



LNGS SEMINARS

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Precision beta-spectrometry with semiconductor detectors

Abstract

Precision measurements of beta-spectra have always been and are still playing an important role in several fundamental physical problems, predominantly in neutrino physics. Magnetic and electrostatic spectrometers possess the superior energy resolution, but at the same time such devices appear to be very complex and large-scale setups. Since the electron free path at 3 MeV (which is, basically, the maximum beta-transition energy for long-living isotopes) does not exceed 2 g/cm³, solid state scintillation and ionization detectors were effectively employed for detection of electron. In case of semiconductor detectors there is a significant probability of back-scattering from the detector surface that depends on the detector material. The most widespread silicon-based semiconductors have the backscattering probability of the order of 10% for 100 keV electrons at normal incidence. In case of electron energies above 1 MeV and high Z detector materials, it also becomes important to take the bremsstrahlung into account. Here we present a beta-spectrometer devoted for precision beta-spectrometry of forbidden transitions with preliminary tests of its applicability based of response function treatment through an allowed transition of ¹⁴⁴Ce -¹⁴⁴Pr.

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<http://agenda.infn.it/event/drachnev>