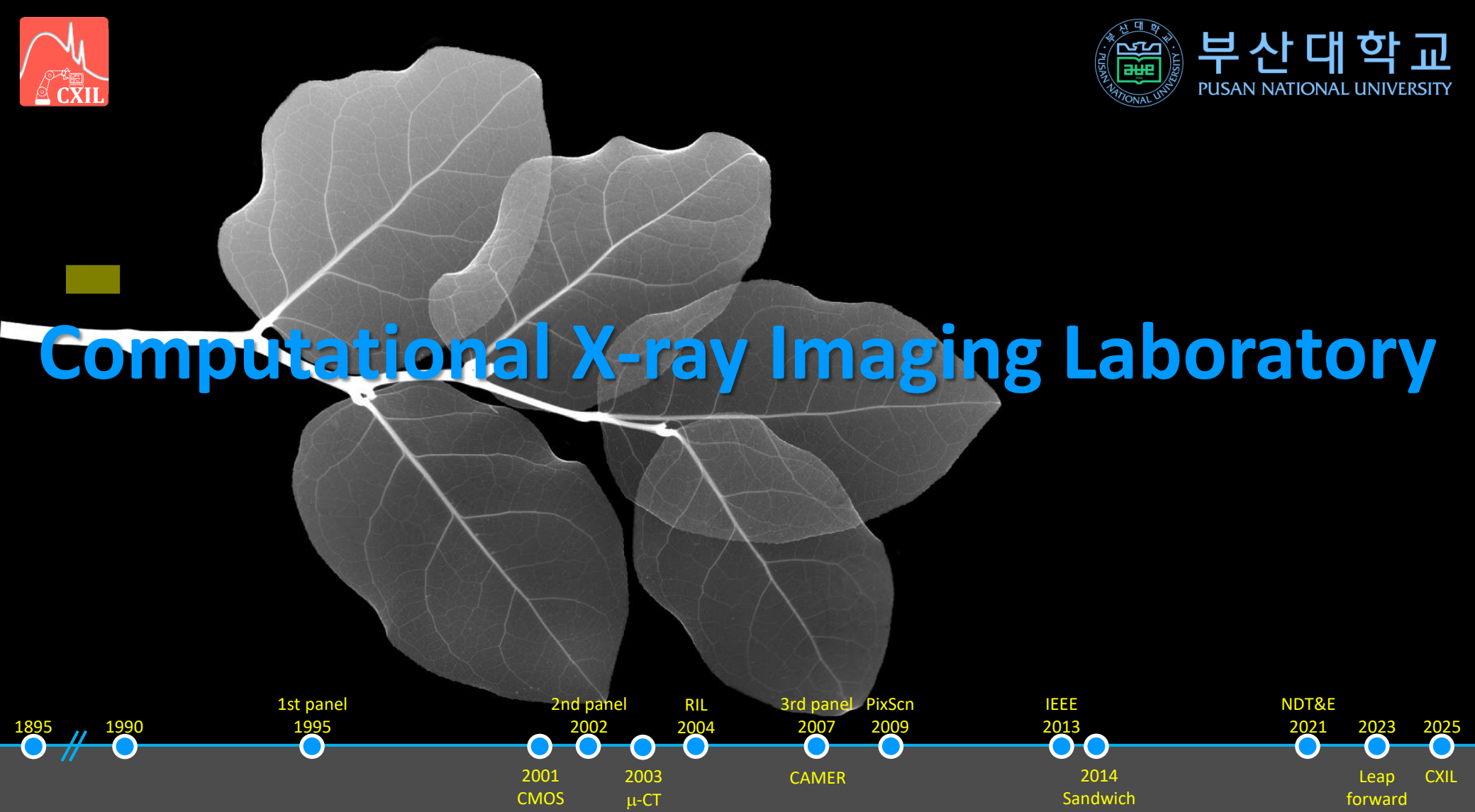


Computational X-ray Imaging Laboratory

1895 // 1990 — 1st panel 1995 — 2nd panel 2002 — 2001 CMOS — 2003 μ-CT — RIL 2004 — 3rd panel 2007 — CAMER — PixScn 2009 — IEEE 2013 — 2014 Sandwich — NDT&E 2021 — 2023 Leap forward — 2025 CXIL

Presenter: Seokwon Oh

Supervisor: Prof. Ho Kyung Kim

Computational X-ray Imaging Laboratory
School of Mechanical Engineering
Pusan National University

1895 — 1990 — 1st panel 1995 — 2nd panel 2002 — 2003 μ-CT — RIL 2004 — 3rd panel 2007 — PixScn 2009 — IEEE 2013 — 2014 Sandwich — NDT&E 2021 — 2023 Leap forward — CXIL 2025

2001 CMOS

CAMER

1895 — 1990 — 1st panel 1995 — 2nd panel 2002 — RIL 2004 — 3rd panel 2007 — PixScn 2009 — IEEE 2013 — NDT&E 2021 — 2023 — CXIL 2025

2001 CMOS

2003 μ-CT

CAMER

2014 Sandwich

Leap forward

AMORPHOUS SILICON SENSOR ARRAYS FOR RADIATION IMAGING

R. A. STREET AND S. NELSON
Xerox Palo Alto Research Center, Palo Alto, CA 94304
L. ANTONUK, Department of Radiation Oncology, University of Michigan, Ann Arbor, MI 48109
V. PEREZ MENDEZ, Lawrence Berkeley Laboratory, Berkeley, CA 94720.

