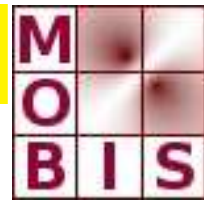# INVITATION

to the talk of

Dr. Georg Schramm

(Department of Imaging and Pathology, Division of Nuclear Medicine, KU Leuven)

**Title**:   Positron Emission Tomography - Physics and Image Reconstruction

Time: Wednesday, March 30, 2016, 10:30

Place: SR 11.34
Institute of Mathematics and Scientific Computing
Heinrichstraße 36, 3rd floor, 8010 Graz

Abstract:
Positron Emission Tomography (PET) is a noninvasive functional imaging method that visualizes and quantifies physiological processes. It uses tracers labeled with a positronemitting radionuclide and is applied in different clinical fields, notably in neurology, cardiology, and oncology. Especially in the latter field, PET has proven its usefulness in the detection, staging, and therapy response control of tumorous diseases. After the very successful combination of PET and CT into hybrid PET/CT scanners, integrated PET/MRI scanners are available since a couple of years. Such a system was installed at the UZ Leuven in October 2015 and allows a combination of the functional information of PET together with the excellent anatomical information of the MRI.

This presentation will focus on the basic physics of PET image acquisition and image reconstruction. The latter one is an inverse problem that is nowadays solved with iterative methods. In clinical routine imaging, the underlying Poisson log-likelihood functional is usually minimized via Ordered Subset Expectation Minimization (OSEM) which will be explained in detail. Moreover, the talk will give an overview about different research projects of our group, such as regularized PET image reconstruction and joint estimation of activity and attenuation.
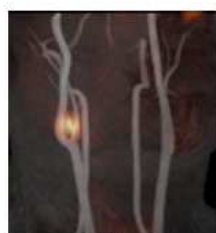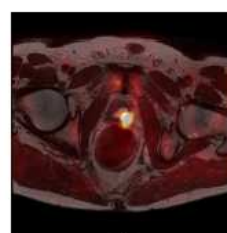
(a) Fusion of MRI angiography and [^{18}F]FDG PET of a tumor in the carotid body
(b) Fusion of anatomical MRI and [^{11}C]Acetat PET of a recurrent prostate carcinoma
Image courtesy University Hospital Dresden

Prof. Karl Kunisch