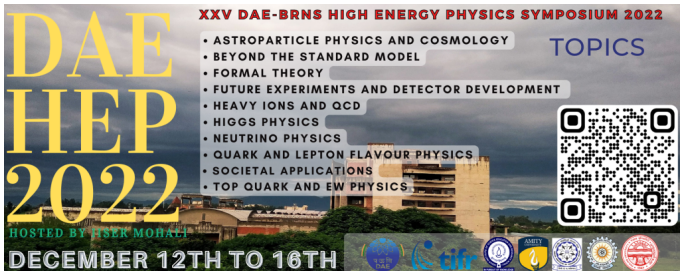

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Discovery potential of multiton detectors in the searches of neutrinoless double beta decay

Wednesday 14 December 2022 17:00 (15 minutes)

Neutrinoless double-β decay ($0\nu\beta\beta$) is the most sensitive experimental probe to answer the question whether neutrinos have Majorana or Dirac nature. The observation of ($0\nu\beta\beta$) would not only establish the Majorana nature of neutrinos, but also provide a measurement of effective mass and probe the neutrino mass hierarchy. The latest precise neutrino oscillation data of the mass differences and mixings among the three neutrino mass eigenstates, along with cosmology data provide slight preferences of the "normal hierarchy"(NH) over the "inverted hierarchy"(IH) in the structures of the neutrino mass eigenstates. In this work, we address issue of the required exposures (target mass × data taking time) of ($0\nu\beta\beta$) projects vs the expected background B0 before the experiments are performed. The background reduction can substantially alleviate the necessity of unrealistic large exposure as the normal mass hierarchy (NH) is probed. The nondegenerate (ND)-NH can be covered with an exposure of order of 100 ton-year, which is only an order of magnitude larger than those planned for next-generation projects—provided that the background could be reduced by order of 10−6 relative to the current best levels[1]. It follows that background suppression will be playing increasingly important and investment-effective role to covering ND-NH in future 0νββ experiments.

[1] M. K. Singh et al., Phy. Rev, D

Session

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