ABSTRACT

Large two-dimensional a-Si:H imaging arrays have applications in imaging of X-ray, gamma-ray and charged particle fluxes. Radiation imaging using a-Si:H p-i-n sensors together with a phosphor to transform the radiation into visible light is

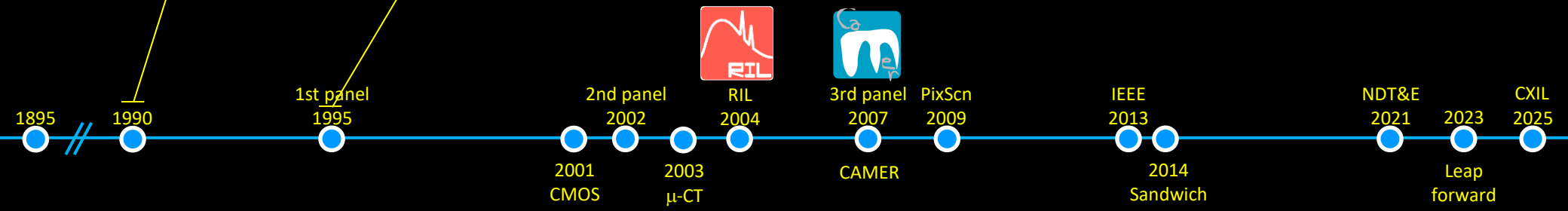
A New Digital Detector for Projection Radiography

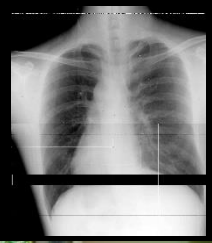
Denny L. Lee, Lawrence K. Cheung, Lothar S. Jeromin

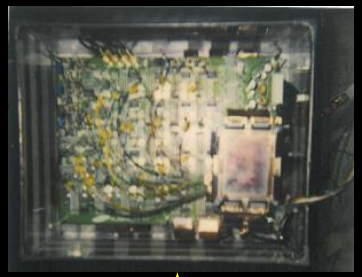
E. I. DuPont de Nemours & Co., Medical Products Department
Experimental Station, E357
Wilmington, DE 19880-0357

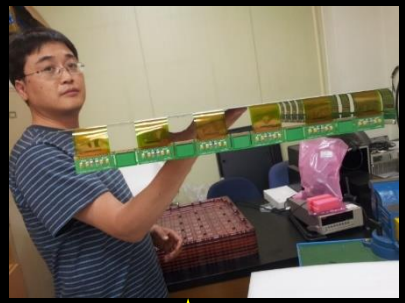
1. ABSTRACT

The operational principle of a new, patented digital radiographic system using a multi-layer structure consisting of a thin-film pixel array, selenium x-ray photoconductor, dielectric layer and top electrode will be described.[1] Under an applied electric field, a diagnostic x-ray signal is obtained by the





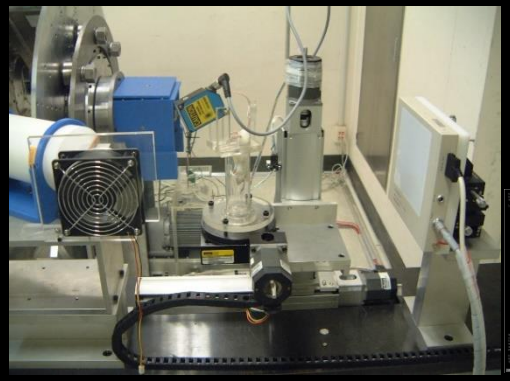




1895 // 1990 — 1st panel 1995 — 2nd panel 2002 — RIL 2004 — 3rd panel 2007 — PixScn 2009 — IEEE 2013 — NDT&E 2021 — 2023 — CXIL 2025

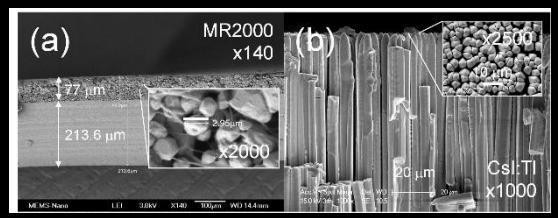
2001 CMOS — 2003 μ-CT — CAMER — 2014 Sandwich — Leap forward

