally, we comment on the perspectives to find traces of heavy neutrinos in future experimental searches at the LHC, NA62, BELLE II, T2K, SHiP or a future high energy collider, such as ILC, CEPC or FCC-ee. If any heavy neutral leptons are discovered in the future, our results can be used to assess whether these particles are indeed the common origin of the light neutrino masses and the baryon asymmetry of the universe. If the magnitude of their couplings to all Standard Model flavours can be measured individually, and if the Dirac phase in the lepton mixing matrix is determined in neutrino oscillation experiments, then all model parameters can in principle be determined from this data. This makes the low scale seesaw a fully testable model of neutrino masses and baryogenesis.

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