Poster session 3 – Wednesday 6 July

P3.027 **Nuclear muon capture measurements on light isotopes in Double Chooz**

M Strait

University of Minnesota, USA

on behalf of Double Chooz collaboration

Using the Double Chooz reactor neutrino detector, we have measured the products of μ^- capture on ^{12}C, ^{13}C, ^{14}N and ^{16}O. Over a period of 490 days, we collected 2.3×10^6 stopping cosmic μ^-, of which 1.8×10^5 captured on these nuclei in the inner detector scintillator or acrylic vessels. The resulting isotopes were tagged using prompt neutron emission (when applicable), the subsequent beta decays, and, in some cases, β-delayed neutrons. Production of these βn isotopes, primarily ^{9}Li, which are $\bar{\nu}_e$ backgrounds, was found at a significance of 5.5σ. The probability of ^{9}Li production per capture on ^{nat}C is $(2.4\pm0.9(\text{stat})\pm0.1(\text{syst}))\times10^{-4}$. We have made the most precise measurement of the rate of ^{12}C$(\mu^-,\nu)^{12}$B to date, $6.57^{+0.11}_{-0.21}$ x 10^3 s^{-1}, or $(17.35^{+0.35}_{-0.59})$% of nuclear captures. By tagging excited states emitting gammas, the ground state transition rate to ^{12}B has been determined to be $5.68^{+0.14}_{-0.23}$ x 10^3 s^{-1}. We compare this rate, and the rates of the excited state transitions, to nuclear models also used for neutrino cross sections.