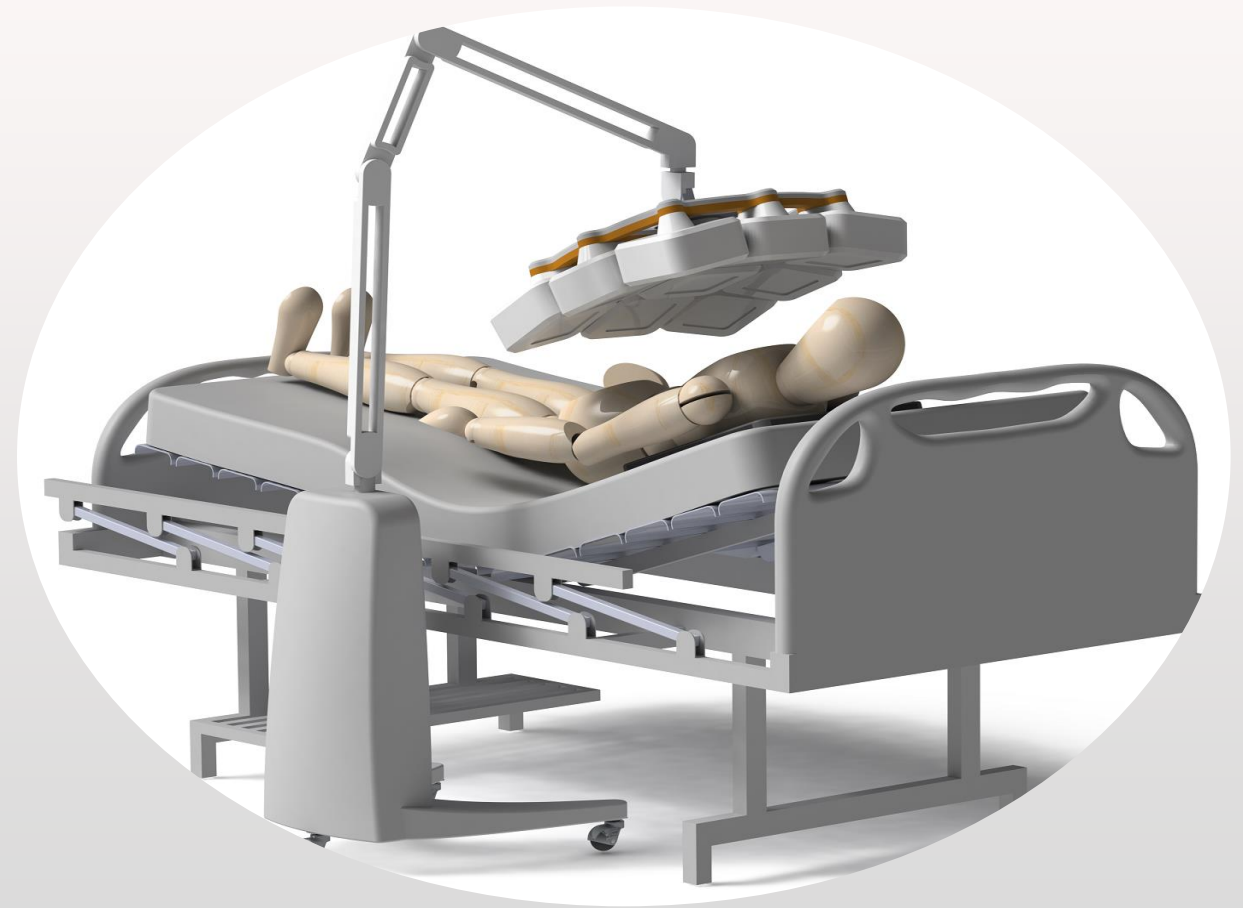


Collaboration Case Study: Adaptix Ltd

Dr Alexander Hill
Data Science Fellow
a.d.hill@liverpool.ac.uk



A bit about myself

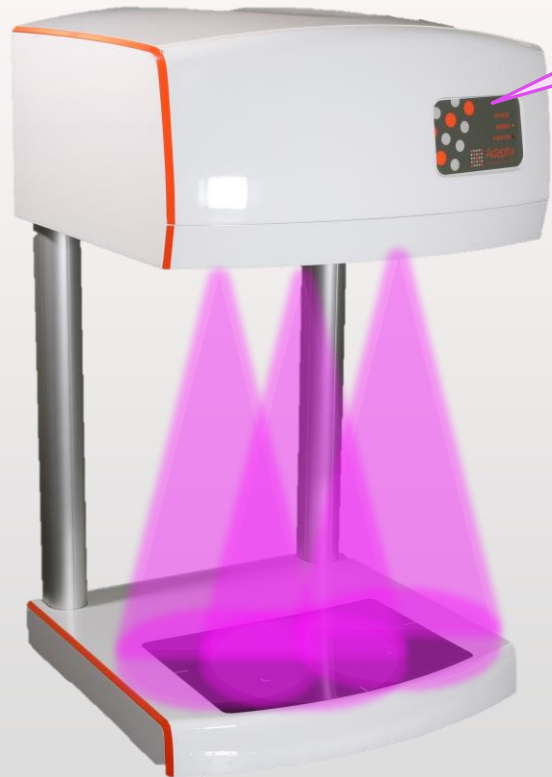
- Data Science Fellow within the LIV.INNO Centre for Doctoral Training
- Research in medical physics with industry
- Supervise and provide novel training approaches for LIV.INNO PhD students
- Build connections with industry and develop partnerships



