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#08-56 Spid-X: A Gamma camera with spectro-identification and dosimetry embedded functions

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A gamma camera, allowing the localization of radioactive sources, is a very useful device in various fields of the nuclear industry: monitoring, D&D or waste management are some examples. However, the information of the source position is not enough and should come with the sources identification and dosimetry information, which are provided by additional devices, such as radiameters. In this paper, we present the various functions and performances of the Spid-X Gamma camera, which overcomes this problem by performing in real time the 4 following functions: automatic identification of radioactive sources, proportion measurement of each detected sources, imaging of sources and dosimetry at the camera level. This is possible thanks to the embedded Caliste-O technology, which is a CdTe-based pixelated imaging spectrometer using a single plane 1.4 x 1.4 cm^2 crystal and 8 low noise ASICs as a readout enabling high energy resolution. Thus, Caliste-O allows position sensitivity and fine spectroscopic performances that are a perfect fit to develop the Spid-X camera. The spectro-identification is performed thanks to advanced Convolutional Neural Network (CNN) trained on synthetic data, which can determine from a measured spectrum made of a few photons which radioisotopes created the signal, even in the case of multi-sources detection. In this last case, it also provides the information of the relative proportions of the different sources. This identification capability is coupled to imaging algorithms, allowing precise Coded Mask and Compton imaging on a wide energy range from 2 keV to 2 MeV and localization of each point and extended detected sources. Finally, dosimetry measurement at the device position is automatically calculated in order to provide to the used the answers to the three following questions: what do we detect, where is it, and how much there is, enabling efficient and safe use in the nuclear industry.

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