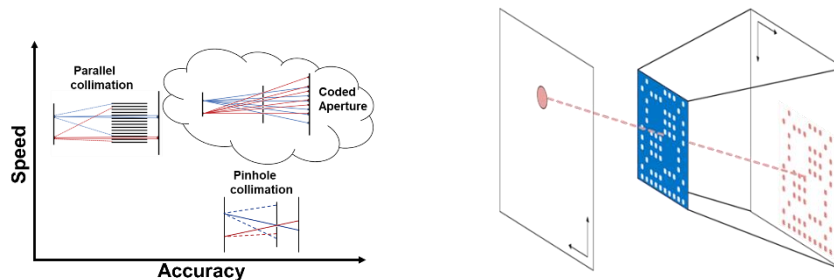


Bachelor Thesis / Hiwi

How Many Photons Do We Need in Coded Aperture Imaging?

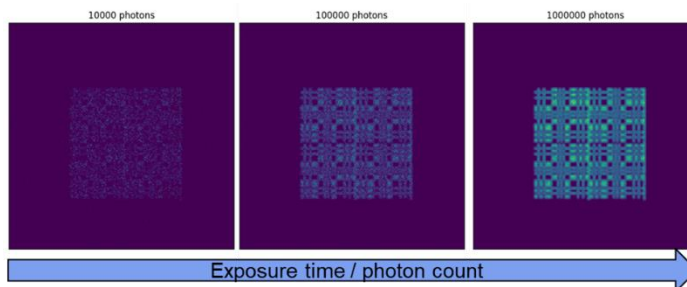
Motivation:

Handheld γ -cameras with coded aperture collimators are under investigation for intra-operative imaging in nuclear medicine. Unlike other type of collimators, a coded aperture offers the possibility for 3D reconstruction of point sources in the nearfield, but requires image reconstruction.



Left: Coded Aperture in comparison to other collimation techniques. Right: The lateral position is encoded by the shadow's shift, the axial position by the shadow's size.

Modern sensors like the Timepix3 chip, allow to measure the incidence of single γ -photons. Thus, the exact number of captured photons can be measured, but the relationship between the reconstruction result and the photon count remains unclear.



Project:

The goal of this project is to analyze the influence of simulated photon counts on the reconstruction results. Initially, a metric need to be chosen, and then the question on how to set up the experiment can be tackled. Partially software already exists, but the main corpse is your task

Notes:

- The thesis can be written in German or English
- Programming knowledge in image processing and Python is essential
- Motivation, fun at scientific work, and the contribution of own ideas are most welcome

Research area:

Optical technologies in nuclear medicine

Project:

3D Localization of Gamma Radiators in the Nearfield of a Single Coded Aperture Camera for Sentinel Lymph Node Biopsy

Orientation:

Literature research, Image processing, python, tensorflow

Course of studies:

Electrical/mechanical/ biomechanical engineering, physics, computer science etc.

Starting date:

Nov / Dec 2023



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