The mass of Electron-Neutrino worked out

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30 August 2013

Abstract

The present paper gives a very simple way how electron-neutrino mass can be calculated using nuclear reaction namely proton-proton one.
It depends only on the measurement precision of the binding energy of deuteron[2], the result may be $m_{\nu_e} = 0.12\ ev$

Consider nuclear reaction $\boldsymbol{p + p \rightarrow d + e^+ + \nu_e}$

In balancing energies between lhs and rhs in this reaction, the electrical potential energy doesn't matter as it is the same on either side because of charges similarities.

Suppose then at first time $m_{\nu_e} = 0$, so let us calculate mass difference :

1) $2m_p - (m_d + m_e) = \Delta(0)$ where $\Delta(0) = 0.420234072\ Mev$

$$2m_p + (m_n - m_n) - (m_d + m_e) = \Delta(0)$$

$$(m_p + m_n - m_d) - (m_n - m_p) - m_e = \Delta(0)$$

let $E_L^0 = m_n + m_p - m_d$ when $m_{\nu_e} = 0$

then

$$E_L^0 = m_n - m_p + m_e + \Delta(0) = 2.224566\ Mev$$

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[2] M. Garçon and J.W. Van Orden : arxiv.org/abs/nucl-th/0102049v1

In fact we have to take into account $m_{\nu_e} \neq 0$, so

$2m_p - (m_d + m_e + m_{\nu_e}) = \Delta(m_{\nu_e})$ where $\Delta(m_{\nu_e})$ the true value of mass difference leading to the exact value of E_L the deuteron binding energy, so

2) $E_L = (m_n - m_p) + m_e + m_{\nu_e} + \Delta(m_{\nu_e})$

. eq 2) – eq 1) leads to $m_{\nu_e} = E_L - E_L^0 + \Delta(m_{\nu_e}) - \Delta(0)$

but at zero approximation $\Delta(m_{\nu_e}) = \Delta(0)$, so

$$m_{\nu_e} = E_L - E_L^0$$

Considering $E_L = 2.22456612\ Mev$ given by [1]. According to the precision of this value we can estimate neutrino's mass

$$\boldsymbol{m_{\nu_e} = 0.12\ ev}$$

[1] M. Garçon and J.W. Van Orden : arxiv.org/abs/nucl-th/0102049v1