

New Generation Inorganic Scintillators:

- High Light output, and fast decay time output pulse.
- Better energy resolution and stability than NaI(Tl).
- Higher maximum throughput at high input count rates.

Lanthanum Bromide, or LaBr₃(Ce), sometimes simply (and incorrectly) referred to as “LaBr”, is one of the new generation of inorganic scintillation gamma-ray detectors. LaBr detectors exhibit improved resolution and faster light decay time.

When used with the latest ORTEC digital electronics, these detectors provide improved resolution, pulse shape, and temperature stability compared to NaI(Tl) types. As a convenience to our customers, ORTEC is pleased to offer various LaBr detector models.

Crystals sizes for the spectroscopy systems range from 1 x 1-in. to 3 x 3-in.



Improved Resolution and Efficiency

As shown in Figure 1, LaBr provides better resolution performance over NaI(Tl) systems by approximately a factor of 2. Note that neither the NaI(Tl) detectors nor the lanthanum bromide detectors can approach the resolution of a HPGe detector.

The efficiency for LaBr is about 1.3 times that of NaI(Tl) for the same volume and the decay time constant is slightly more than 10% of the NaI detector decay time (see Table 1). On the basis of photoelectron yield, LaBr has higher efficiency and temperature stability than NaI(Tl).

High Count Rate Compatibility

Lanthanum bromide detectors can operate over wide dynamic ranges of count rate with little variation in energy resolution.

Figures 2 and 3 show high rate performance of a LaBr detector with an ORTEC digiBASE.

The digiBASE shows minimal resolution degradation over a wide range of count rates.

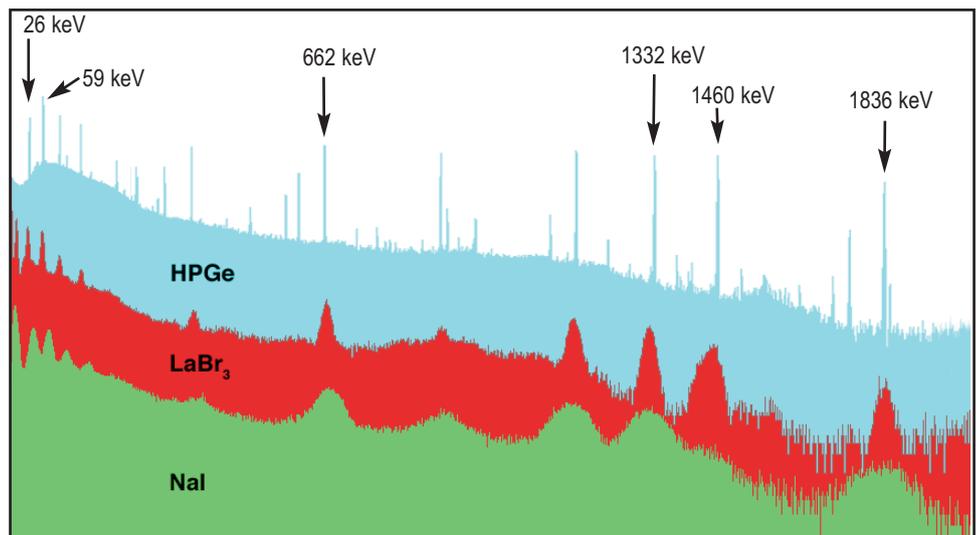


Figure 1. Comparison for LaBr₃(Ce), NaI(Tl), and HPGe spectra.

Table 1. Comparison of Critical Parameter for Lanthanum Bromide Detectors.

Detector Type	Resolution @662 keV (%)	Density (g/cc)	Photoelectron Yield Relative to NaI	Primary Decay Time (μsec)
LaBr ₃ (Ce)	2.8—4.0	5.29	130	0.026
NaI(Tl)	7	3.7	100	0.230
HPGe	0.2 (1.3 keV)	5.35	N/A	N/A

Lanthanum Bromide

Scintillation Detectors

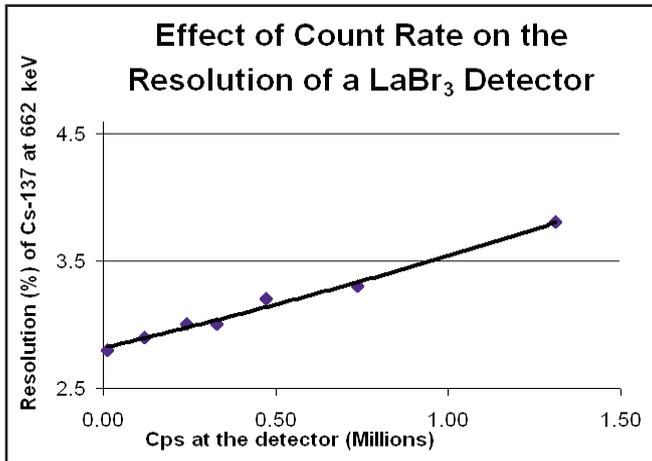


Figure 2.