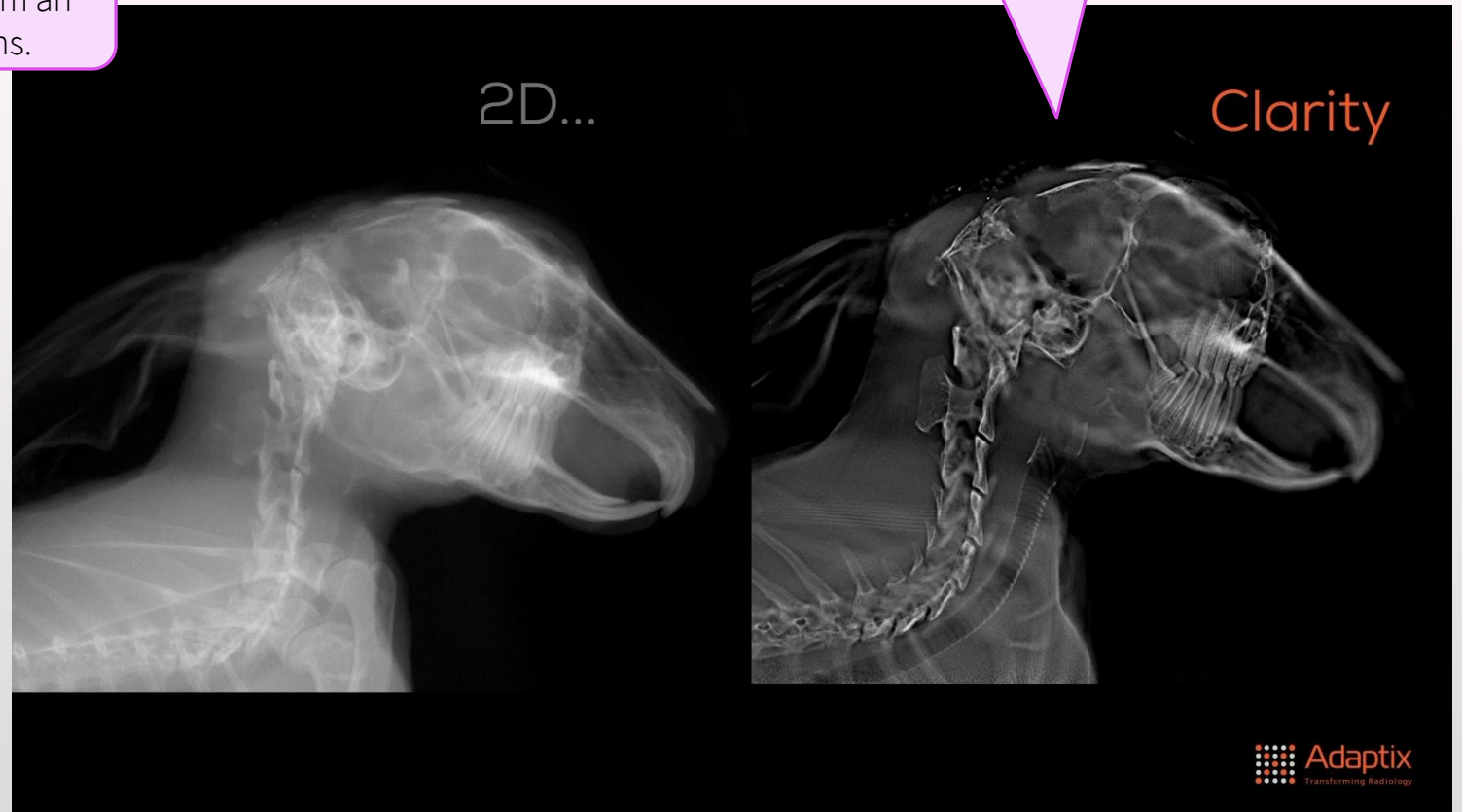
LIV.INNO Partnerships



Digital Tomosynthesis



Low dose X-ray source firing from an array of positions.



Displayed as a stack of slices through the 3D volume

Chest Imaging

- 2D X-rays are in common use for chest imaging, however they can be inconclusive
- CT scanners have high-dosage and are expensive/limited
- A chest DT device can sit between these modalities, offering cheap, mobile, low-dose 3D imaging
- How should this device be constructed?



Beginnings of Partnership (2015)



Dr Eleferios Skordis

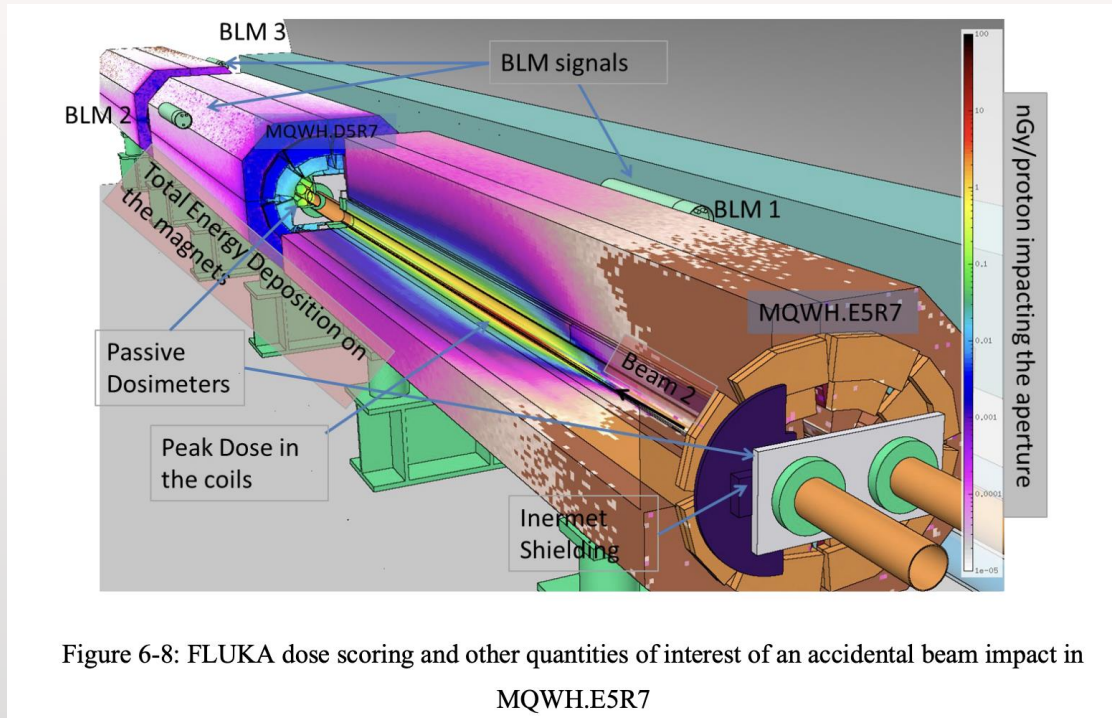
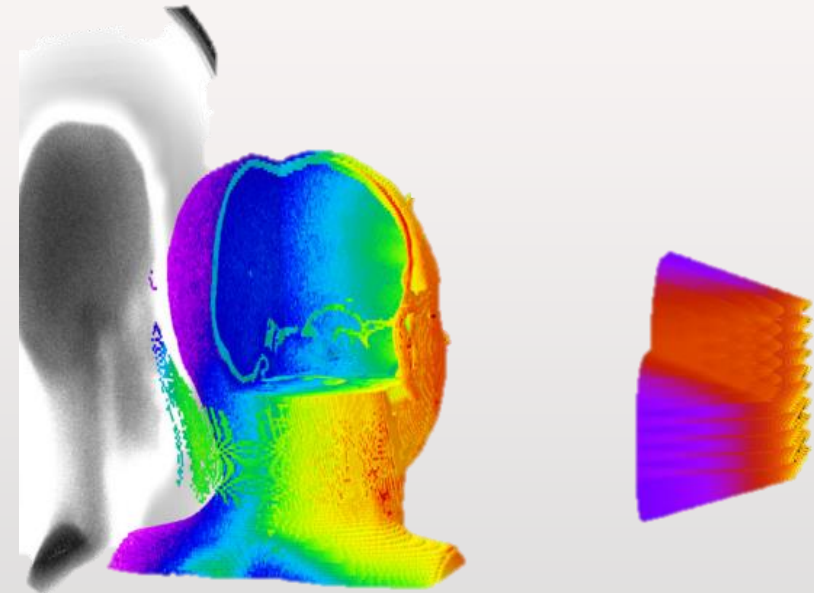


Figure 6-8: FLUKA dose scoring and other quantities of interest of an accidental beam impact in MQWH.E5R7

E Skordis

Radiation impact of collimation beam losses in the LHC and HL-LHC
University of Liverpool Thesis (2019)



