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Kinematical test of large extra dimension in KATRIN

We consider a model with large extra dimensions where 3 right-hand neutrino can propagate in more than four dimensions, this full space-time is called bulk. These neutrinos have Yukawa couplings to the 3 active neutrinos in the 4-dimensional subspace, called brane. The role of large extra dimensions is provide a small Dirac neutrino mass. This mass is test in the forthcoming experiment KATRIN, a experiment to measurement kinematically the neutrino mass using beta decay. The Kurie function of beta decay receives contributions of the Kaluza-Klein tower of neutrinos in large extra dimensions. We show that KATRIN can probe the compactification radius of extra dimensions down to $0.2 \mu\text{m}$ which is better, at least by a factor of two, than the upper limits from neutrino oscillation experiments.

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