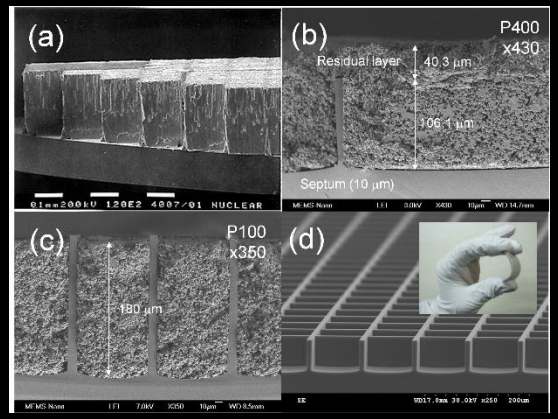
1895
1990
1st panel
1995
2001
CMOS
2nd panel
2002
2003
μ-CT
RIL
2004
3rd panel
2007
CAMER
PixScn
2009
IEEE
2013
2014
Sandwich
NDT&E
2021
2023
Leap
forward
CXIL
2025

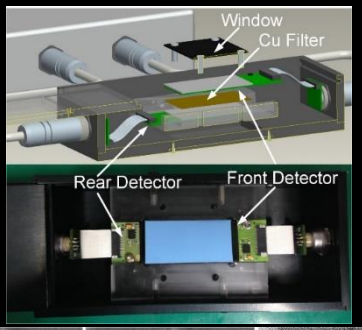


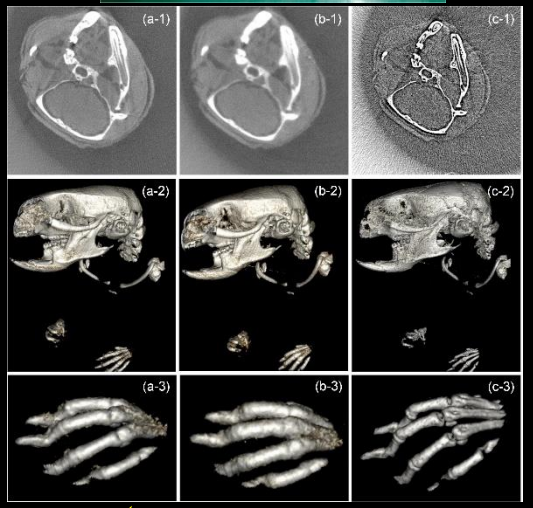
1895 // 1990 — 1st panel 1995 — 2nd panel 2002 — RIL 2004 — 3rd panel 2007 — PixScn 2009 — IEEE 2013 — NDT&E 2021 — 2023 — CXIL 2025

2001 CMOS — 2003 μ-CT — CAMER — 2014 Sandwich — Leap forward



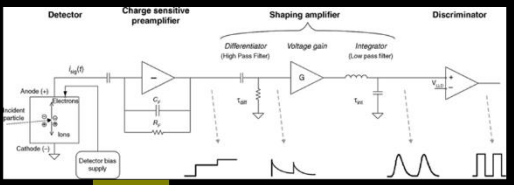




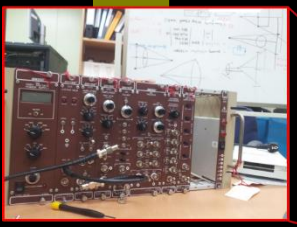


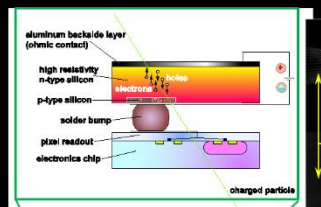
1895 // 1990 — 1st panel 1995 — 2nd panel 2002 — RIL 2004 — 3rd panel 2007 — PixScn 2009 — IEEE 2013 — 2014 Sandwich — NDT&E 2021 — 2023 Leap forward — CXIL 2025

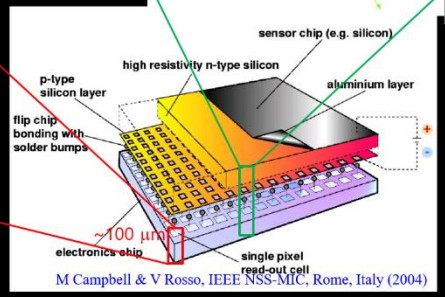
2001 CMOS — 2003 μ-CT — CAMER



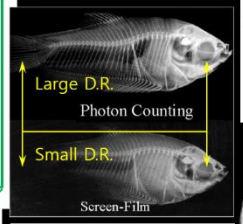
GF Knoll, *Radiation Detection and Measurement*, Wiley (2010)