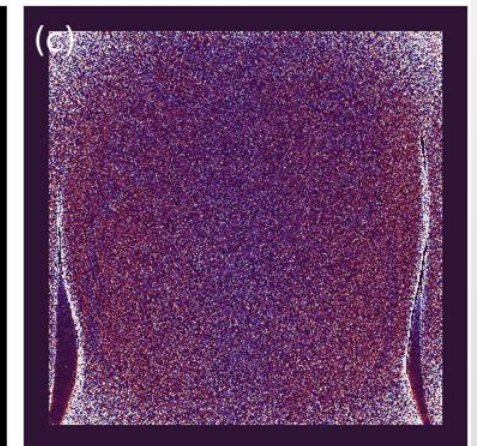
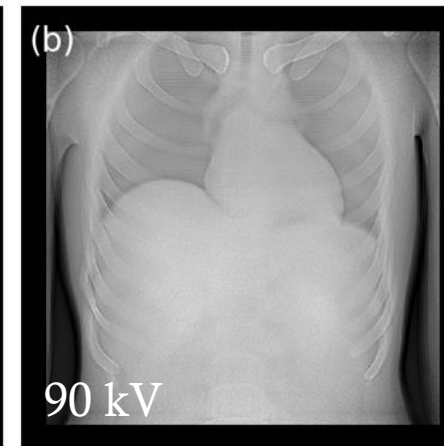
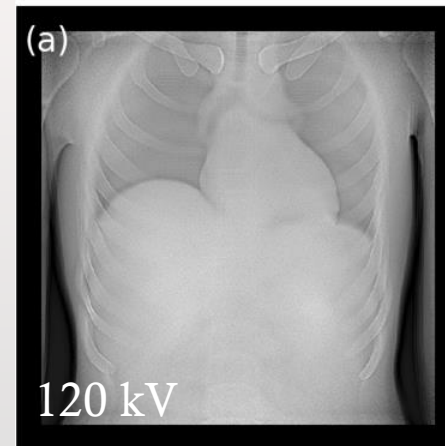
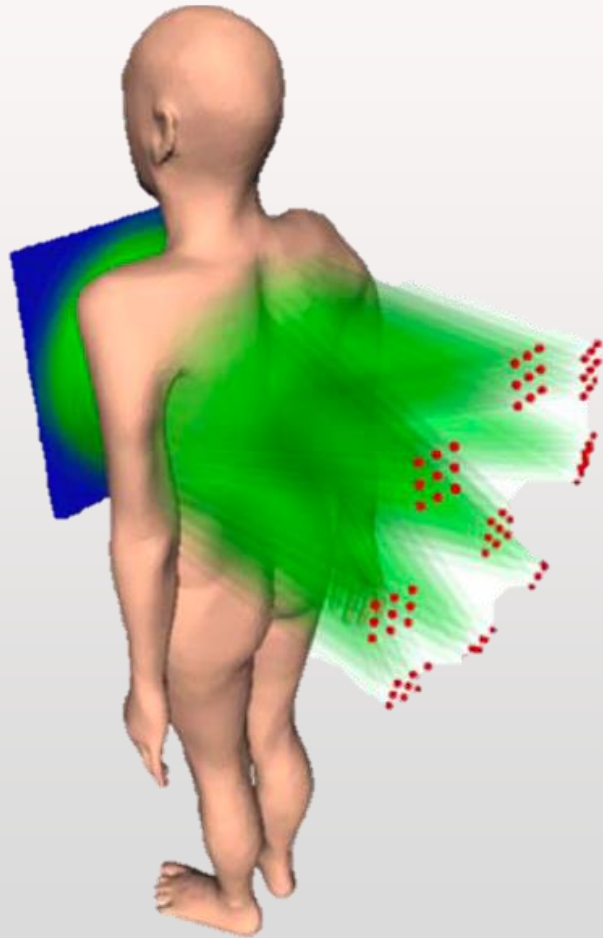
E Skordis and C P Welsch

A Monte Carlo Approach to Imaging and Dose Simulations in Realistic Phantoms Using Compact X-Ray Source
Proc. IPAC17, Copenhagen, Denmark. (2017)

Joint-Funded PhD Studentship (2017)



Dr Thomas Primidis



T G Primidis

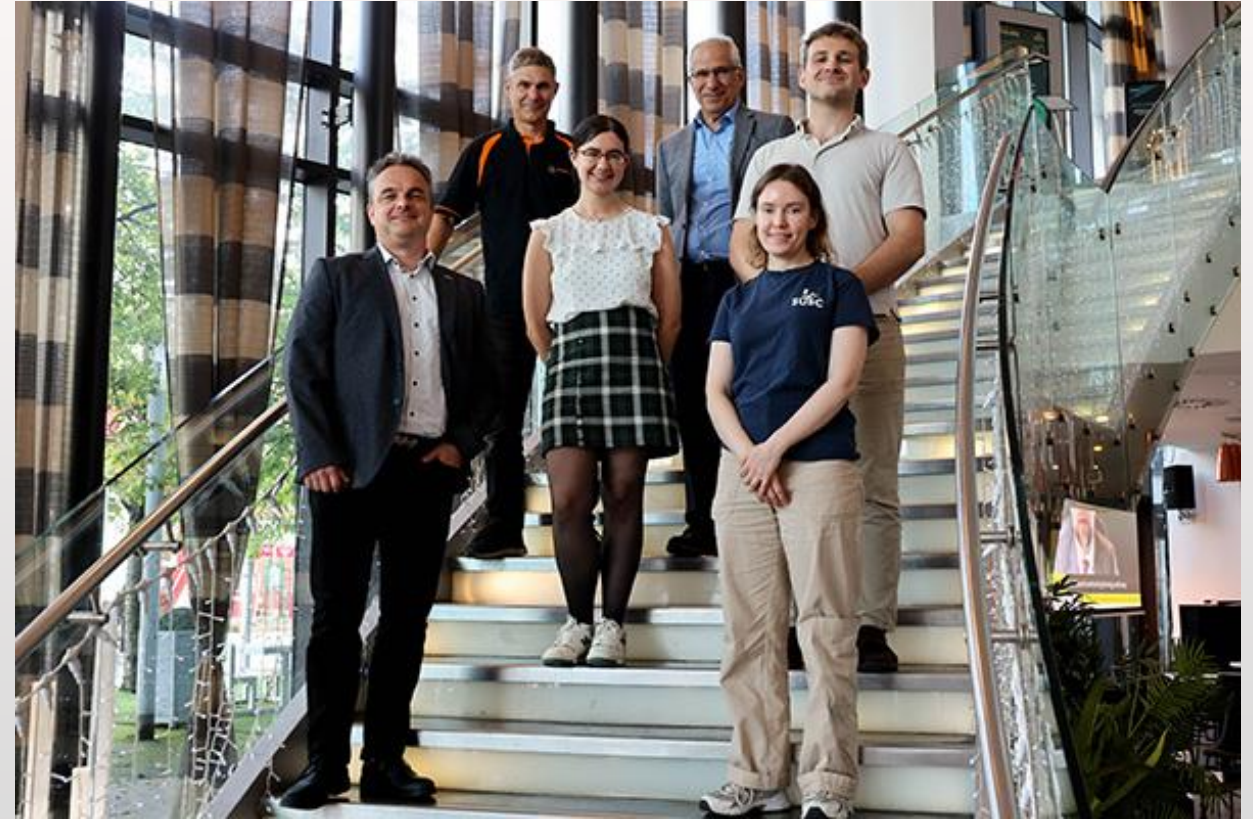
*Design and optimisation of ultra-compact,
high-resolution, 3D X-ray imaging systems*
University of Liverpool Thesis (2022)

