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P3.048 Neutrinoless double beta decay: expectations, uncertainties and interactions with cosmological surveys

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The current status of the neutrinoless double beta decay ($0\nu\beta\beta$) search is summarized, exploiting the most up-to-date knowledge of the oscillation parameters (2016 global analysis) and of the recent theoretical developments in the understanding of the $0\nu\beta\beta$ process, especially those concerning the nuclear description and its limitations. This also allows to infer expectations and uncertainties for the experimental search for the $0\nu\beta\beta$.

In addition, the strong relevance of post-Planck 2015 cosmological analyses for the study of $0\nu\beta\beta$ is pointed out. Several combinations of data probing different scales indicate very stringent bounds on the sum of the active neutrino masses, Σ . These developments have just become very relevant for numerous laboratory investigations including the ones for the $0\nu\beta\beta$ search. In light of this new available information, the allowed values for the Majorana effective mass are pushed below the 100meV value at 90%C.L.. Such results motivate further cosmological investigations of neutrino masses and have a great importance for the interpretation of future generations of $0\nu\beta\beta$ experiments. If these limits are confirmed, the impact will be tremendous since the possibility of detecting a signal induced by light neutrino exchange will be out of the reach of the next generation of experiments. On the other side, a $0\nu\beta\beta$ signal in the near future would indicate exciting scenarios. In fact, this could be an indication either of some other mechanisms mediating the $0\nu\beta\beta$ transition or that (at least) part of the current cosmological modeling is wrong.