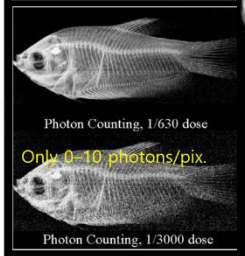


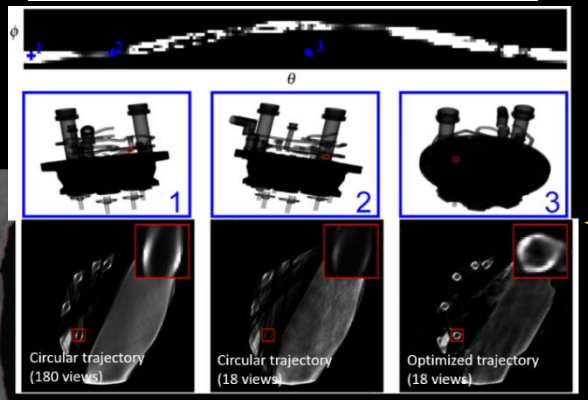


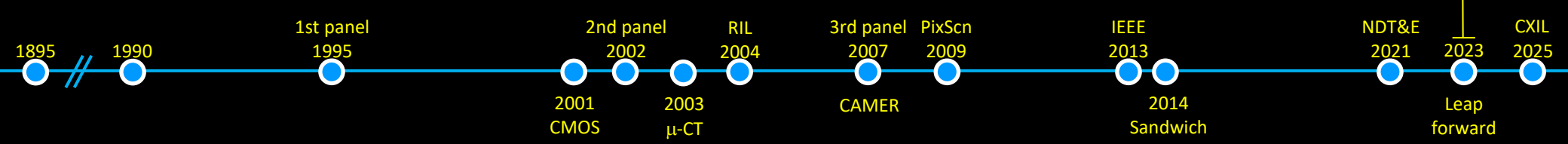


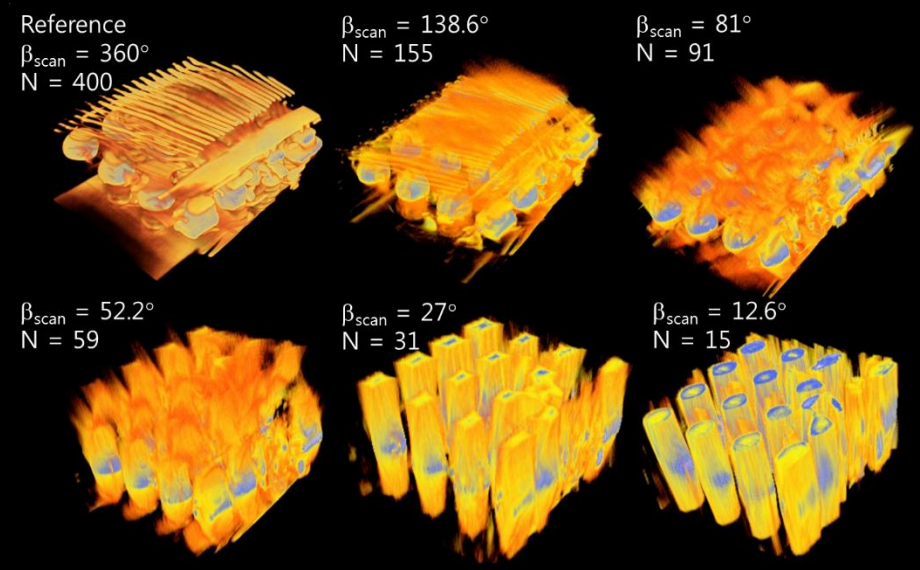
M Campbell & V Rosso, IEEE NSS-MIC, Rome, Italy (2004)





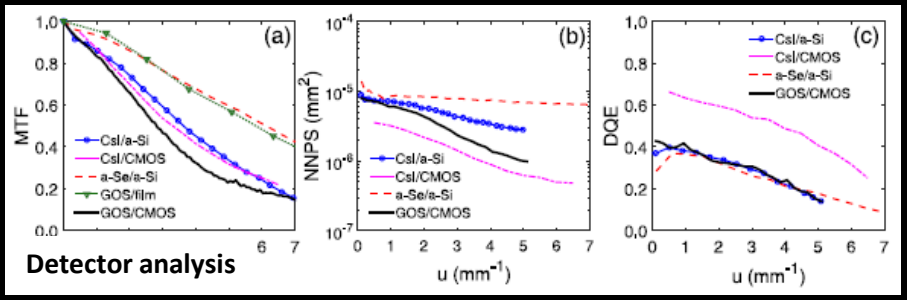




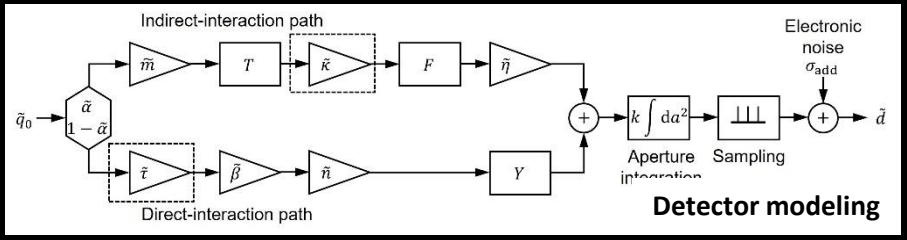


1895 // 1990 — 1st panel 1995 — 2nd panel 2002 — RIL 2004 — 3rd panel 2007 — PixScn 2009 — IEEE 2013 — NDT&E 2021 — 2023 — CXIL 2025

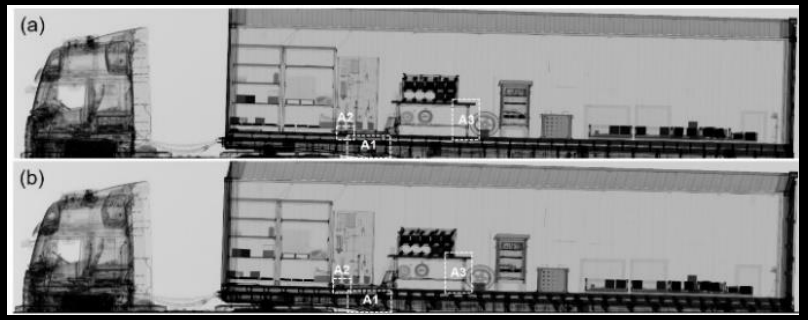
2001 CMOS — 2003 μ-CT — CAMER — 2014 Sandwich — Leap forward

