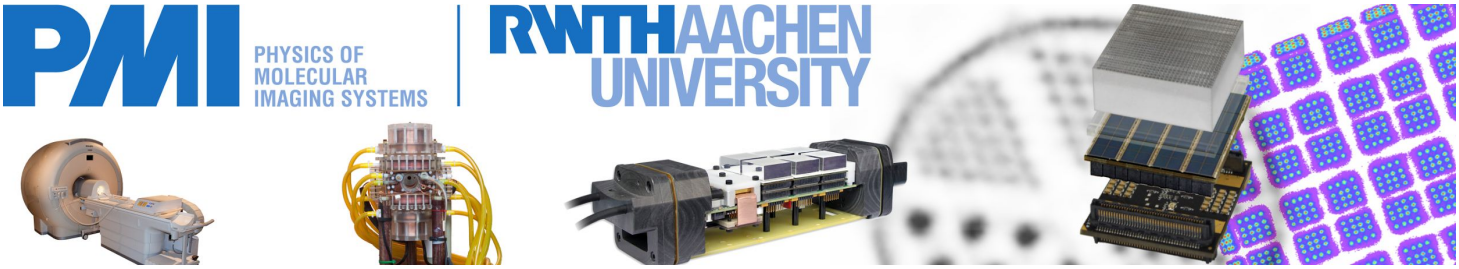
PMI PHYSICS OF MOLECULAR IMAGING SYSTEMS | RWTH AACHEN UNIVERSITY



Research focus of the department of “Physics of Molecular Imaging Systems” (**PMI**) is on exploring the physical limits of current and future molecular imaging technologies. These areas range from simulations of new detector concepts, hardware prototypes, high speed data processing, image reconstruction algorithms and applications using our research imaging prototypes. Our group consists of students and researchers from different disciplines: physics, engineering, computer science and medicine. PMI is part of a large international network with a close link to industry, particularly to Philips Research.

Master’s Thesis: Energy Calibration of a PET with Multiple Gamma Lines

Positron Emission Tomography

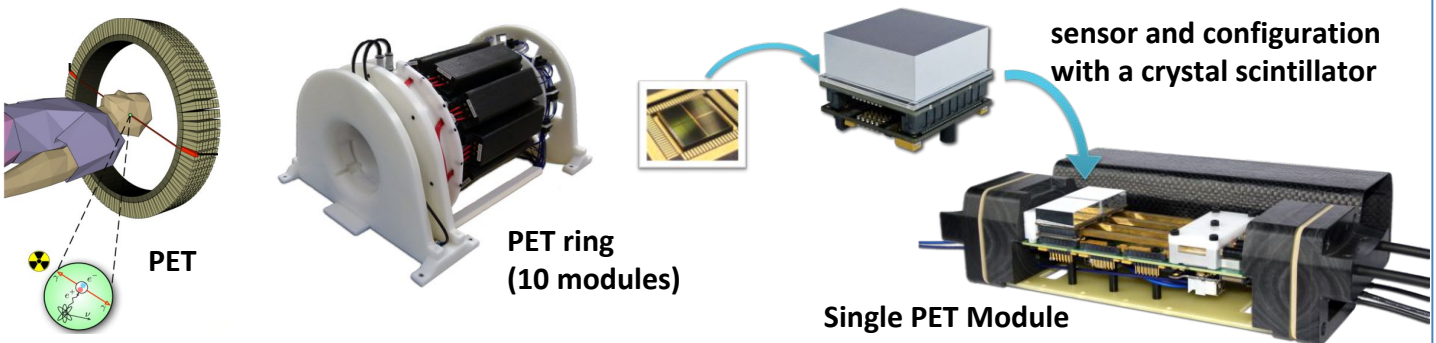
In Positron Emission Tomography (PET) imaging, a patient or animal is injected with a radioactive substance emitting positrons during decay. The positron annihilates with an electron from the patient’s body, thus producing two photons which propagate through the body in opposite directions. These photons are detected outside the body using a ring of PET detectors. From the detection points a line of response can be assumed along which the annihilation took place. With this information a quantitative cross-section image of the radiotracer distribution inside the patient's body can be reconstructed. Despite the quantitative character of PET images, they lack detailed anatomic information. To overcome this problem other imaging modalities like MRI are used to get anatomic information and to fuse both images.

Energy Calibration for Pixelated Scintillation Arrays

Our group developed the world’s first preclinical PET/MRI insert on basis of fully digital Silicon Photomultipliers (dSiPM). A preclinical high resolution PET Scanner uses crystal scintillators with a very small pitch. For each crystal element an energy calibration has to be performed. This is traditionally done using a PET tracer resulting in a single peak at 511keV. The candidate shall use multiple gamma sources to perform and check the energy calibration over a larger range of reference energies.

Your Thesis

The candidate will work with a processing and calibration environment, which is implemented in a multi-threaded C++/Qt/ROOT environment. Good programming skills are preferred as well as a good understanding of statistical data analysis.



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