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Are anitneutrinos affecting beta-plus decay rates?

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Abstract content
   (Max 300 words)

Inspired by the observed oscillations in the radioactive decay rate of the beta-minus emitters 32Si (Alburger et al., 1986) , 226Ra and 152Eu (Siegert et al., 1998) and more recently 54Mn by Jenkins et al. (2008), and their proposal that these oscillations are related to the periodically varying solar neutrino flux (depending on the Earth-Sun distance as well as solar flares), leads one to believe that an analogous interaction for antineutrinos with beta-plus emitters might occur. To test this hypothesis one would need a source of varying antineutrino flux. Fortunately one does not have to look far as anthropogenic sources come in the form of nuclear reactors where the flux of antineutrinos with a range of energies changes, depending on the operational mode of the reactor. A 3GWth reactor, such as the two at Koeberg nuclear power plant in Cape Town, has an isotropic antineutrino strength of the order of 10^20 antineutrinos per second. In 2011 we were allowed access to the Koeberg nuclear power plant to perform a measurement to investigate the influence of reactor antineutrinos on the beta-plus decay rate of 22Na. During this period reactor unit one was operating at full power while reactor unit two was in outage. By studying the time evolution of the gamma-ray count rates of 22Na as reactor unit two makes the transition from outage to powering up and eventually operating at full power, we investigated what the effect of the varying antineutrino flux is on the decay rate of 22Na, when the source is 23m from the reactor core. In 2012 we performed a confirmation experiment, this time at a distance of 17m from the reactor core of unit one, while unit one makes the transition from on to off, while unit two was operating at full power. The results of these two measurements are presented.

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