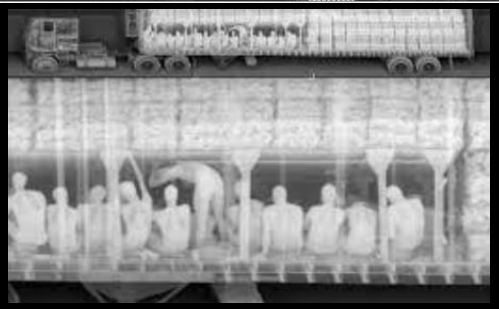


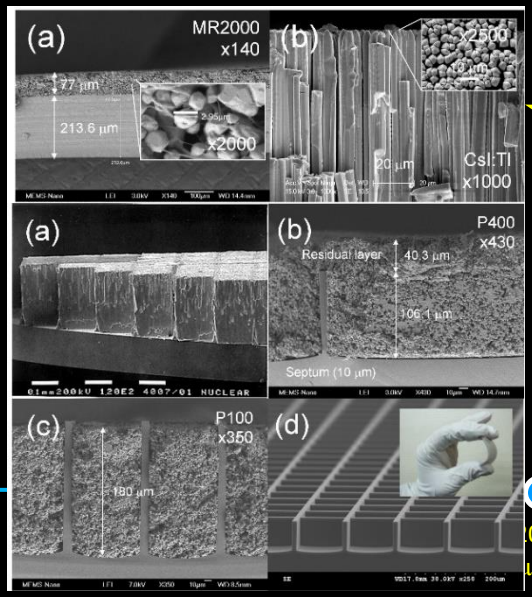
Detector analysis



Detector modeling





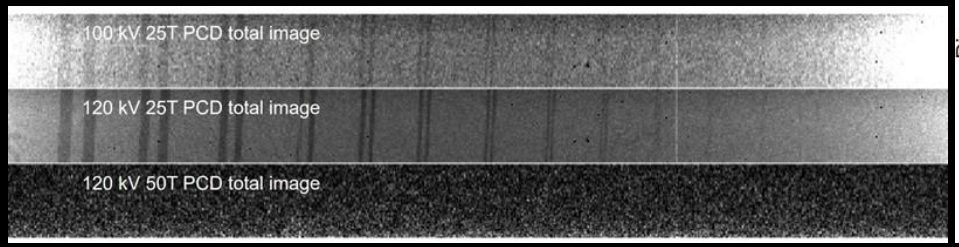


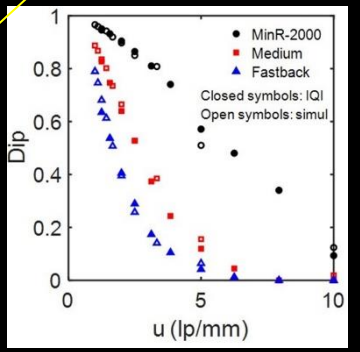
"X-ray detector"

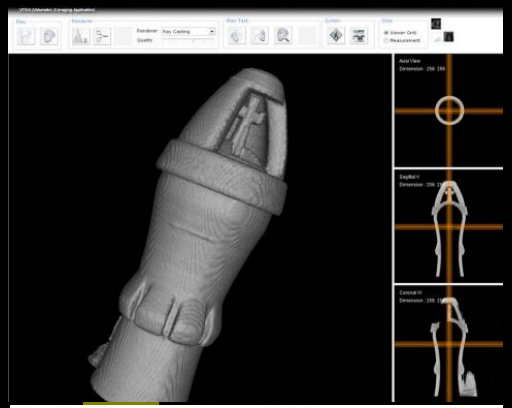
1895 // 1990 — RIL 2004 — 3rd panel 2007 — PixScn 2009 — IEEE 2013 — 2014 Sandwich — NDT&E 2021 — 2023 — CXIL 2025

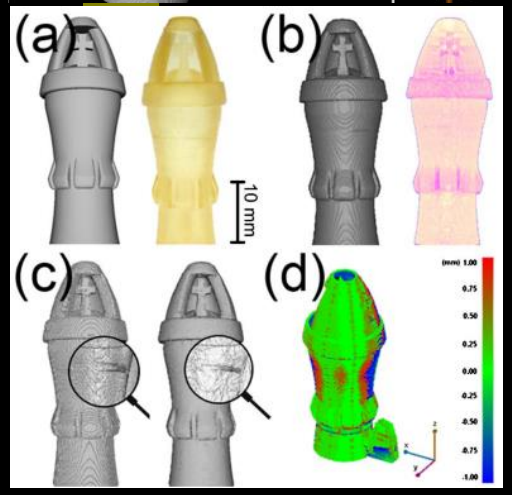
X-ray detector — PixScn — LG — Container inspection — Doosan

