

# SAIP 2011



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## **A comparison of analysis methods of gamma-ray spectra obtained with a LaBr<sub>3</sub> scintillation detector**

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### **Content :**

The goal of any measurement and data-analysis technique should always be to minimize uncertainties, whether it is statistical or systematic. Although uncertainties are unavoidable, one can find ways to reduce them depending on the circumstances. High-precision measurements play a crucial role in constraining various quantities. Recently a new inorganic scintillation detector has become available in large cylindrical sizes (e.g. 7.6 cm in diameter and with length over 15 cm). It consists of LaBr<sub>3</sub> and has an energy resolution which is not as good as HPGe, but superior to the energy resolution of NaI and CsI, and does not need to be cooled to LN<sub>2</sub> temperatures. Since La has a naturally radioactive isotope, <sup>138</sup>La, which emits  $\gamma$ -rays, the detector has an internal calibration source for energy and dead-time corrections. Moreover it produces pulses with fast rise time, which allows setting up the electronics such that measurements can be made with a high count rate and a low dead time. Gamma-ray spectra were collected with a 3"×3" LaBr<sub>3</sub> detector for LaBr<sub>3</sub> intrinsic background, <sup>22</sup>Na and <sup>137</sup>Cs which exhibit some gain drifts. A set of off-line analysis methods of these spectra is presented to select the procedure that yields the optimal precision and accuracy.

### **Level (Hons, MSc, PhD, other)? :**

PhD

### **Consider for a student award (Yes / No)? :**

Yes

### **Short Paper :**

No

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