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The half-life of 212Po

Wednesday, 25 August 2021 12:00 (30 minutes)

The half-life of ^{212}Po (one of the ^{232}Th daughters) was measured with the highest up-to-date accuracy using a thorium-loaded liquid scintillator. The scintillator was produced by a solution of thorium and trioctylphosphine oxide complex in toluene in 0.1 % mass concentration of Th (^{232}Th activity in scintillator is 4.61 Bq/mL). 12 mL of the scintillator was optically connected to a fast photomultiplier tube Hamamatsu R13089-100-11 with 2 ns rise time and 0.17 ns transit time spread (FWHM). The scintillation waveforms were recorded by a high frequency oscilloscope LeCroy WavePro 735Zi-A with a sampling frequency of 20 GS/s and 3.5 GHz bandwidth. In total about 50 millions of events were recorded and about 2.7 millions of BiPo-pairs were selected by using the digital constant-fraction discrimination technique. A rather high signal to background ratio on the level of 0.3×10^6 was achieved in the time interval 80 –1600 ns. The obtained half-life of ^{212}Po is $T_{1/2}$ = (295.1 $\pm$ 0.4) ns which is the most accurate up-to-date (relative uncertainty: 0.14 %). The value is in agreement with the recommended one T1/2 = (294.3 $\pm$ 0.8) ns [1] and with the recent experimental results obtained with a liquid scintillator [2] and a xenon liquid/gas time projection chamber [3].

[1] K. Auranen, E.A. McCutchan, Nuclear Data Sheets for A = 212, Nucl. Data Sheets 168 (2020) 117.
[2] G. Bellini et al., Lifetime measurements of 214Po and 212Po with the CTF liquid scintillator detector at LN
[3] E. Aprile et al., Results from a calibration of XENON100 using a source of dissolved radon-220, Phys. Rev.

Is this abstract from experiment?

Yes

Name of experiment and experimental site

N/A

Is the speaker for that presentation defined?

Yes

Details

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http://www.kinr.kiev.ua/index_en.html

Internet talk

Yes

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