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**Selected Radiation Detection and Imaging Developments for Medical Applications: A Perspective
from an Experimental Nuclear Physicist**

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nuclear radiation in a wide range of applications, including the development and use of new radiotracers or particle beams for disease diagnostics or treatment purposes. Enormous advances have been achieved in enhancing more conventional approaches in gamma -ray imaging exemplified by the Explorer for human-scale PET imaging or high-resolution SPECT systems for small animal studies. However, conventional approaches in gamma-ray imaging are insufficient in realizing the full potential of radio- biologically highly efficient cancer treatment methodologies such as targeted alpha particle therapy or external beam ion-cancer therapy which require gamma-ray imaging capabilities over a broad range of energies. I will discuss some of our efforts to provide gamma-ray imaging for energies ranging from below 100 keV up to 7 MeV which are based on advanced collimation and coded aperture concepts and collimator-less Compton imaging. Some of these developments leverage advances driven by the needs in other fields such as nuclear physics or nuclear security and safety.