

Precision measurements of ^{210}Bi β -spectrum for neutrino physics tasks.

Wednesday, 13 July 2022 10:00 (20 minutes)

The isotope ^{210}Bi is an element of ^{238}U natural decay chain. As decay product of ^{222}Rn gas and subsequent long-lived ^{210}Pb , the ^{210}Bi isotope is present inside and on the surface of all structural materials. At present, accurate measurement of ^{210}Bi β -spectrum is necessary for background simulation of modern neutrino and dark matter detectors, as well as for other low-background experiments. In particular, the shape of ^{210}Bi β -spectrum is very similar to the spectrum of recoil electrons from the scattering of solar CNO-neutrinos. The β -spectrum was measured with two types of Si-spectrometers developed and manufactured at the PNPI. To register electrons in a spectrometer designed according to the classical "target-detector" scheme, a Si(Li) detector 15 mm in diameter and 7 mm thick was used [1]. The main difference of the new $4\pi\beta$ - spectrometer is the response function, which is close to Gaussian, which does not require careful consideration of electron backscattering from the crystal surface [2,3]. As a result of two independent measurements, the values of the nuclear form factor parameters are determined with an accuracy better than a percent and are consistent with each other.

1. Alekseev I.E., Bakhlanov S.V., Derbin A.V., Drachnev I.S., Kotina I.M., Lomskaya I.S., Muratova V.N., Niyazova N.V., Semenov D.A., Trushin M.V., Unzhakov E.V., Phys. Rev. C 102, 064329 (2020). 2 Alekseev I.E., Bakhlanov S.V., Derbin A.V., Drachnev I.S., Kotina I.M., Lomskaya I.S., Muratova V.N., Niyazova N.V., Semenov D.A., Trushin M.V., Unzhakov E.V. J. Phys.: Conf. Ser. 2103, 012144 (2021).
2. Bakhlanov S.V., Derbin A.V., Drachnev I.S., Kotina I.M., Lomskaya I.S., Muratova V.N., Niyazova N.V., Semenov D.A., Trushin M.V., Unzhakov E.V., Chmell E.A. Instrum. Exp. Tech., 64, 190 (2021).

The speaker is a student or young scientist

No

Section

1. Neutrino physics and nuclear astrophysics

Primary authors: DERBIN, Alexander (Petersburg Nuclear Physics Institute NRC KI); DRACHNEV, Iliia (PNPI NRC KI); Dr KOTINA, Irina (PNPI NRC KI); LOMSKAYA, Irina (PNPI); MIKULICH, Maksim (PNPI); Dr MURATOVA, Valentina (PNPI NRC KI); NIYAZOVA, Nelli; SEMENOV, Dmitrii (PNPI); Dr TRUSHIN, Maxim (PNPI NRC KI); UNZHAKOV, Evgenii (PNPI); CHMELL, Ekaterina (PNPI)

Presenter: DERBIN, Alexander (Petersburg Nuclear Physics Institute NRC KI)

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