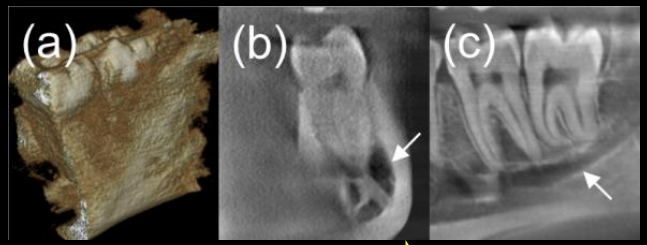
CAMER

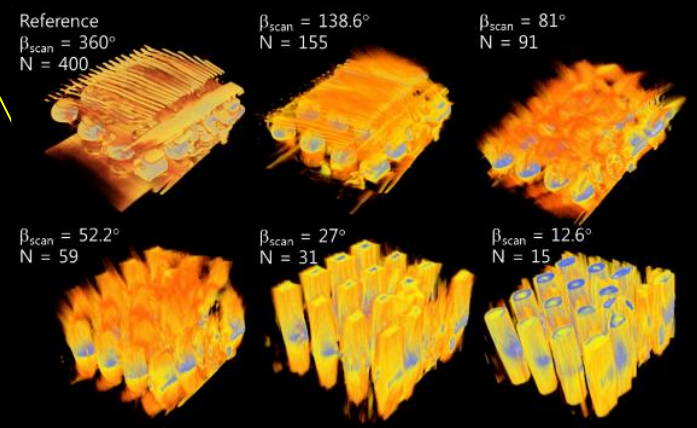








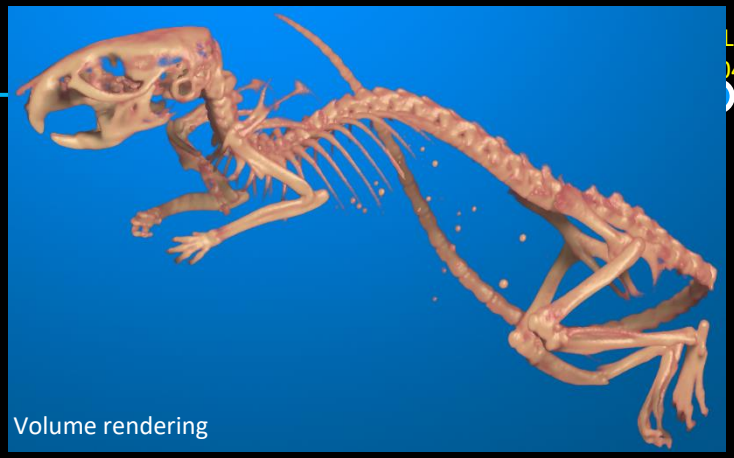


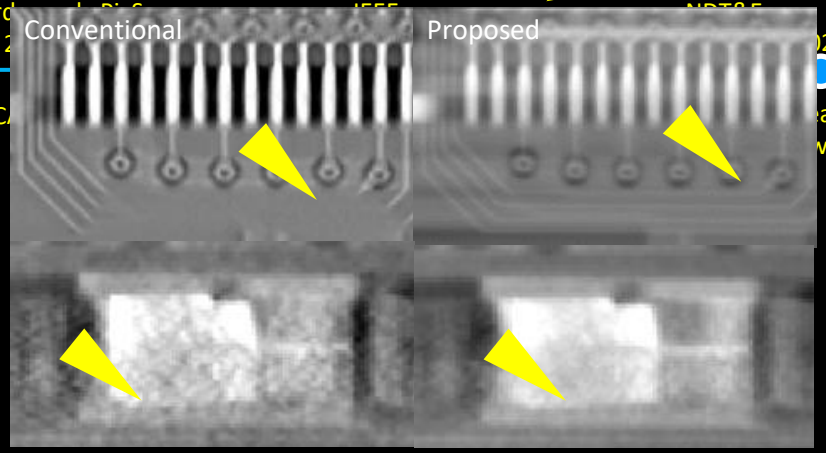


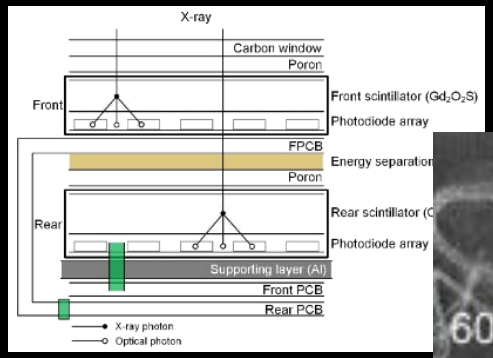
“Tomography”

