Response Function and Formation Response Matrix

The crystal size of NaI(Tl) used in this simulation is 2 inches by 2 inches = 5.08 cm by 5.08 cm

4th April, 2017

Introduction

- **Distributions measured in physical experiments are usually distorted and transformed by different detector effects.**

- **In order to reproduce the true photon spectrum from the measured one, it is necessary to take into account these effects by the means of the response function.**

- **Normally this response function can be approximated by a response matrix, as obtaining the following expression,**

$$M(E)=R(E,E_o)T(E_o)$$

- **But we are interested with T, therefore**

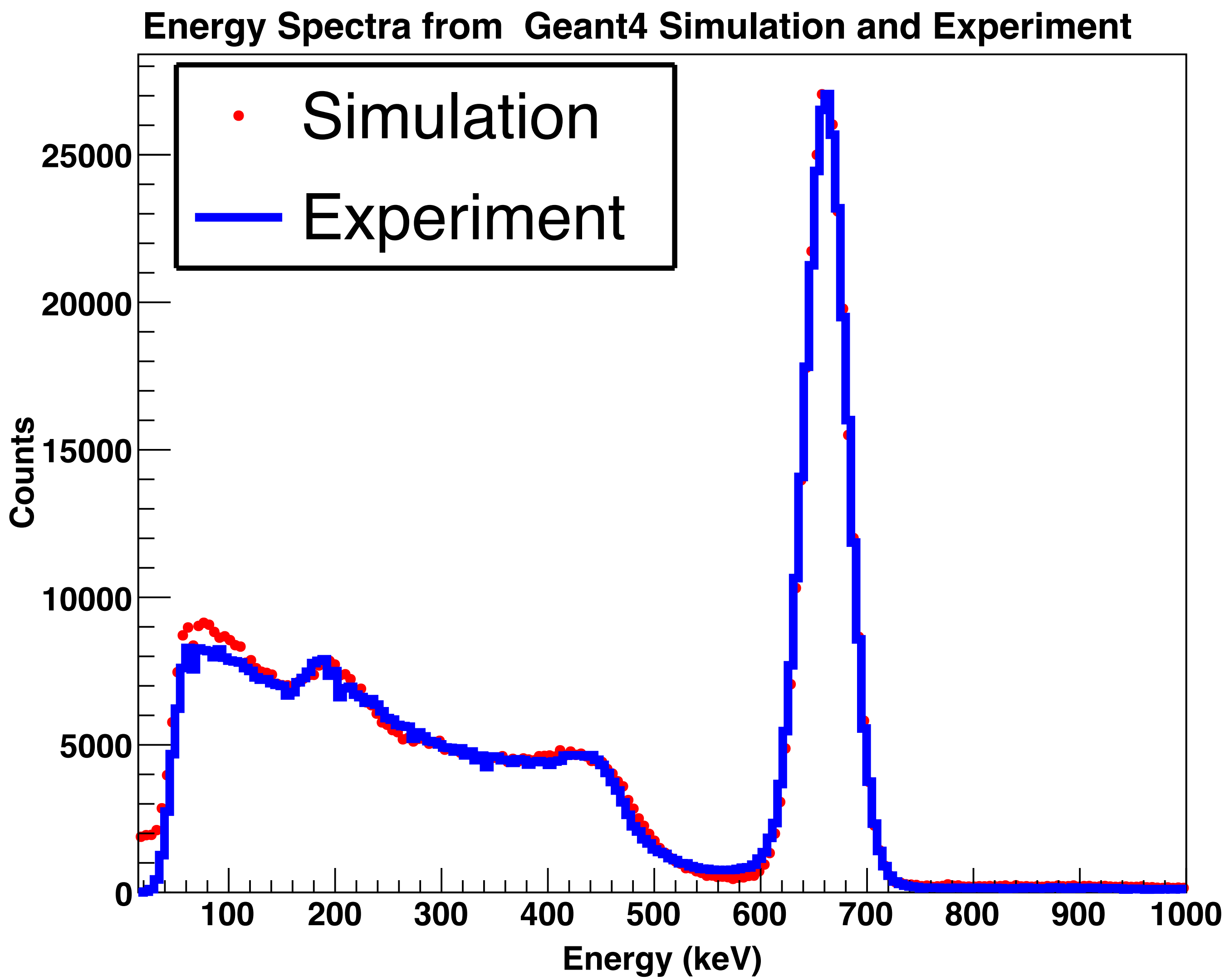
$$T(E_o)=R^{-1}(E,E_o)M(E)$$

- **For the deconvolution method described in equation 2 above, the response function R (E, E_0) should be known for having many energy points.**

