Development of a 2012 model for the ^{6}Li time analyzer (LiTA12) detector system

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Neutron scattering experiments are indispensable for the structural analysis of substances. Large-scale experimental facilities, like the Japan Proton Accelerator Research Complex (J-PARC), are constructed all over the world. However, there are not enough detectors that detect neutrons well because a neutron is difficult to detect directly. A ^{3}He gas detector [1], which is most often used, is the most ideal detector for neutrons; however, it has a low counting rate and low position resolution.

A neutron detector system which uses a neutron scintillator [2] is one of the solutions. A 2012 model for the ^{6}Li time analyzer (LiTA12) system [3] is developed for overcoming the weaknesses of the ^{3}He detector. The LiTA12 system is a two-dimensional (2-D) detector system that has a high count rate and a comparatively high position resolution. Furthermore, the LiTA12 system attains a high counting rate of 50 million counts per second (2 million counts per second per square centimeter) as of April, 2014, a position resolution of 3 mm, and a detection area of 5 cm × 5 cm. The detection efficiency of the system is approximately 48% compared to that of a ^{3}He detector. The LiTA12 system is expected to be used in J-PARC direct neutron beam experiments, such as small-angle scattering experiments.

References

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