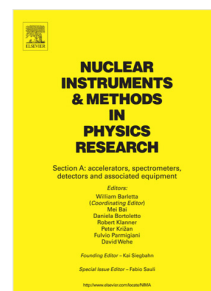


## Accepted Manuscript

Building blocks of a multi-layer PET with time sequence photon interaction discrimination and double Compton camera

V. Ilisie, V. Giménez-Alventosa, L. Moliner, F. Sánchez, A.J. González, M.J. Rodríguez-Alvarez, J.M. Benlloch



PII: S0168-9002(18)30443-1  
DOI: <https://doi.org/10.1016/j.nima.2018.03.076>  
Reference: NIMA 60718

To appear in: *Nuclear Inst. and Methods in Physics Research, A*

Received date: 12 January 2018  
Revised date: 7 March 2018  
Accepted date: 30 March 2018

Please cite this article as: V. Ilisie, V. Giménez-Alventosa, L. Moliner, F. Sánchez, A.J. González, M.J. Rodríguez-Alvarez, J.M. Benlloch, Building blocks of a multi-layer PET with time sequence photon interaction discrimination and double Compton camera, *Nuclear Inst. and Methods in Physics Research, A* (2018), <https://doi.org/10.1016/j.nima.2018.03.076>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## Building blocks of a multi-layer PET with time sequence photon interaction discrimination and double Compton camera

V. Ilisie<sup>a,\*</sup>, V. Giménez-Alventosa<sup>a</sup>, L. Moliner<sup>a</sup>, F. Sánchez<sup>a</sup>, A. J. González<sup>a</sup>,  
M. J. Rodríguez-Alvarez<sup>a</sup>, J. M. Benloch<sup>a</sup>

<sup>a</sup>*Instituto de Instrumentación para Imagen Molecular (I3M),  
Centro Mixto CSIC - Universitat Politècnica de València, Camino de Vera SN, 46022,  
Valencia, Spain*

---

### Abstract

Current PET detectors have a very low sensitivity, of the order of a few percent. One of the reasons is the fact that Compton interactions are rejected. If an event involves multiple Compton scattering and the total deposited energy lays within the photoelectric peak, then an energy-weighted centroid is the given output for the coordinates of the reconstructed interaction point. This introduces distortion in the final reconstructed image. The aim of our work is to prove that Compton events are a very rich source of additional information as one can improve the resolution of the detector and implicitly the final reconstructed image. This could be a real breakthrough for PET detector technology as one should be able to obtain better results with less patient radiation. Using a PET as a *double Compton camera*, by means of Compton cone matching i.e., Compton cones coming from the same event should be compatible, is applied to discard randoms, patient scattered events and also, to perform a correct matching among events with multiple coincidences. In order to fully benefit experimentally from Compton events using monolithic scintillators a multi-layer configuration is needed and a good time-of-flight resolution.

*Keywords:* PET, monolithic scintillator, Compton camera, TOF, multi-layer

---

\*Corresponding author

Email address: [victor.ilisie@i3m.upv.es](mailto:victor.ilisie@i3m.upv.es) (V. Ilisie)

Download English Version:

<https://daneshyari.com/en/article/8166270>

Download Persian Version:

<https://daneshyari.com/article/8166270>

[Daneshyari.com](https://daneshyari.com)