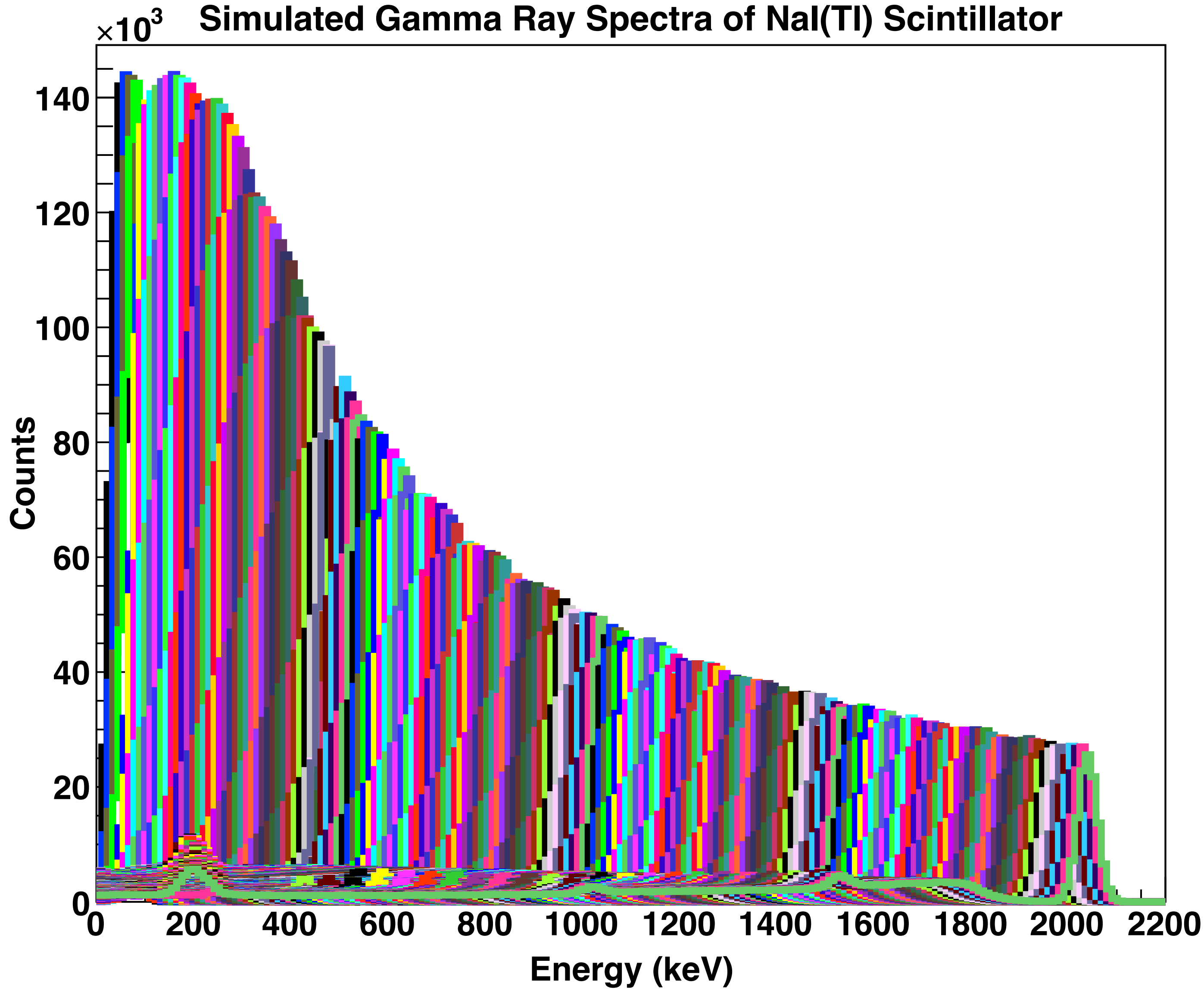
- **Therefore, in this study we used Monte Carlo method for $E\gamma$ = 0.050 - 2.04 MeV.**

- **To check the validity of the simulated results we compare the experiment and simulated spectra obtained from ^{137}Cs source as depicted in Fig. 1.**

