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Study of solar activity correlations with Fe-55 and Co-60 nucleus decay parameters

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Temporal variations of nucleus decay parameters studied extensively in last years, their observation can be signal of unknown physical effects of cosmic origin, in particular, induced by solar influence. Several experiments reported annual and daily decay rate oscillations in α - and β -decays of some nuclides at the level of .01 % [1]. Also, correlations of Mn-54 β -decay rate with solar activity, in particular, with X-ray solar flares, reported [2]. BSTU - PhIAN - ITEP collaboration studies decay rate correlations for Co-60 β -decay and Fe-55 inverse β -decay with solar activity. Possible influence of solar activity on nucleus decay rates was studied during 2022 – 2026 for Fe-55 and Co-60 isotopes by means of decay γ -ray registration by semiconductor detectors. 24 significant decay rate deviations from expected exponential decay rate of the order .3 % with duration from 50 to 188 hours were found [3,4]. It was shown that such rate deviations occur 20 – 80 hours before intense solar flare event with reliability of 90%. X-ray ionizing radiation produced during intense solar flares can be significant danger for astronaut health and satellite instrument functioning, hence development of corresponding warning systems can improve radiation safety of space flights. “Raspad” project realized now to perform measurements of Fe-55, Co-60 decay rate parameters at International Space Station and Earth labs to check such methodics applicability for that purpose.

1. E. Alekseev et al. , Phys. Part. Nucl. 47, 1803 (2016); *ibid.* 49, 557 (2018)
2. E. Fischbach et al. , Rev. Space Sci. 145, 285 (2009); *Astrop. Phys.* 59, 47 (2009)
3. S. Bogachev et al. J. Phys.: Conf. Series 1690, 012028–012035 (2020)
4. S. Mayburov et al. Phys. Part. Nucl. 56, 861 (2025)

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