

Medical Imaging Applications and Demonstrators: Challenges in PET Imaging

The physics of the emission and detection of the coincident photons that enables Positron Emission Tomography (PET) imaging provides this technique with unique capabilities for both very high sensitivity and accurate estimation of the *in vivo* radiotracer concentration. PET imaging is one of the primarily preferred clinical modalities for oncological, cardiovascular, infectious and neurological applications, and preclinical PET imaging has been established as an essential tool for *in vivo* research on murine models of disease and for other small animal models.

Nevertheless, current PET imaging technology has several challenges that need to be addressed in order to become a more accessible and effective clinical tool. Those challenges include: the quantitative accuracy of the measurements, a better resolution for the trade-offs between resolution and noise, the integration with other imaging modalities like x-ray CT and Magnetic Resonance imaging, and its accessibility in terms of installation and running costs.

In this presentation we will explore how cross-fertilization among different areas of research like the ones involved in the INFIERI ITN (high-performance computing, advanced photodetectors, highly-integrated front-end processors), can contribute to the resolve those challenges, and what are the opportunities for working on PET imaging demonstrators.