Current Collaboration

Optix Project: £400k STFC Late-Stage Commercialisation Grant

Two postdocs and one jointly-funded PhD student

Goals: Device Design, Image Analysis and Signal Processing

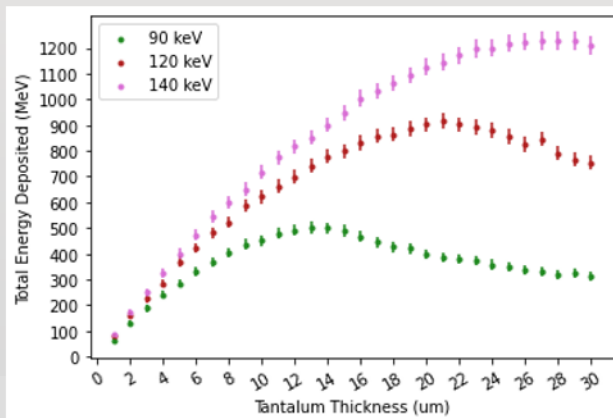
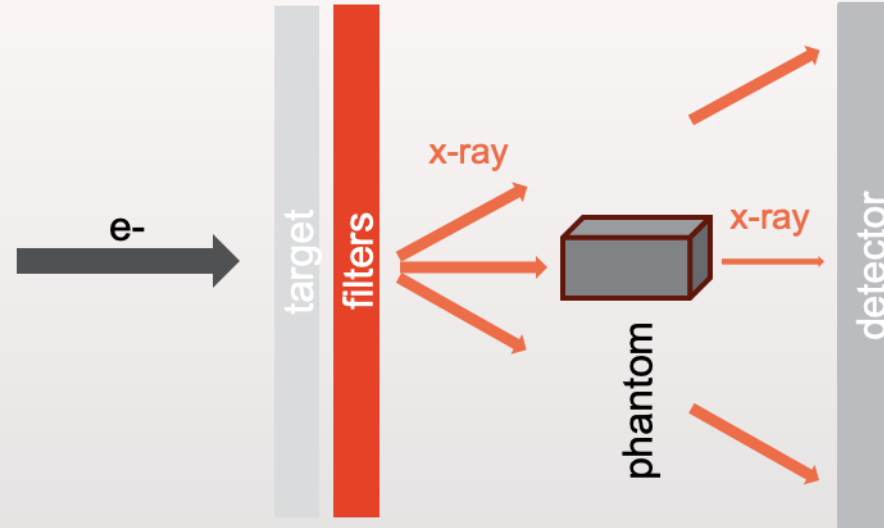
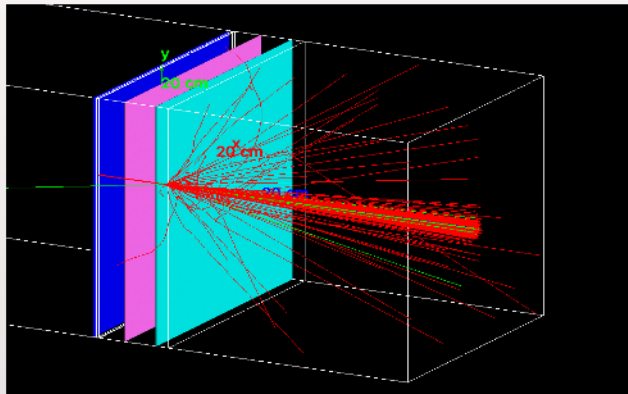


Monte Carlo Simulations

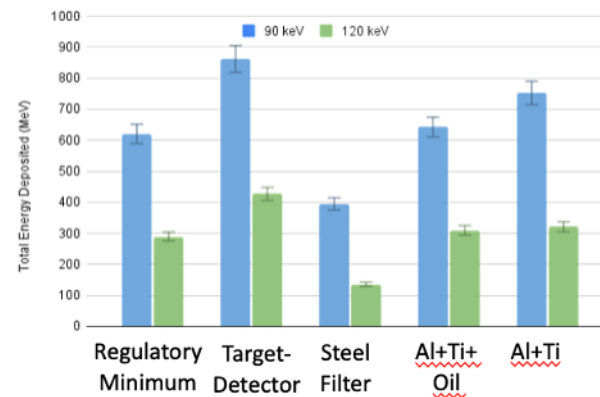
Full physics simulation of X-ray emitter, medical phantom, detector, and imaging



