

Study of charged particles emitted in β decay of ^{11}Be

Abstract

Delayed emission of charged particles following β decay of neutron-rich beryllium isotope ^{11}Be was investigated in two independent experiments. One of them was conducted at the Laboratori Nazionali del Sud in Catania, Sicily, while the other took place at the HIE-ISOLDE facility in CERN, Geneva. The data collected in the first experiment allowed for the determination of the branching ratio for delayed α particle emission from ^{11}Be at the level of 3.26(45)%. The data obtained from the second measurement were used to determine the energy spectrum of α particles emitted in the β decay of ^{11}Be across the entire energy range, including energies below 500 keV, for which the spectrum was previously unknown. The obtained spectrum was analyzed within the framework of the R-matrix formalism. The results of this analysis are consistent with existing literature data. Additionally, 14 events were identified as candidates for delayed proton emission from ^{11}Be , which allowed for establishing an upper limit for the branching ratio of this emission at the level of 2×10^{-6} . This limit is consistent with results obtained from indirect studies but contradicts the value obtained from the only direct observation of this phenomenon so far.