



# GLAST Burst Monitor



## The calibration of the GLAST Burst Monitor NaI- and BGO-detectors

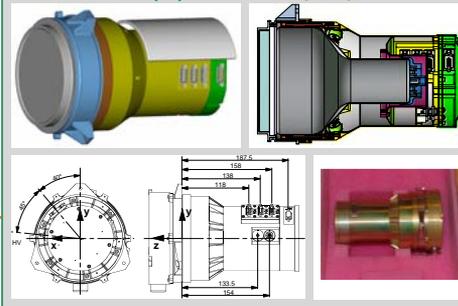
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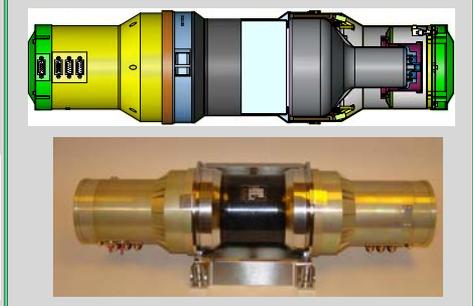
### Introduction:

The next large NASA mission in the field of gamma-ray astronomy, GLAST, is scheduled for launch in September 2007. Aside from the main instrument LAT, a gamma-ray telescope for the energy range between ~20 MeV and ~300 GeV, a secondary instrument, the GLAST burst monitor (GBM), is foreseen. Its task is to increase the detection rate of gamma-ray bursts for the LAT and to extend the energy range of the main instrument to lower energies (from ~10 keV to ~30 MeV). The GBM consists of 12 thin NaI-plates, which allow the determination of the angle of incidence of the gamma radiation. These crystals are sensitive in the energy range between ~10 keV and ~1 MeV. Two additional BGO detectors, which are able to detect gamma-rays in the energy range between ~150 keV and ~30 MeV, are responsible for the overlap in energy measurement with the LAT main instrument and the NaI detectors. All flight detectors were already delivered to NASA. This poster gives an overview of the calibration measurements performed by MPE at the detector level before delivery.

### The GBM-NaI(Tl) Detectors (12 x):



### The GBM-BGO Detectors (2 x):

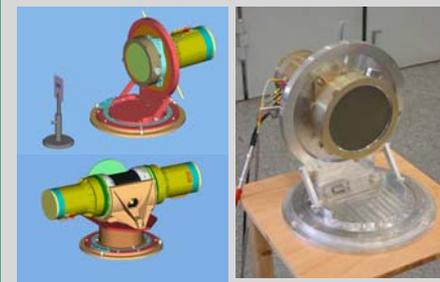


### Purpose of Calibration:

- provide performance verification of the GBM detectors.
- provide benchmark data to compare with calculated detector response data.
- provide accurate, well-characterized data for subsequent scientific analysis.

### The Calibration Setup:

- allows the acquisition of spectra at different angles of incidence.
- high accuracy due to laser adjustment.



