

# Neutron Detector Based on SiPM and CLYC

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## Abstract

The potassium cryolite crystal CLYC (molecular formula  $\text{Cs}_2\text{LiYCl}_6$ ) is a new kind of inorganic scintillator widely used in recent years. The CLYC contains  $^6\text{Li}$  and  $^{35}\text{Cl}$ , respectively, which have large cross section with thermal neutrons and fast neutrons, the nuclides  $^{89}\text{Y}$  and  $^{133}\text{Cs}$  that are high atomic number, and its density is high, so it has high detection efficiency for thermal neutrons, fast neutrons and gamma rays, and also has pulse shape ability for neutrons and gamma rays. Silicon photomultiplier (SiPM) is a new type of high performance semiconductor photodetector, which is composed of arrays of multiple pixels working in Geiger mode in parallel with each other. Each pixel consists of a series of avalanche photodiodes and quenching resistors. SiPM is characterized by its spectral response range from near ultraviolet to near infrared, high photon detection efficiency and fast time response, as well as insensitive to magnetic field, low operating voltage and compact volume. Therefore, the detector based on SiPM and CLYC will have the obvious advantages of high efficiency and convenient use in ray detection and particle discrimination.

**Keywords** : SiPM, CLYC, neutron detector, pulse shape discrimination