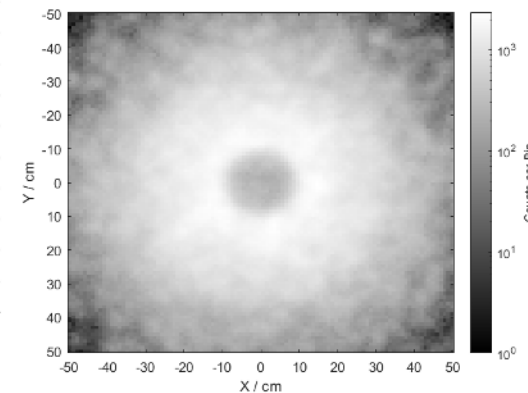
Lauryne Eley



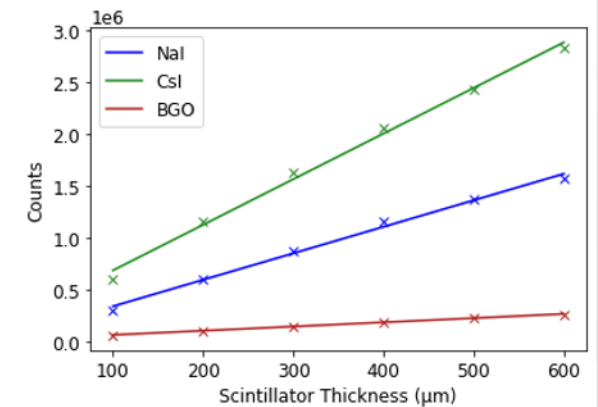
X-ray Target Optimisation



Comparison of Filters

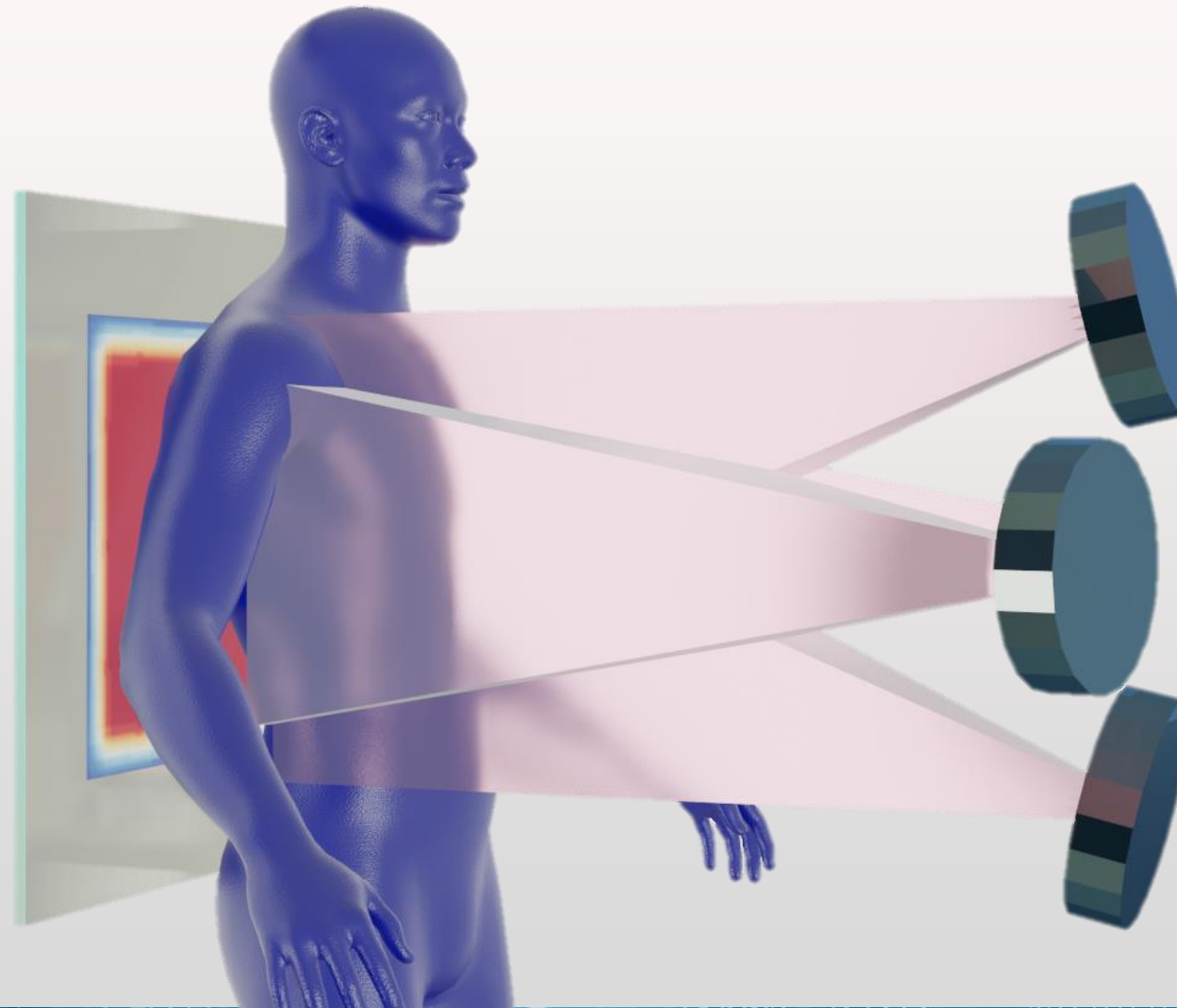


Phantom Imaging



Detector Optimisation

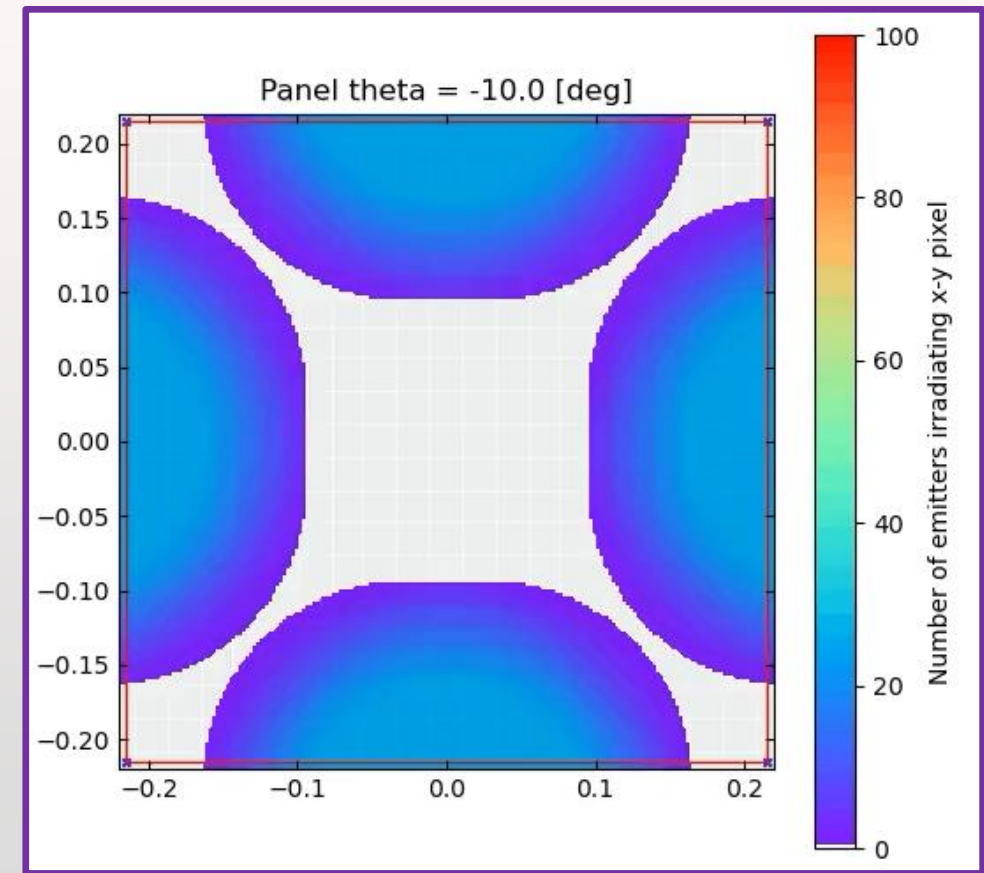
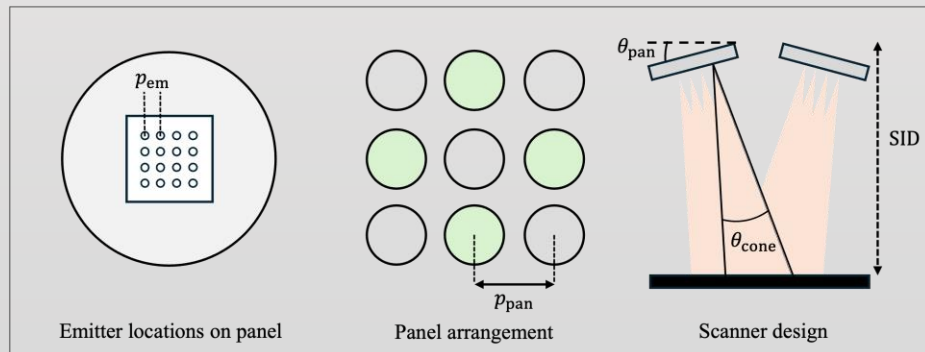
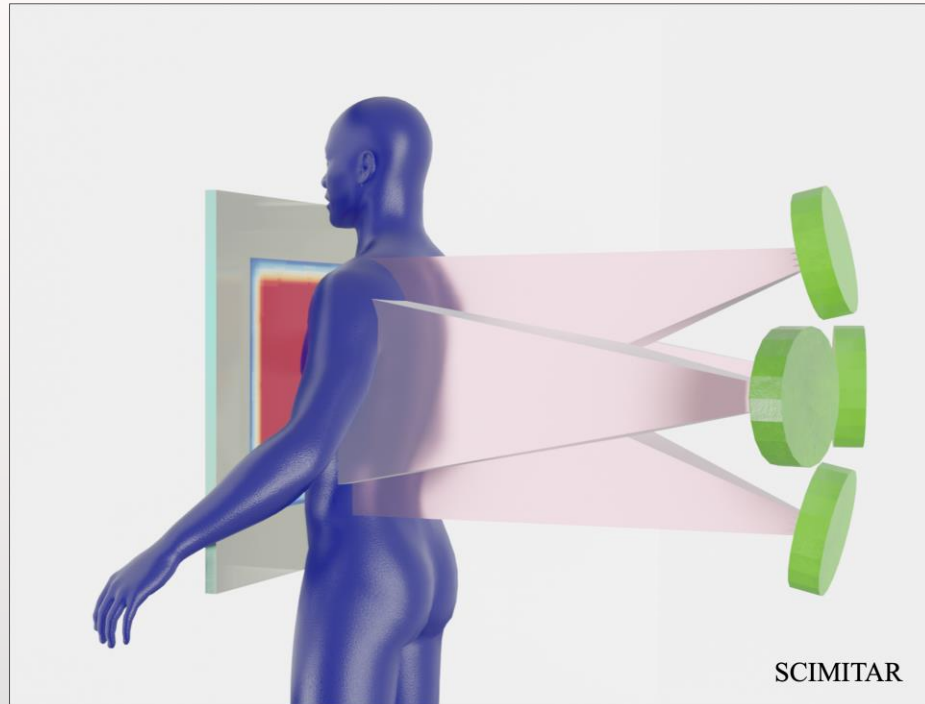
Design Optimisation through Simulations

