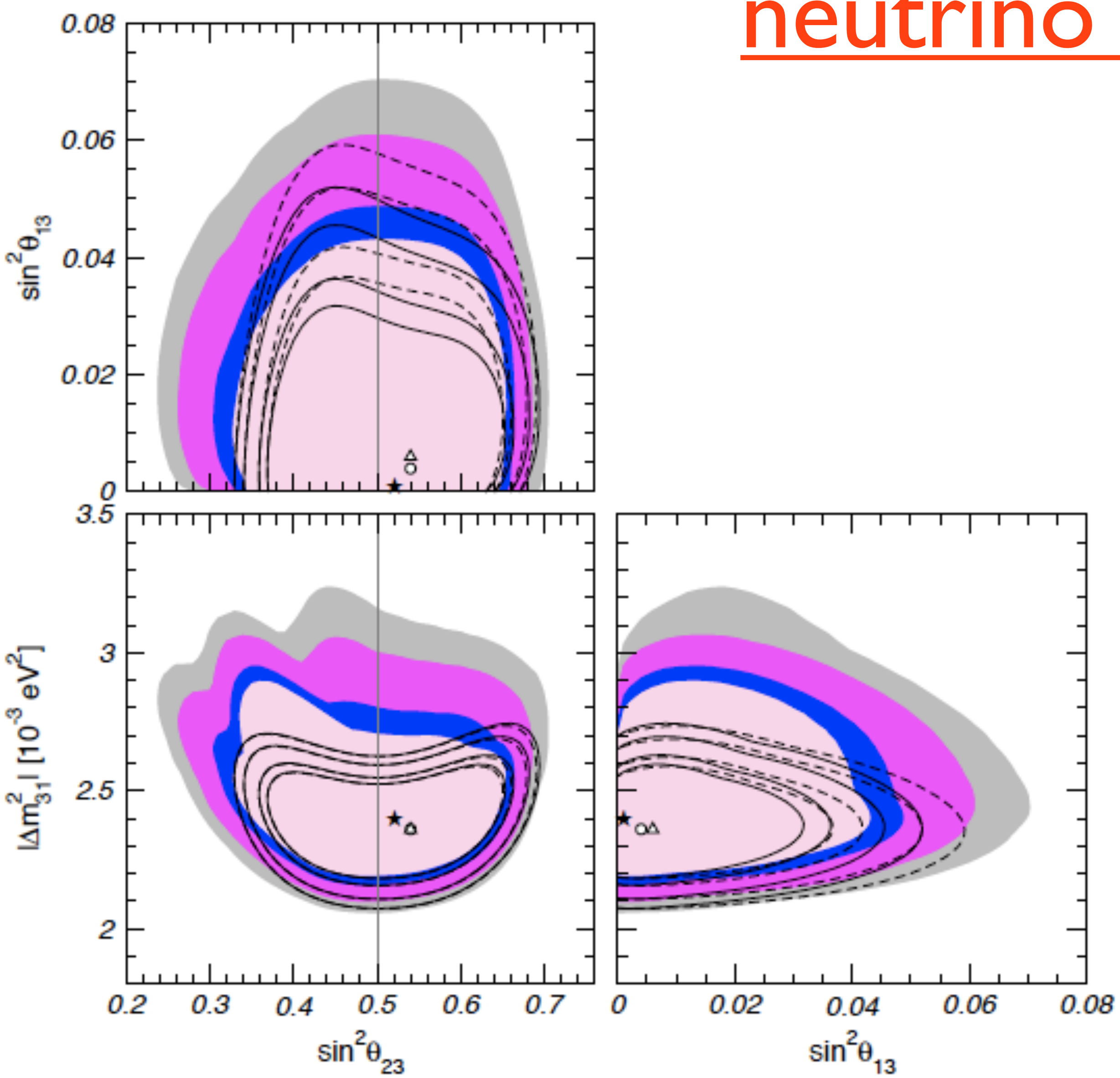
Univ. Barcelona: Concha Gonzalez-Garcia

The group at UB is widely recognized expert on the characterization of the low energy parameterization of neutrino properties -- either masses and mixings, or more exotic properties like new interactions and tests of fundamental theories-- as obtained from direct comparison with existing and upcoming experimental results. These comparisons require extensive numerical work, in what is called global analysis. Particular care in global analysis is required for statistical meaningful results with correct accounting of all sources of uncertainties. The results are important because the determination of flavor structure of the leptons at low energies, is, at this point, our most precise source of information to decipher the underlying new dynamics at high energy. Along the years this work has been done in collaboration with Michele Maltoni, member of the UAM node and more recently also with Thomas Schwetz from Heidelberg node.