### List of Calibration Sources:

Isotope	Energy (keV)	Branch	Intensity (%)	Half-life (yr)	Decay Mode	Gamma Energy (keV)	Gamma Intensity (%)	Gamma Branching Ratio (%)	Gamma Energy (keV)	Gamma Intensity (%)	Gamma Branching Ratio (%)
<sup>137</sup> Cs	604.7	β	100	30.17	β	661.46	84.6	84.6	661.46	84.6	84.6
<sup>60</sup> Co	1120.3	β	100	5.27	β	1120.3	99.85	99.85	1120.3	99.85	99.85
<sup>138</sup> La	403.2	β	100	1.05e5	β	403.2	100	100	403.2	100	100
<sup>134</sup> Cs	464.5	β	100	2.06	β	464.5	100	100	464.5	100	100
<sup>132</sup> I	220.4	β	100	0.2295	β	220.4	100	100	220.4	100	100
<sup>134</sup> Te	203.9	β	100	6.52	β	203.9	100	100	203.9	100	100
<sup>132</sup> Te	214.9	β	100	3.81	β	214.9	100	100	214.9	100	100
<sup>132</sup> Xe	244.5	β	100	3.11	β	244.5	100	100	244.5	100	100
<sup>134</sup> Xe	236.4	β	100	1.92	β	236.4	100	100	236.4	100	100
<sup>136</sup> Xe	247.4	β	100	1.48	β	247.4	100	100	247.4	100	100
<sup>138</sup> Xe	250.2	β	100	1.08	β	250.2	100	100	250.2	100	100
<sup>138</sup> La	286.5	β	100	1.05e5	β	286.5	100	100	286.5	100	100
<sup>138</sup> La	302.9	β	100	1.05e5	β	302.9	100	100	302.9	100	100
<sup>138</sup> La	320.1	β	100	1.05e5	β	320.1	100	100	320.1	100	100
<sup>138</sup> La	348.8	β	100	1.05e5	β	348.8	100	100	348.8	100	100
<sup>138</sup> La	379.8	β	100	1.05e5	β	379.8	100	100	379.8	100	100
<sup>138</sup> La	400.2	β	100	1.05e5	β	400.2	100	100	400.2	100	100
<sup>138</sup> La	424.4	β	100	1.05e5	β	424.4	100	100	424.4	100	100
<sup>138</sup> La	448.2	β	100	1.05e5	β	448.2	100	100	448.2	100	100
<sup>138</sup> La	472.6	β	100	1.05e5	β	472.6	100	100	472.6	100	100
<sup>138</sup> La	496.6	β	100	1.05e5	β	496.6	100	100	496.6	100	100
<sup>138</sup> La	520.2	β	100	1.05e5	β	520.2	100	100	520.2	100	100
<sup>138</sup> La	544.4	β	100	1.05e5	β	544.4	100	100	544.4	100	100
<sup>138</sup> La	568.2	β	100	1.05e5	β	568.2	100	100	568.2	100	100
<sup>138</sup> La	592.6	β	100	1.05e5	β	592.6	100	100	592.6	100	100
<sup>138</sup> La	616.6	β	100	1.05e5	β	616.6	100	100	616.6	100	100
<sup>138</sup> La	640.2	β	100	1.05e5	β	640.2	100	100	640.2	100	100
<sup>138</sup> La	664.4	β	100	1.05e5	β	664.4	100	100	664.4	100	100
<sup>138</sup> La	688.2	β	100	1.05e5	β	688.2	100	100	688.2	100	100
<sup>138</sup> La	712.6	β	100	1.05e5	β	712.6	100	100	712.6	100	100
<sup>138</sup> La	736.6	β	100	1.05e5	β	736.6	100	100	736.6	100	100
<sup>138</sup> La	760.2	β	100	1.05e5	β	760.2	100	100	760.2	100	100
<sup>138</sup> La	784.4	β	100	1.05e5	β	784.4	100	100	784.4	100	100
<sup>138</sup> La	808.2	β	100	1.05e5	β	808.2	100	100	808.2	100	100
<sup>138</sup> La	832.6	β	100	1.05e5	β	832.6	100	100	832.6	100	100
<sup>138</sup> La	856.6	β	100	1.05e5	β	856.6	100	100	856.6	100	100
<sup>138</sup> La	880.2	β	100	1.05e5	β	880.2	100	100	880.2	100	100
<sup>138</sup> La	904.4	β	100	1.05e5	β	904.4	100	100	904.4	100	100
<sup>138</sup> La	928.2	β	100	1.05e5	β	928.2	100	100	928.2	100	100
<sup>138</sup> La	952.6	β	100	1.05e5	β	952.6	100	100	952.6	100	100
<sup>138</sup> La	976.6	β	100	1.05e5	β	976.6	100	100	976.6	100	100
<sup>138</sup> La	1000.2	β	100	1.05e5	β	1000.2	100	100	1000.2	100	100