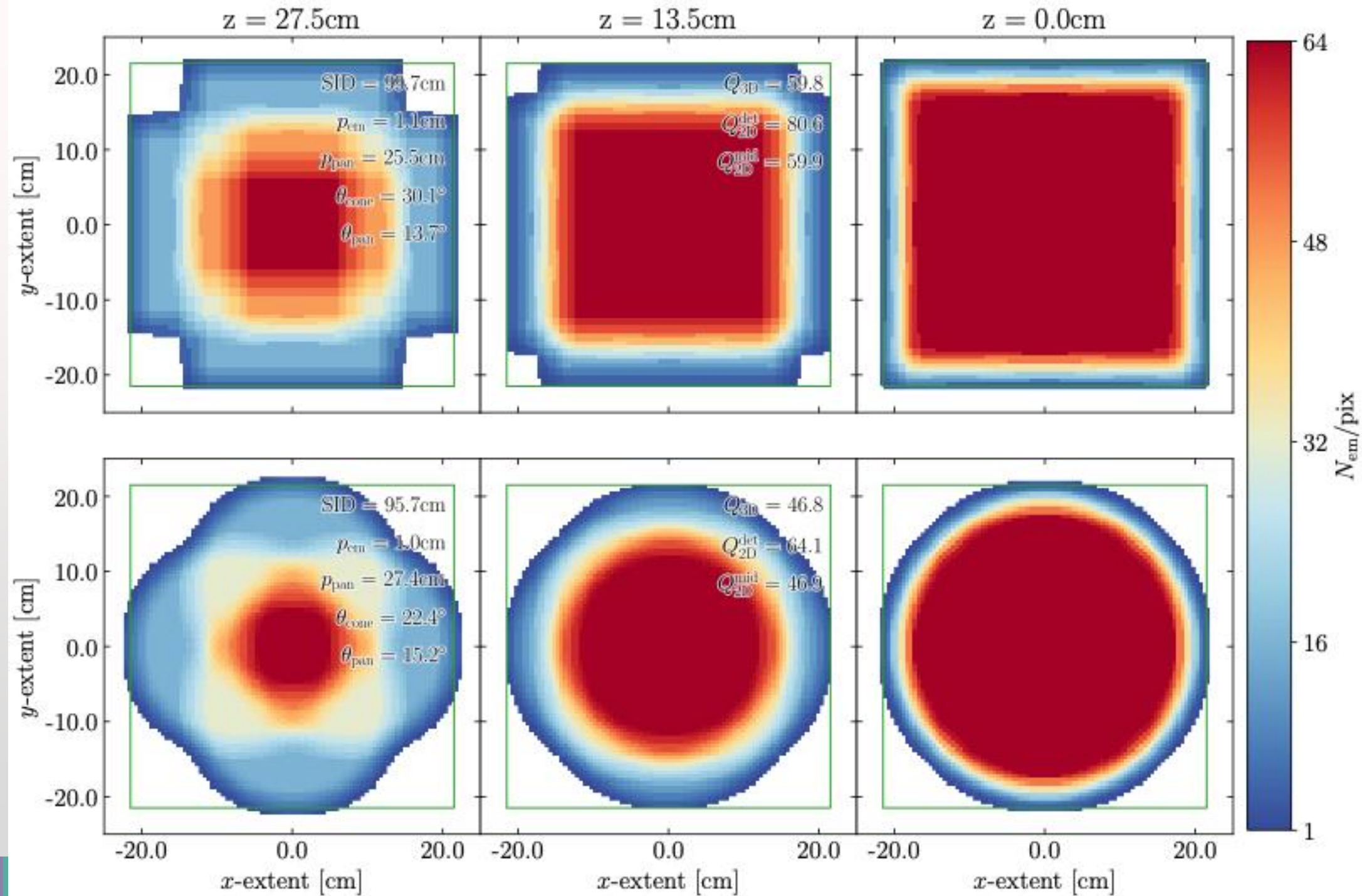


A D Hill et al
*Optimising chest digital tomosynthesis
devices using geometric simulations and
genetic algorithms*
IOP (In review; 2025)

