# Compton-imaging estimation of the position resolution of the AGATA detectors

F. Recchia
on behalf of the AGATA collaboration

The next generation of γ-ray spectrometers will consist of array of segmented germanium detectors. While the present generation spectrometers use the Compton suppression technique to reduce the background in the reconstructed γ-ray spectra, the new generation arrays will adopt an opposite strategy: the γ-ray tracking.

The performance gain promised by γ-ray tracking arrays, estimated by detailed Monte Carlo simulations, resulted to be strongly depending on the attainable precision in locating each interaction.

An in-beam experiment was performed in order to measure this parameter in experimental condition close to what is expected for the future use of these detectors. The estimated 5 mm FWHM of position resolution are in agreement with the assumptions made in designing the array and even better performance was obtained on a selected dataset. Anyway the estimation of the position resolution of these detectors using an in-beam experiment resulted to be particularly difficult and more sensitive methods can be used instead.

An alternative solution is the Compton-imaging. With γ-ray tracking techniques, clusters of interaction points are validated and re-ordered according to their scattering sequence assuming a given origin for the photons. The result of such a procedure is the photon energy. In Compton-imaging, the energy of the photons is assumed to be known and the location of the source is gathered from clusters of interaction points through knowledge of the Compton scattering mechanism.

As the efficiency of a tracking algorithm depends critically on the precision in locating the individual photon interaction points, i.e. on the position resolution it has been demonstrated that the quality of the image reconstructed through Compton scattering depend as well on the same parameter. Hence this method was used to gather another estimation of the position resolution.

In my presentation I will briefly review the principles of Compton imaging and present the preliminary result of the tests performed with AGATA detectors.