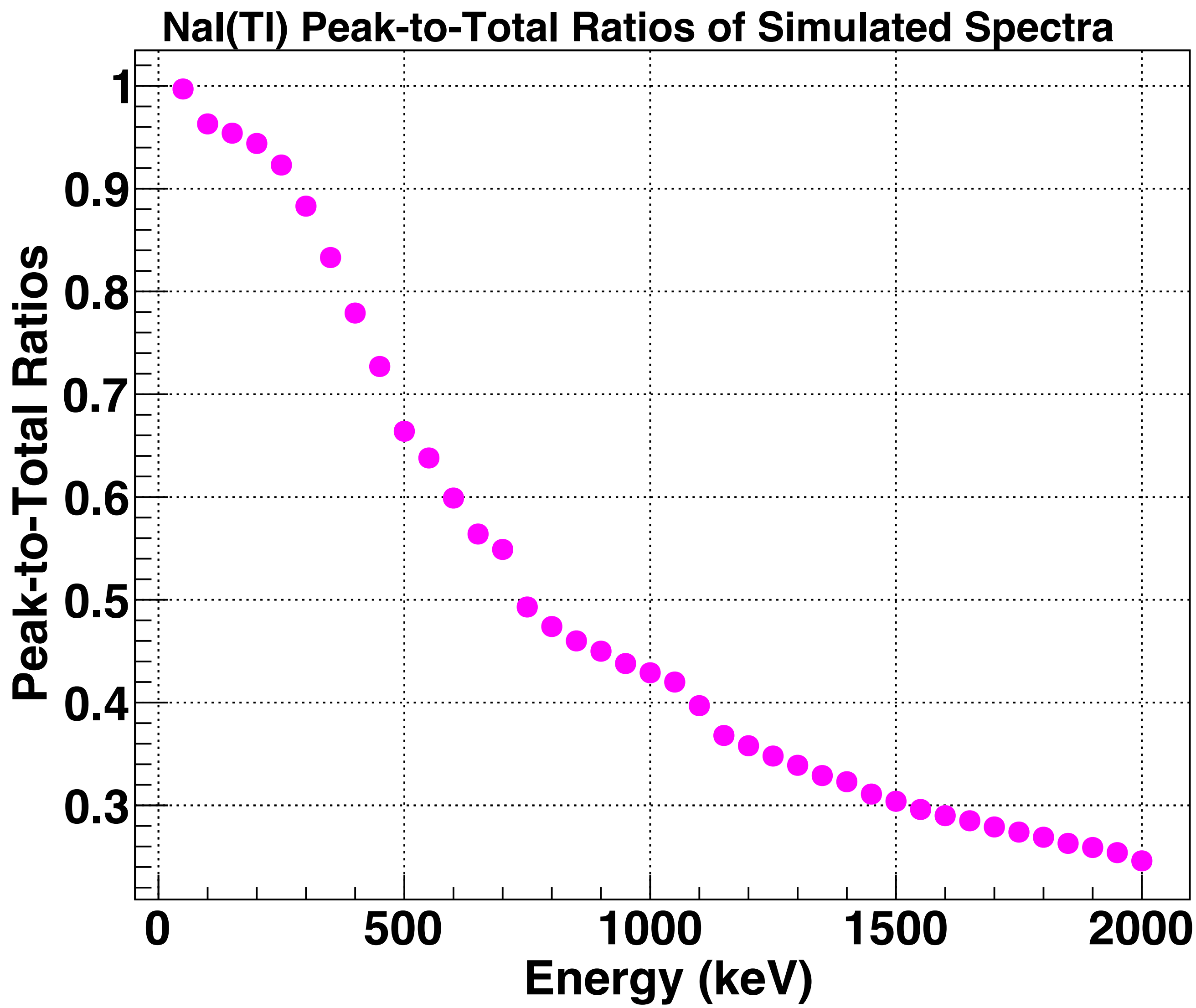
Results and Discussions



- **Good agreement is observed between measured and simulated spectra.**



- **PHD from 200 mono-energetic gamma ray from 50 keV to 2040 keV in the interval of 10 keV.**



- **The P/T curve describes the probability a photon energy E_o, when detected, is completely absorbed.**
- **P/T ratio gives the diagonal element of the response matrix.**

Future Work

- **Formation of 200 by 200 detector response matrix.**
- **To invert the matrix and confirm this method with the measured spectrum.**