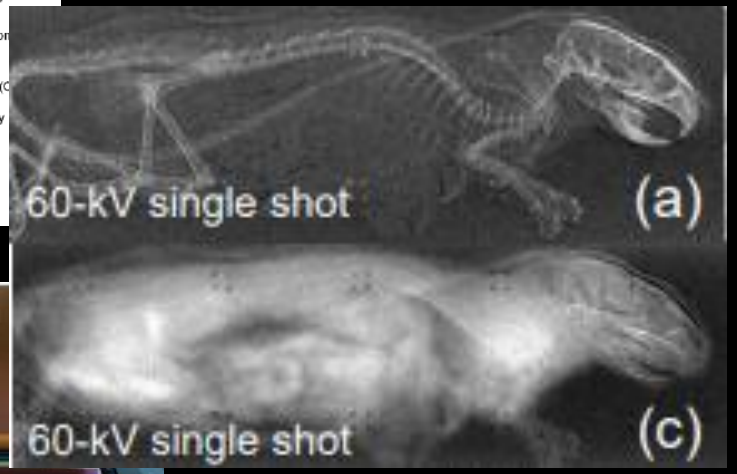
CT — VOXA — Dental — Micro-CT — PCB inspection

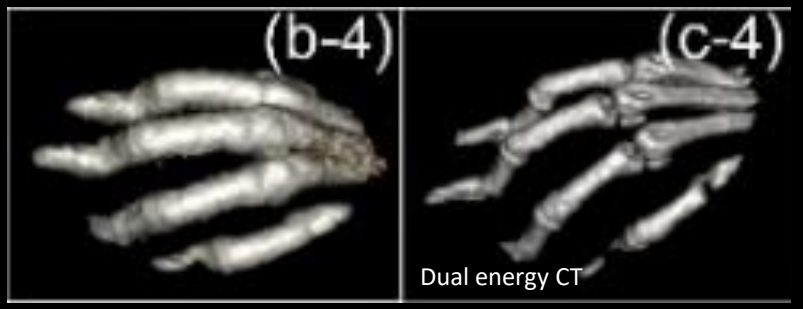
1895 // 1990 — 3rd … — 2023 — CXIL 2025

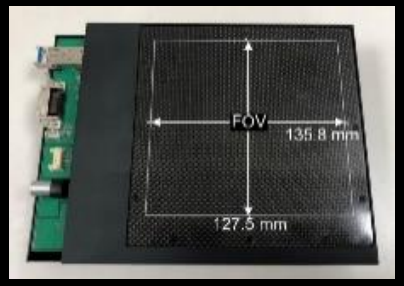




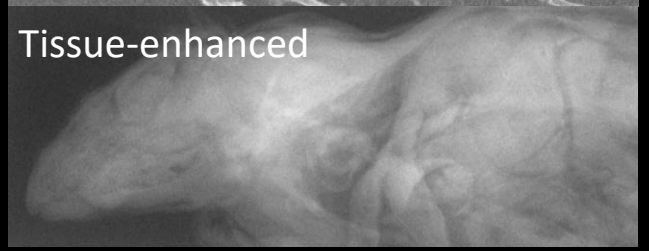




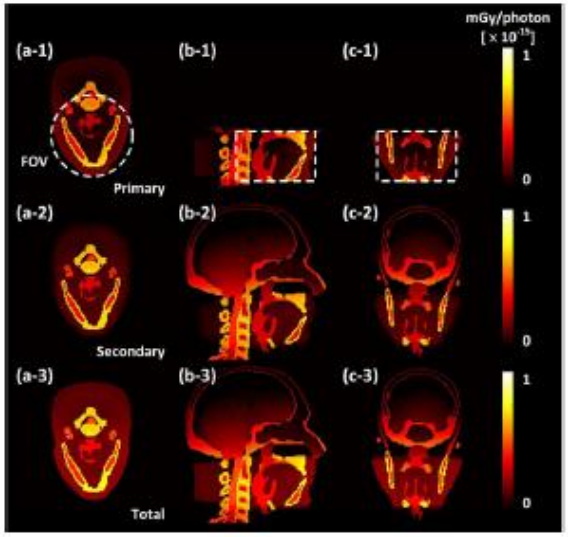




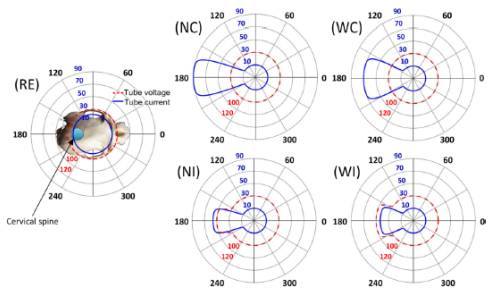
“Dual-energy imaging”

