

Research focus of the department of “Physics of Molecular Imaging Systems” (**PMI**) of the University RWTH Aachen 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 institute with international network with a close link to industry and RWTH spin-offs.

PhD/Postdoc positions for ML-based PET/MRI Image Recon.

Hybrid simultaneous acquisition of Positron Emission Tomography (PET) and Magnetic Resonance Imaging (MRI) data has gained interest in clinical and preclinical research, due to their complementary information. PET allows imaging of metabolic processes down to the molecular level while MRI provides anatomical information with high soft tissue contrast and physiological parameters. Our group developed the world’s first small bore MR-compatible PET insert on basis of fully digital Silicon Photomultipliers (dSiPM) that enables true simultaneous Time-of-Flight(TOF)-PET/MRI studies in clinical MRI scanners.

The goal of the project is to develop an ML-based image reconstruction method that can handle unconventional detector configurations that contain different detectors with lower and (2D/3D) higher spatial resolution in an unconventional geometry. The reconstruction should use information from PET and MRI and could be based on existing open-source packages such as CASTOR.

The data will be generated by a detector based on the Hyperion IIID platform. The hardware to perform the measurements is available, c.f. Fig. At a later stage, the reconstruction will be applied to clinical prototypes. The project is carried out in a consortium with our spin-off Hyperion HIS and other RWTH institutes. The goal of the project is to overcome the current limitations of spatial resolution.

New group members should be highly motivated and creative, show an exceptional track record, and have a strong background in mathematics, electrical engineering or physics, or related fields, and be interested in working in an interdisciplinary environment at the interface of imaging physics and medicine. In particular, you should have an interest in novel PET detector reconstruction methods and Machine Learning. You will work in a project team of about 20+ very experienced scientists at PMI with close cooperation to leading university groups, to the Radiology and Nuclear Medicine departments of the University clinic RWTH Aachen and to leading industry.

The positions are fully funded (TVL, 100%). In order to apply, please submit a complete application, consisting of a cover letter, your CV, university transcripts, and the coordinates of at least two referees as a single PDF file via email to Prof. Dr.-Ing. Volkmar Schulz (schulz@pmi.rwth-aachen.de) with “[Application PETMRI Recon]” in the subject line. The preferred starting date for these positions is Q2/Q3-2022.

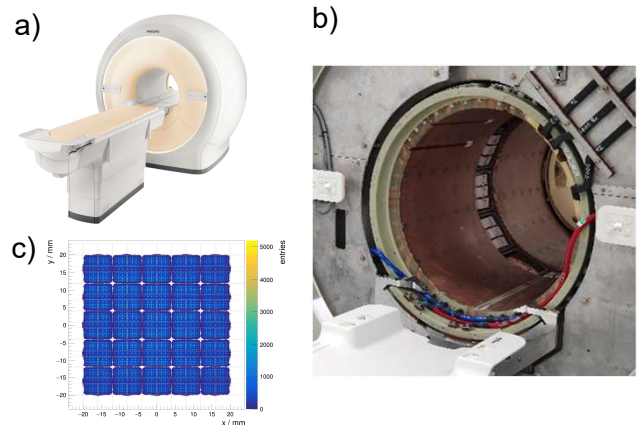


Fig: a) Clinical MRI system; b) prototype PET-detector; c) high-res flood map of a Hyperion IIID detector. The Fig. is just one of several scanners we have built.