# PROJECT PROPOSAL

## ANDRÉS MARTÍNEZ MORA

## HL2029 Medical Engineering, Advanced Course

The project for the HL2029 course will be carried out by the student Andrés Martínez Mora with the supervision of KTH professor Massimiliano Colarieti-Tosti. In order to complete the compulsory minimum time of 4 weeks, the student will complete 3 weeks in June and a week in August.

The project will consist in the search of a more accurate and general input to train and get the weights and biases of a Convolutional Neural Network (CNN) with the aim of denoising PET images. The state-of-the-art consists in a CNN that has been trained with images of hand-written numbers extracted from the MNIST database. This CNN is used to denoise PET images that are reconstructed with Maximum-Likelihood Expectation-Maximization (MLEM) method. However, there is the wish to explore whether training the network with a more general input may provide a better efficiency for the denoising process, rather than just using images with hand-written numbers. With a more general input it is meant to use images extracted from a mini-PET scanner from the lab of Mr. Colarieti-Tosti from phantoms with "general" shapes (cylinders, for example). However, before starting to acquire images from the scanner and training the CNN with them, the student will study the process with simulated images, using also this as a way of acquiring the necessary theoretical knowledge to complete the project. The denoising process will be performed during the reconstruction of those images, so the study of 3D MLEM reconstruction of PET images will be also a substantial part of the project.