Matter effects tests in atmospheric and long baseline neutrino experiments



Gonzalez-Garcia, Maltoni, Salvado

New type of interactions would induce new matter effects in long baseline oscillations. The presence of non-standard interactions can modify the extracted values of the oscillation parameters

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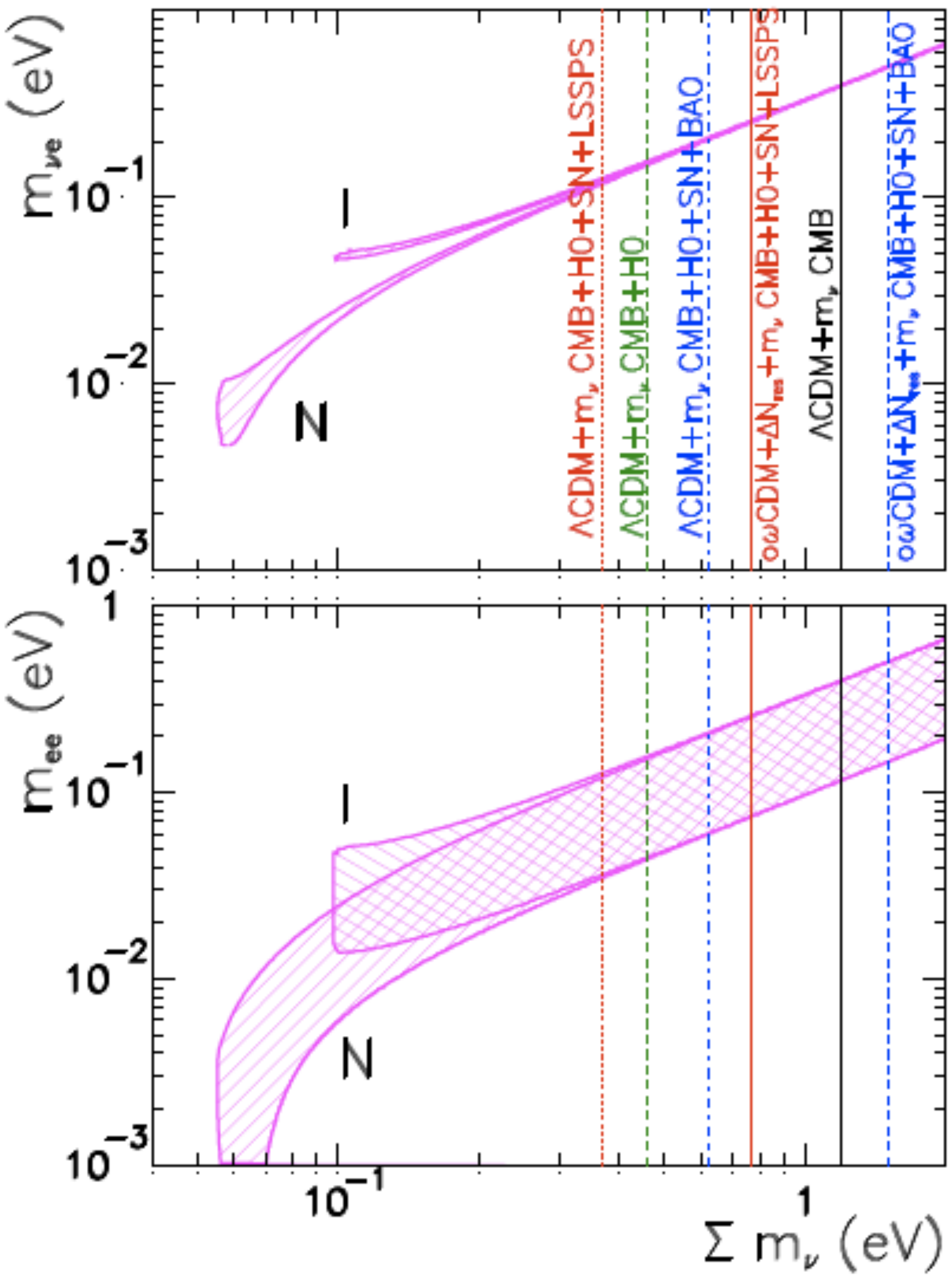
Another important aspect of neutrino physics which we are also involved in is the well known fact that, due to their weak interactions, neutrinos can travel to us from the nucleus of distant astrophysical sources and provide us with relevant information on the mechanisms involved in energy production internal to these sources such as the case with solar neutrinos or high energy neutrinos, these ones detectable at neutrino telescopes such as ICECUBE.

Massive neutrinos also have interesting cosmological consequences. Simply by having non-zero masses they can impact the evolution of the Universe and the structures formed therein in a very specific form. For this reason, information on their abundance and their masses can be extracted, or at least constrained, from the analysis of cosmological data. This a line of research which has mostly involved the work of the student Jordi Salvado, who will receive his PhD this year.



