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## Two Body Weak Decays Studies in an Ion Storage Ring

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We have studied in a heavy ion storage ring at GSI Darmstadt, Germany the orbital electron capture decays of H-like  $^{140}\text{Pr}$ ,  $^{142}\text{Pm}$  and  $^{122}\text{I}$  ions and found that the time dependence of the electron capture rate is not exponential but time modulated with a period of  $T = 7.06(8)$  s,  $7.10(22)$  s and  $6.04$  s for  $^{140}\text{Pr}$ ,  $^{142}\text{Pm}$  and  $^{122}\text{I}$ , respectively, in the laboratory system of the ions moving with 071% of speed of light (Lorentz factor  $\gamma = 1.43$ ). The modulation amplitude is  $a = 0.20(3)$  for all three nuclei. Such modulation periods correspond to a small energy difference of  $8.6 \times 10^{-16}$  eV for a quantum beat type phenomenon. We attribute it to flavor mixing of massive neutrinos with a squared mass difference of  $2.22(3) \times 10^{-4} \text{ eV}^2$ . It is 2.75 times larger than reported by the KamLAND neutrino oscillation experiment. The difference will be discussed in terms of neutrino mass modification by vacuum polarisation of lepton-W boson pairs in the high Coulomb field of the daughter nuclei.

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