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Radiation hardness of scintillation detectors based on organic plastic scintillators and optical fibers.

Scintillation detectors (SDs) based on organic plastic scintillators and optical fibers are among of the basic detectors at all modern accelerators and in astrophysics and neutrino experiments. In recent years, interest in SDs has increased significantly due to the forthcoming large-scale Updates of LHC, the construction of new accelerators NICA, FAIR, FCC, etc. At the same time, requirements for the stability and reliability of SD operation in the new conditions became stricter and their fulfillment largely depends on the radiation hardness of the scintillators, optical fibers and photodetectors.

The review presents the results of the radiation hardness investigations of various scintillators and optical fibers (scintillating, wave length shifting and clear), and optical glues used to increase the light collection from the scintillators by the fibers.

The influence of various factors (dose, radiation dose rate, scintillator materials, fluors) on light output, light collection and light transmission of the irradiated materials and their recovery is considered. Aging of scintillators can be caused not only by radiation but also by environment effect (temperature, humidity). In the review, to this problem some attention is also given.

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