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Search for Non Standard Neutrino Interactions and other Lorentz Invariance Violation effects in neutrino physics

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The neutrino experiments that in the near future are expected to shed some light on a series of open fundamental questions (like the final proof of the leptonic CP violation and the determination of its value, the \theta_23 octant determination, the solution of the mass ordering problem) will also reinforce our knowledge of the general neutrino properties and they could be used to search for possible deviations from the expected oscillation and mass pattern. These signals could be indications of new physics and/or of some exotic effects already postulated by theory. In this talk we will focus our attention on two different possible sectors of analysis: the searches for Lorentz Invariance Violation (LIV) and for Non Standard Neutrino Interactions (NSI).
The LIV effects (that could be also interpreted as "low energy"phenomenological manifestations of very high energy quantum gravity theories) could in principle affect the oscillation probability with deviations from the standard scenario, that can be investigated in experiments studying high energy atmospheric and cosmic neutrinos. We will discuss this possibility with particular attention to the search for isotropic effects predicted by models like the HMSR model, on which we have been working.
Concerning the NSI effects, they can be investigated mainly in solar neutrino physics, with particular attention to the ^7Be and even more to the ^8B part of the spectrum, looking for possible deviations from the traditional MSW scenario especially in the vacuum to matter transition region. The search for these signals can be conducted by experiments with high masses and good energy resolution, to guarantee high statistics and a detailed study of the spectrum. Important synergies could come also from the combined analysis of the solar neutrino and the reactor antineutrino signals.

Collaboration name

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