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WG2 Gamma-ray production in NC interactions

In neutral current (NC) neutrino scattering off nucleus, protons and neutrons contribute almost equally to the cross section (44 and 56%, respectively). To detect the NC interactions one observes the knockout protons or the secondary interactions of neutrons. However, the gamma-rays, produced in de-excitation of residual nucleus, may provide an additional signal for detection of neutral-current events, e.g. in water Cherenkov detectors. We will describe in detail the example of the NC nucleon knockout from p3/2 shell of the oxygen nucleus, showing that this process, contributing ˜42 % of the total O(nu,nu) cross section at neutrino energy 600 MeV, yields a narrow peak of gamma rays of energy 6.3 MeV with branching ratio 100%.

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