Combining cosmological bounds on neutrino parameters with direct searches and neutrinoless double beta decay

Cosmology disfavours part of the quasi-degenerate spectrum.

Gonzalez-Garcia, Maltoni, Salvado

from Silvia Pascoli's kindness

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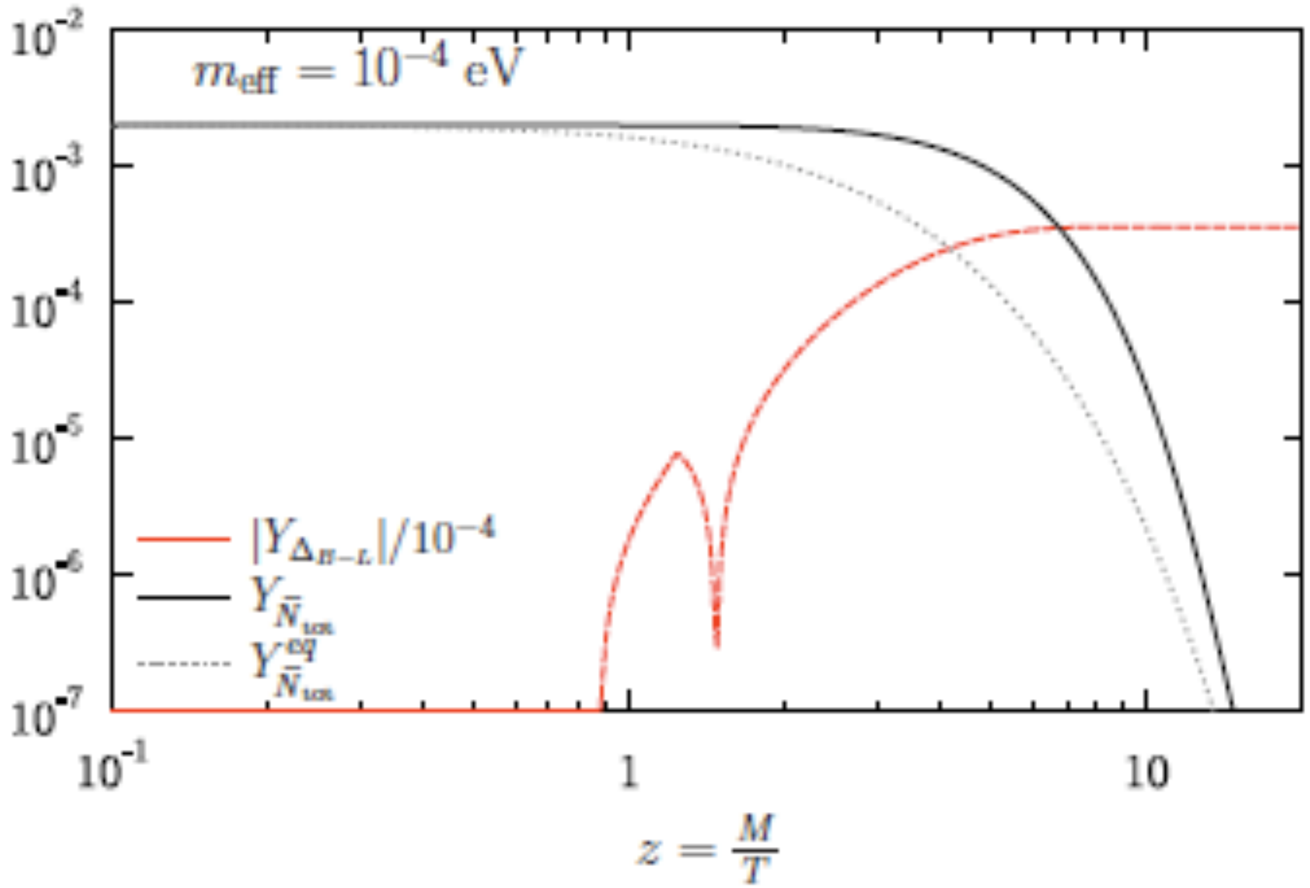
Other relevant cosmological consequence of models of massive neutrinos is that they allow for the possibility of generating the observed matter-antimatter asymmetry in the early Universe via leptogenesis. It constituted the main topic of the dissertation of my Stony Brook student, Chee Sheng Fong and of the work of Juan Racker, who is a member of Invisibles in the UB node moving to UV-IFIC.

Also in the last year we have studied the possibility of testing at the LHC some of the models that are intended to explain the neutrino masses. When possible this opens a very attractive connection between the two lines of research, since the expected signatures at colliders depends on the values of the neutrino parameters extracted from the analysis of neutrino oscillation data.

Soft Leptogenesis



Fong, Gonzalez-Garcia, Nardi

The baryon asymmetry can be generated in the decays of right-handed sneutrinos. The required CP-violation arises from the supersymmetric soft breaking terms.

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