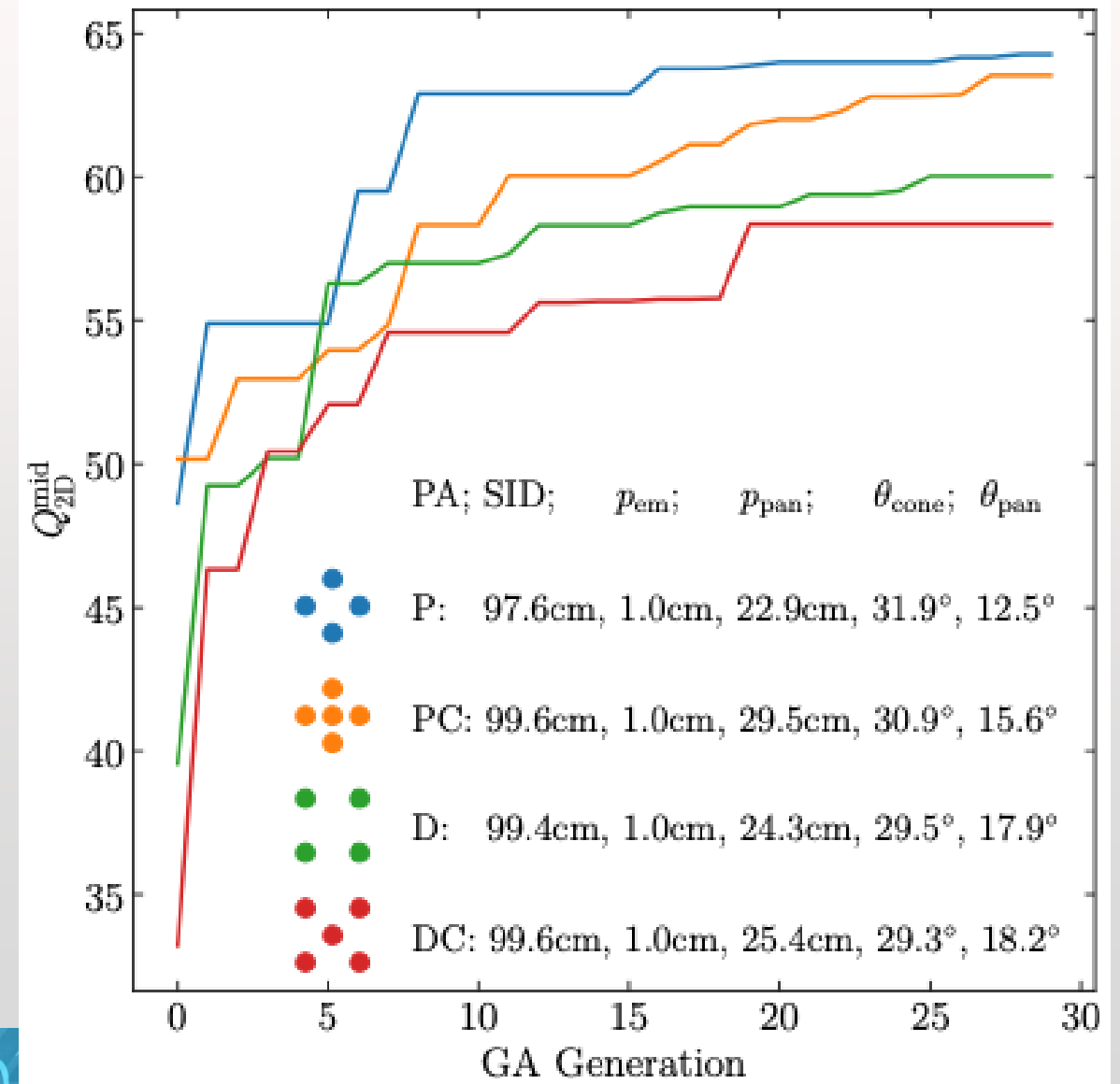
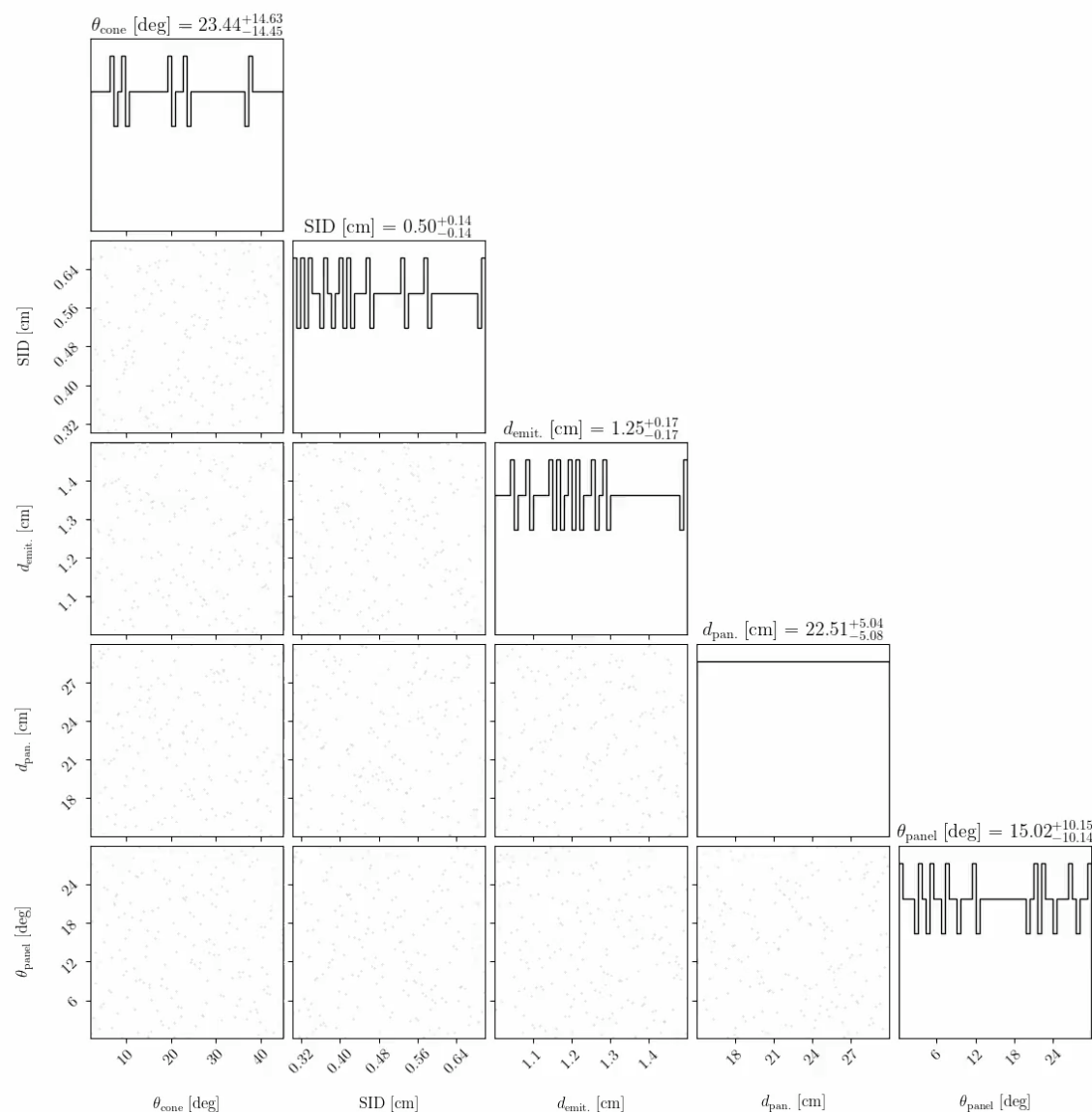