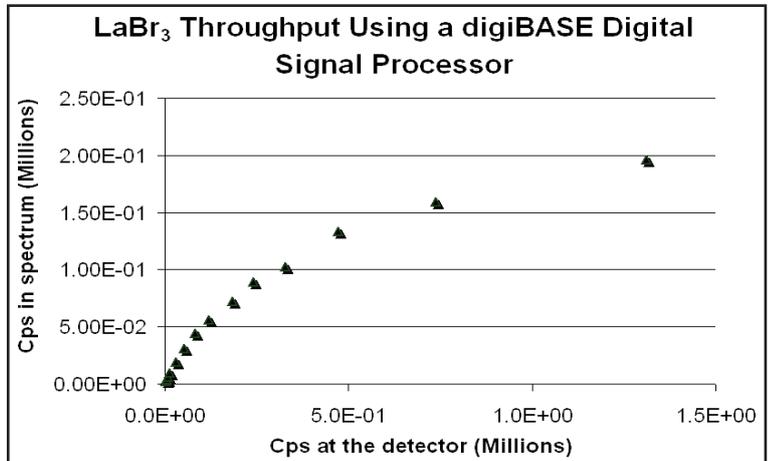


Figure 3.

Spectroscopy Electronics for LaBr

Lanthanum bromide crystals are generally supplied ready mounted on a PMT in the form of an integrated assembly. Many options are available to develop a complete spectroscopy system.

Electronics	PMT Base/Preamp	Amplifier	MCB	HVPS	Comments
digiBASE or digiBASE-E	Included in digiBASE and digiBASE-E	Included in digiBASE and digiBASE-E	digiBASE or digiBASE-E	Included in digiBASE and digiBASE-E	Simplest system — requires computer.
digiDART or digiDART-LF with DIM-296	Included in digiDART-296 and DD-LF-296	Included in digiDART-296 and DD-LF-296	digiDART-296 or DD-LF-296	Included in digiDART-296 and DD-LF-296	Portable applications with or without computer.
NIM solution with 296 ScintiPack PMT Base HVPS	296	NIM amplifier*	MCB**	Included in PMT Base	Requires NIM BIN/PWR and computer. Energy and timing can be simultaneous.
NIM solution with 276 Preamp PMT Base	276	NIM amplifier*	MCB**	556	Requires NIM BIN/PWR and computer. Energy and timing can be simultaneous.
NIM solution with 266 PMT Base and 113 Preamp	266 and 113	NIM amplifier*	MCB**	556	Requires computer. Energy and timing can be simultaneous.

Lanthanum Bromide

Scintillation Detectors

Dimensions and Weights

Model	Base OD	PMT OD	Detector Housing OD	Detector Housing Length	Overall Length	Net Weight	Shipping Weight
LABR-1X1	57 mm 2.2 in	44.5 mm 1.8 in	30.4 mm 1.2 in	26.1 mm 1.0 in	143 mm 5.6 in + pins	~1.08 lb	20 lb
LABR-1.5X1.5	58.7 mm 2.3 in	58.7 mm 2.3 in	43.1 mm 1.7 in	39 mm 1.5 in	151.5 mm 6.0 in + pins	~2 lb	20 lb
LABR-2X2	58.7 mm 2.3 in	58.7 mm 2.3 in	55.8 mm 2.2 in	51.5 mm 2.0 in	164 mm 6.5 in + pins	~3 lb	20 lb
LABR-3X3	58.7 mm 2.3 in	58.7 mm 2.3 in	82.5 mm 3.2 in	157 mm 6.2 in	194 mm 7.6 in + pins	~6 lb	25 lb

Ordering Information

Model	Description
LABR-1X1	LaBr ₃ (Ce) scintillation detector, 1 x 1-in. crystal with 1.5-in. diameter 14-pin PMT; resolution 3.5% guaranteed.
LABR-1.5X1.5	LaBr ₃ (Ce) scintillation detector, 1.5 x 1.5-in. crystal with 2-in. diameter 14-pin PMT; resolution 3.0% target.
LABR-2X2	LaBr ₃ (Ce) scintillation detector, 2 x 2-in. crystal with 2-in. diameter 14-pin PMT; resolution 3.5% target.
LABR-3X3	LaBr ₃ (Ce) scintillation detector, 3 x 3-in. crystal with 3-in. diameter 14-pin PMT; resolution 3.5% target.

Lanthanum Bromide Scintillation Detectors



Specifications subject to change
092023