

Measurement of β –ray spectra

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Abstract

We measure the momentum spectrum of electrons emitted as β –radiation from a Cs-137 source.

Various electron momenta are observed using a magnetic lens spectrometer. We focus the electron beam by adjusting the magnetic field.

The momentum is defined by a proportionality relation between the adjustable lens current and a constant (k) directly dependent of the geometry of the spectrometer.

k is measured by calibrating the observed spectrum to the well-known K-conversion peak visible in the spectrum.

Using a linear model of the Kurie distribution, the relativistic energy-momentum relation and after correcting for the spectrometer resolution (2 – 3%) we find the value of the kinetic energy of the observed nuclear transition is $T = 0.57 \pm 0.03$ MeV. We compare this result to the theoretical value for the transition energy $T_{theory} = 0.512$ MeV ...