<sup>138</sup> La	1024.4	β	100	1.05e5	β	1024.4	100	100	1024.4	100	100
<sup>138</sup> La	1048.2	β	100	1.05e5	β	1048.2	100	100	1048.2	100	100
<sup>138</sup> La	1072.6	β	100	1.05e5	β	1072.6	100	100	1072.6	100	100
<sup>138</sup> La	1096.6	β	100	1.05e5	β	1096.6	100	100	1096.6	100	100
<sup>138</sup> La	1120.2	β	100	1.05e5	β	1120.2	100	100	1120.2	100	100
<sup>138</sup> La	1144.4	β	100	1.05e5	β	1144.4	100	100	1144.4	100	100
<sup>138</sup> La	1168.2	β	100	1.05e5	β	1168.2	100	100	1168.2	100	100
<sup>138</sup> La	1192.6	β	100	1.05e5	β	1192.6	100	100	1192.6	100	100
<sup>138</sup> La	1216.6	β	100	1.05e5	β	1216.6	100	100	1216.6	100	100
<sup>138</sup> La	1240.2	β	100	1.05e5	β	1240.2	100	100	1240.2	100	100
<sup>138</sup> La	1264.4	β	100	1.05e5	β	1264.4	100	100	1264.4	100	100
<sup>138</sup> La	1288.2	β	100	1.05e5	β	1288.2	100	100	1288.2	100	100
<sup>138</sup> La	1312.6	β	100	1.05e5	β	1312.6	100	100	1312.6	100	100
<sup>138</sup> La	1336.6	β	100	1.05e5	β	1336.6	100	100	1336.6	100	100
<sup>138</sup> La	1360.2	β	100	1.05e5	β	1360.2	100	100	1360.2	100	100
<sup>138</sup> La	1384.4	β	100	1.05e5	β	1384.4	100	100	1384.4	100	100
<sup>138</sup> La	1408.2	β	100	1.05e5	β	1408.2	100	100	1408.2	100	100
<sup>138</sup> La	1432.6	β	100	1.05e5	β	1432.6	100	100	1432.6	100	100
<sup>138</sup> La	1456.6	β	100	1.05e5	β	1456.6	100	100	1456.6	100	100
<sup>138</sup> La	1480.2	β	100	1.05e5	β	1480.2	100	100	1480.2	100	100
<sup>138</sup> La	1504.4	β	100	1.05e5	β	1504.4	100	100	1504.4	100	100
<sup>138</sup> La	1528.2	β	100	1.05e5	β	1528.2	100	100	1528.2	100	100
<sup>138</sup> La	1552.6	β	100	1.05e5	β	1552.6	100	100	1552.6	100	100
<sup>138</sup> La	1576.6	β	100	1.05e5	β	1576.6	100	100	1576.6	100	100
<sup>138</sup> La	1600.2	β	100	1.05e5	β	1600.2	100	100	1600.2	100	100
<sup>138</sup> La	1624.4	β	100	1.05e5	β	1624.4	100	100	1624.4	100	100
<sup>138</sup> La	1648.2	β	100	1.05e5	β	1648.2	100	100	1648.2	100	100
<sup>138</sup> La	1672.6	β	100	1.05e5	β	1672.6	100	100	1672.6	100	100
<sup>138</sup> La	1696.6	β	100	1.05e5	β	1696.6	100	100	1696.6	100	100
<sup>138</sup> La	1720.2	β	100	1.05e5	β	1720.2	100	100	1720.2	100	100
<sup>138</sup> La	1744.4	β	100	1.05e5	β	1744.4	100	100	1744.4	100	100
<sup>138</sup> La	1768.2	β	100	1.05e5	β	1768.2	100	100	1768.2	100	100
<sup>138</sup> La	1792.6	β	100	1.05e5	β	1792.6	100	100	1792.6	100	100
<sup>138</sup> La	1816.6	β	100	1.05e5	β	1816.6	100	100	1816.6	100	100
<sup>138</sup> La	1840.2	β	100	1.05e5	β	1840.2	100	100	1840.2	100	100
<sup>138</sup> La	1864.4	β	100	1.05e5	β	1864.4	100	100	1864.4	100	100
<sup>138</sup> La	1888.2	β	100	1.05e5	β	1888.2	100	100	1888.2	100	100
<sup>138</sup> La	1912.6	β	100	1.05e5	β	1912.6	100	100	1912.6	100	100
<sup>138</sup> La	1936.6	β	100	1.05e5	β	1936.6	100	100	1936.6	100	100
<sup>138</sup> La	1960.2	β	100	1.05e5	β	1960.2	100	100	1960.2	100	100
<sup>138</sup> La	1984.4	β	100	1.05e5	β	1984.4	100	100	1984.4	100	100
<sup>138</sup> La	2008.2	β	100	1.05e5	β	2008.2	100	100	2008.2	100	100
<sup>138</sup> La	2032.6	β	100	1.05e5	β	2032.6	100	100	2032.6	100	100
<sup>138</sup> La	2056.6	β	100	1.05e5	β	2056.6	100				