Design Optimisation through Simulations

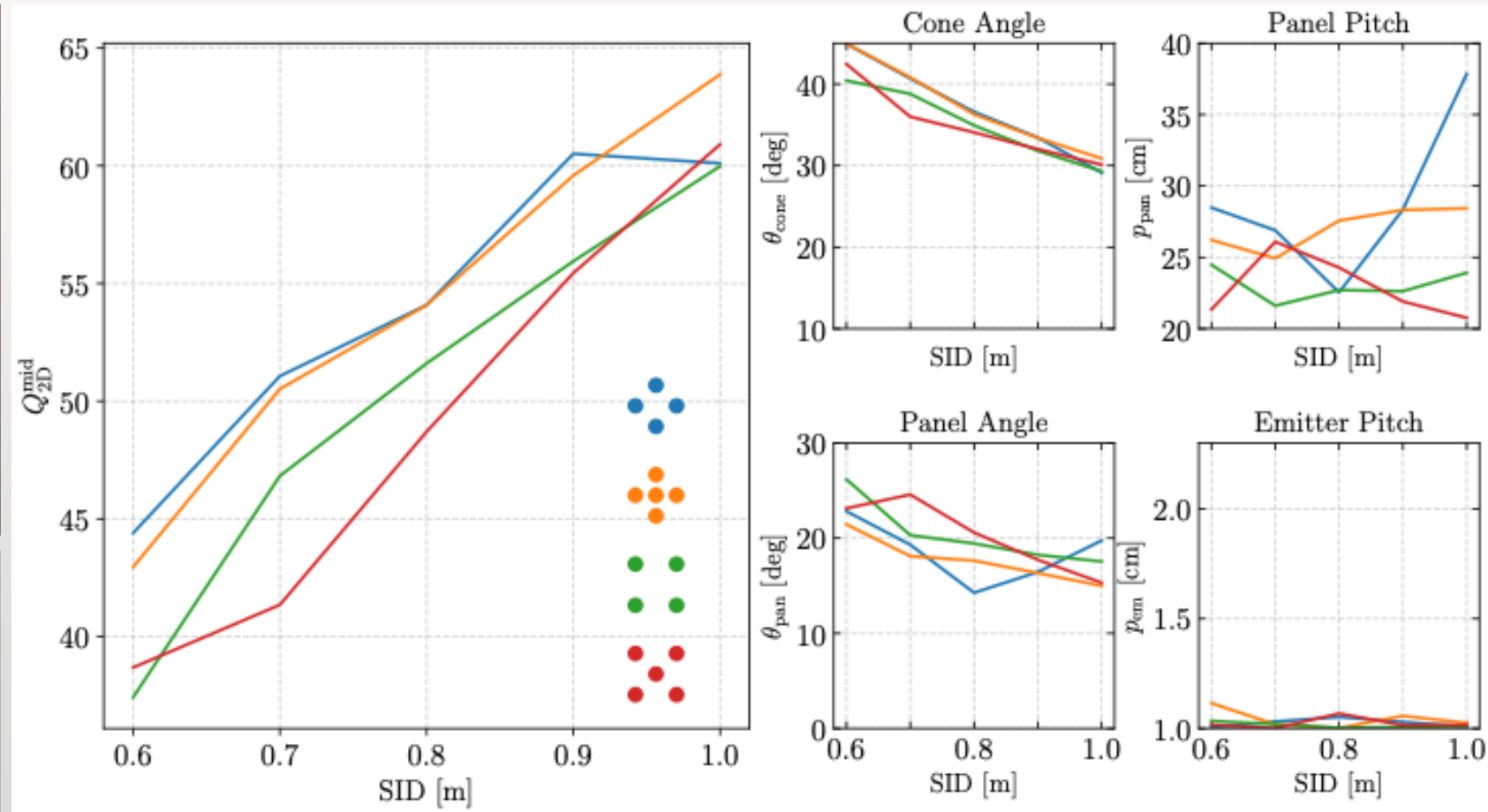
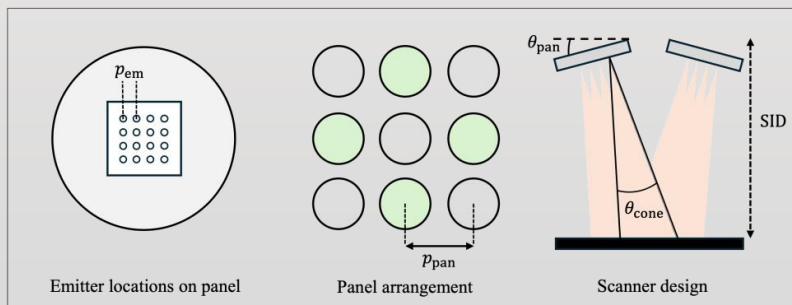
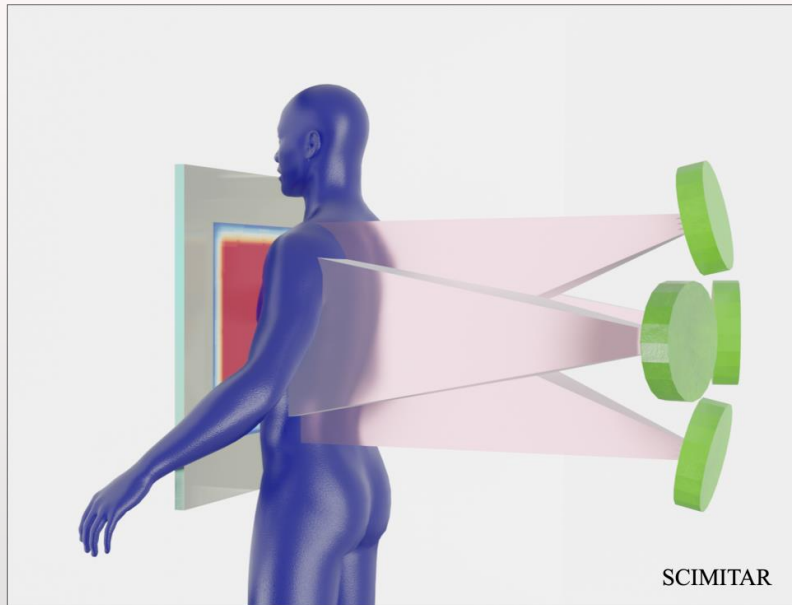




Device Design Optimisation – Genetic Algorithms



Imposition of Engineering Constraints



What's next?

- Added realism in simulations
- More sophisticated metrics characterising device performance
- Experimental validation
- Prototype development

The development of a low dose, flat-panel 3D X-ray source to enable remote, ambulatory and bedside imaging is transformational in the field of digital imaging.

Dr Siân Phillips MB BCH MRCP FRCR
*Consultant Radiologist
Associate Dean and Head of School, Radiology,
Health Education and Improvement Wales*



Do you have an idea that you would like to explore?

Collaborate with us by

- Co-organising hackathons
- Hosting a PhD student placement
- Partnering in joint-studentships
- Exploring joint funding opportunities (e.g. Innovate UK, NIHR, EPSRC)



Thanks!

Dr Alexander Hill
Data Science Fellow
a.d.hill@liverpool.ac.uk

