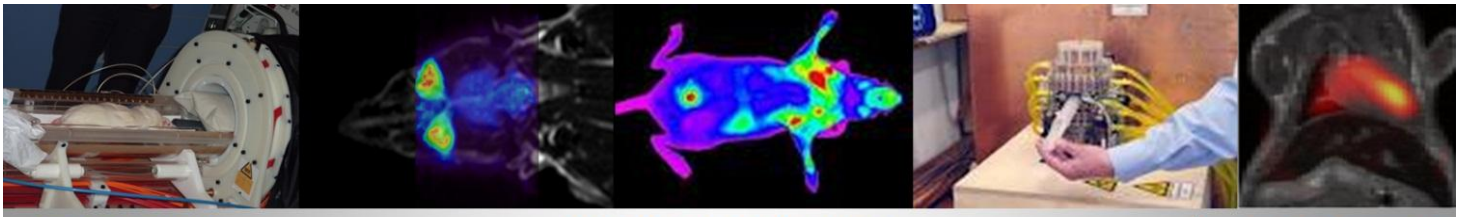


PMI Physics of Molecular Imaging Systems

HELMHOLTZ-INSTITUT FÜR BIOMEDIZINISCHE TECHNIK

RWTH

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, especially Philips Research.

Characterization of positioning algorithms for a preclinical PET insert

Positron Emission Tomography

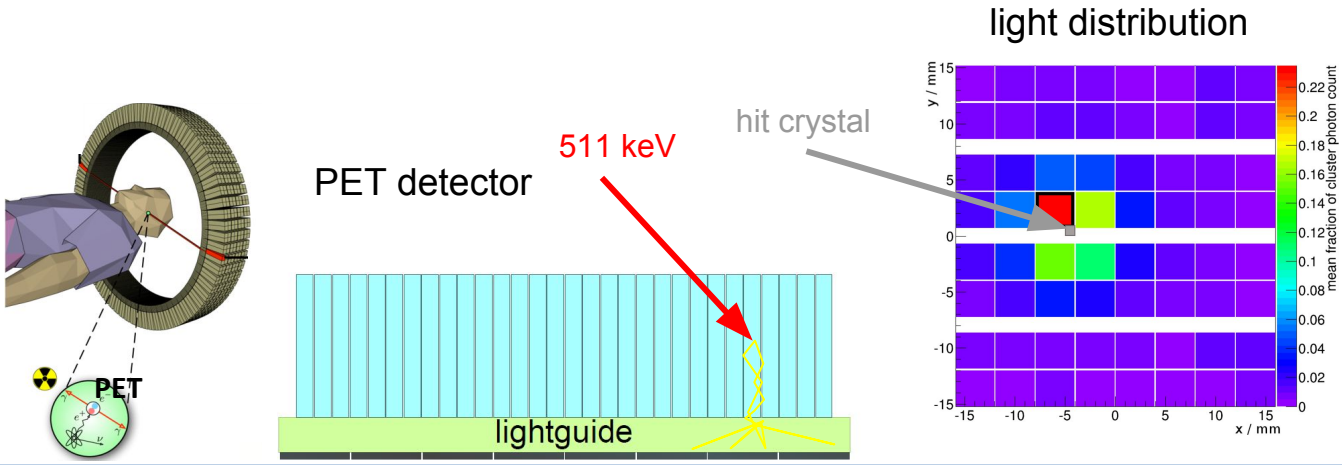
In Positron Emission Tomography (PET) imaging, a patient or animal is injected with a radioactive substance emitting positrons during decay. The positron annihilates with an electron from the patient’s body, thus producing two gammas which propagate through the body in opposite directions. These gammas 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.

Positioning Algorithms For Pixelated Scintillator Arrays

PET detectors mostly use scintillator arrays which are readout by photosensors. In high resolution PET detectors, the scintillator pitch is smaller than the channel size of the photosensor. A lightguide is attached to spread the scintillation light over the photosensors. Thus, the position of the hit scintillator element has to be determined by the measured light distribution, using a positioning algorithm. Our group implemented two positioning algorithms. The COG algorithm uses the center-of-gravity of the measured light distribution. The maximum likelihood (ML) algorithm compares a set of expected light distributions given by probability density functions with the measured light distribution.

Your Thesis

In this master’s thesis the candidate shall compare and characterize the COG and ML algorithm for different imaging scenarios. 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.



For more information: Physics of Molecular Imaging Systems (Univ.-Prof. Dr.-Ing. Volkmar Schulz)
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