

# Gamma-Neutron Scintillator Configurations

CLLBC

Dual Mode Detection

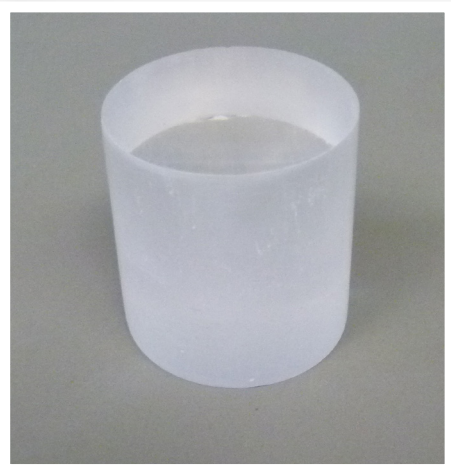
Room Temperature Operation

Single Scintillation Material

The Science Behind the Technology

 **RMD**  
A Dynasil Company

# CLLBC Scintillation Standard Detectors



CLLBC Crystal



CLLBC SiPM Array

CLLBC

$\text{Cs}_2\text{LiLa}(\text{Br},\text{Cl})_6:\text{Ce}$  (CLLBC) is a practical gamma-neutron detector for use as a replacement for both high energy resolution gamma-ray detectors and high pressure Helium-3 tubes for neutron detection. The ease of using pulse height as well as pulse shape discrimination for neutron detection, combined with gamma-ray energy resolution better than NaI:Tl or CsI:Tl and in the working range of LaBr<sub>3</sub>:Ce, make the CLLBC detector an ideal solution for several classes of handheld instruments, including spectroscopic personal radiation detectors (SPRDs) and radionuclide identification devices (RIDs). Other applications requiring gamma-neutron detection can also benefit from using CLLBC

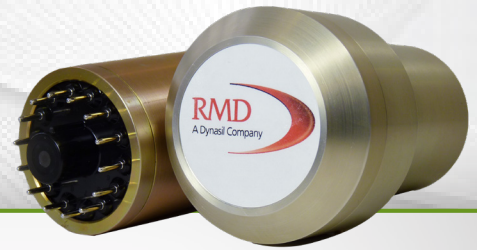
Instrument manufacturers will find the simplicity and compactness of implementing a dual-mode detector to be advantageous. The neutron cross-section of 95% Li-enriched CLLBC is 2.5 times that of <sup>3</sup>He (10 atmospheres), compared on a volume basis. Due to CLLBC's highly proportional response, energy resolution for 662 keV gamma rays can be better than 3.5% using CLLBC (a factor of two improvement over NaI:Tl), depending on the configuration of the detector and photosensor.

CLLBC has a high scintillation light yield of approximately 45,000 photons/MeV. RMD provides CLLBC scintillators in three standard forms.

- CLLBC packaged in a housing with an optical window.
- CLLBC packaged with a photomultiplier tube.
- CLLBC packaged with SiPM arrays.

Additional scintillator shapes and configurations are available. Contact RMD for details.

# CLLBC Scintillation Standard Detectors



Model Numbers	Crystal Shape and Dimensions	Energy Resolution	Package Style
CLLBC-25-PHI-25-S-163	Cylindrical, 25 mm dia., 25 mm tall	$\leq 4\%$ FWHM <sup>1</sup>	Sealed Package. One end window.
CLLBC-25-PHI-25-P-175	Cylindrical, 25 mm dia., 25 mm tall	$\leq 4\%$ FWHM	Sealed package and permanently mounted to a photomultiplier tube.
CLLBC-25-PHI-25-SiPM-187	Cylindrical, 25 mm dia., 25 mm tall	$\leq 4\%$ FWHM	Permanently packaged with SiPM array(s) and temperature sensor.
CLLBC-38-PHI-38-S-163	Cylindrical, 38 mm dia., 38 mm tall	$\leq 4\%$ FWHM <sup>1</sup>	Sealed Package. One end window.
CLLBC-38-PHI-38-P-175	Cylindrical, 38 mm dia., 38 mm tall	$\leq 4\%$ FWHM	Sealed package and permanently mounted to a photomultiplier tube.
CLLBC-38-PHI-38-SiPM-187	Cylindrical, 38 mm dia., 38 mm tall	$\leq 4\%$ FWHM	Permanently packaged with SiPM array(s) and temperature sensor.
CLLBC-50-PHI-50-S-163	Cylindrical, 50 mm dia., 50 mm tall	$\leq 4\%$ FWHM <sup>1</sup>	Sealed Package. One end window.
CLLBC-50-PHI-50-P-175	Cylindrical, 50 mm dia., 50 mm tall	$\leq 4\%$ FWHM	Sealed package and permanently mounted to a photomultiplier tube.
CLLBC-50-PHI-50-SiPM-187	Cylindrical, 50 mm dia., 50 mm tall	$\leq 4\%$ FWHM	Permanently packaged with SiPM array(s) and temperature sensor.

**Note 1:** Energy Resolution is measured at RMD at 22C on a reference photomultiplier tube with a super-bialkali photocathode.

**Note 2:** The above scintillation crystal contains enrichment of the <sup>6</sup>lithium isotope and is subject to U.S. Dept. of Commerce export controls. The scintillation crystal is supplied only to identified customers. For export orders, a verifiable customer identity and statement of use are required.