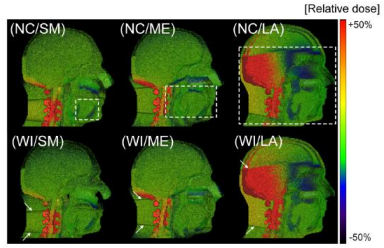


MC simulations

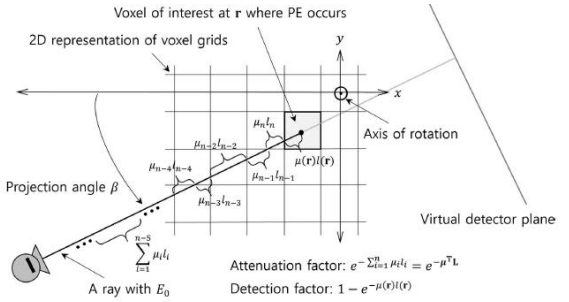


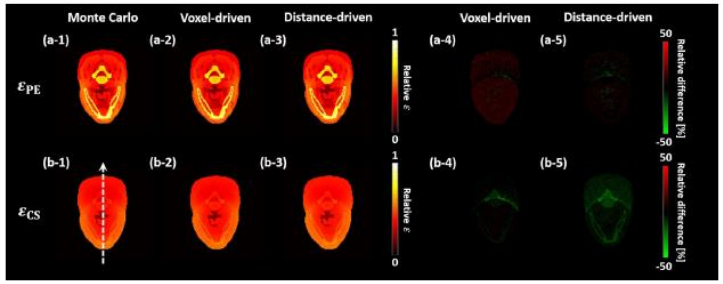
Intensity-modulated scan scenarios



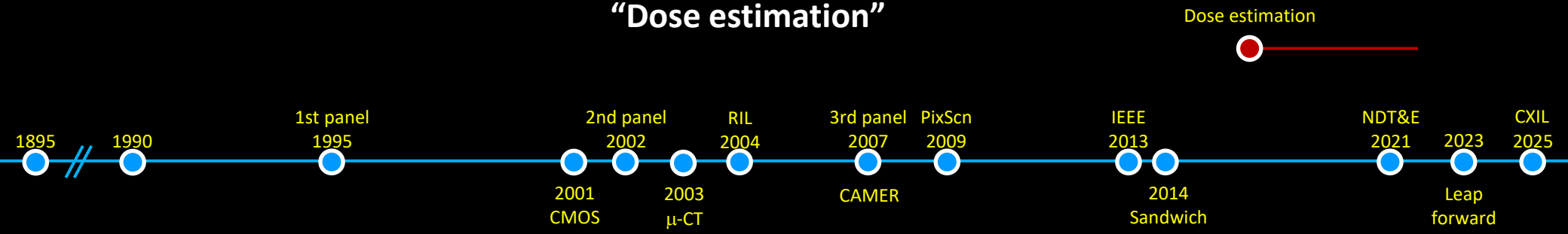


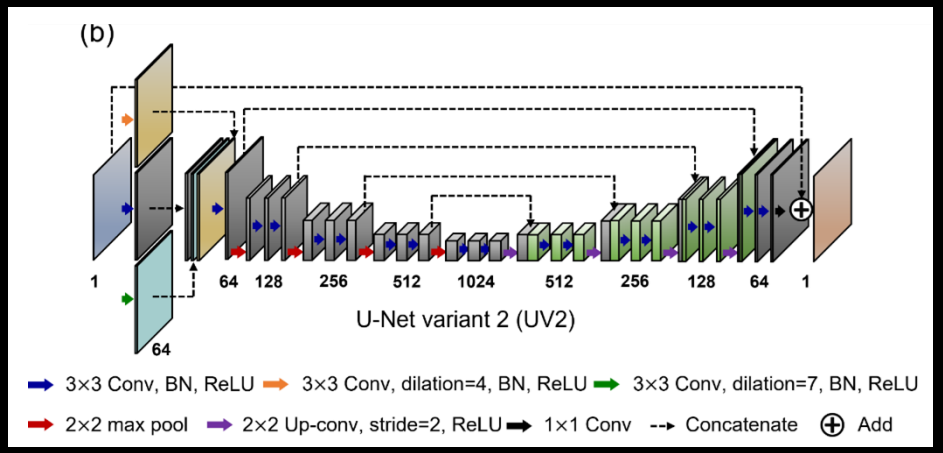
Voxel-driven approach for dose estimation

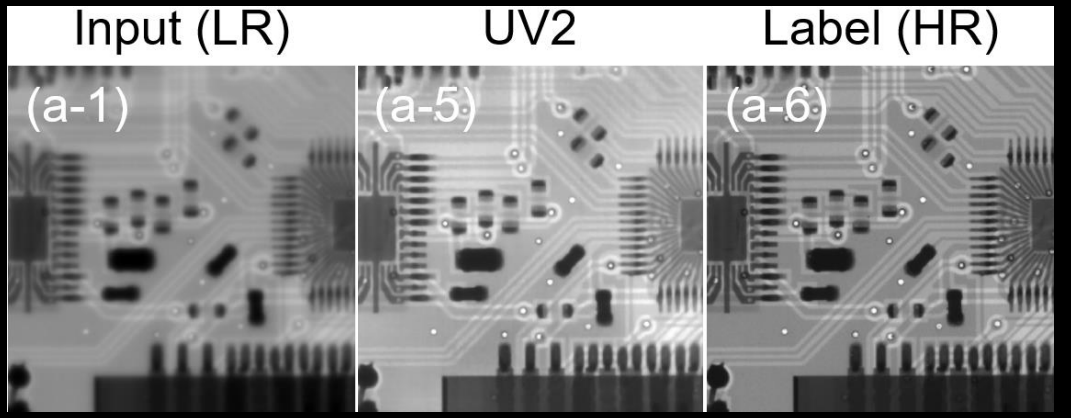


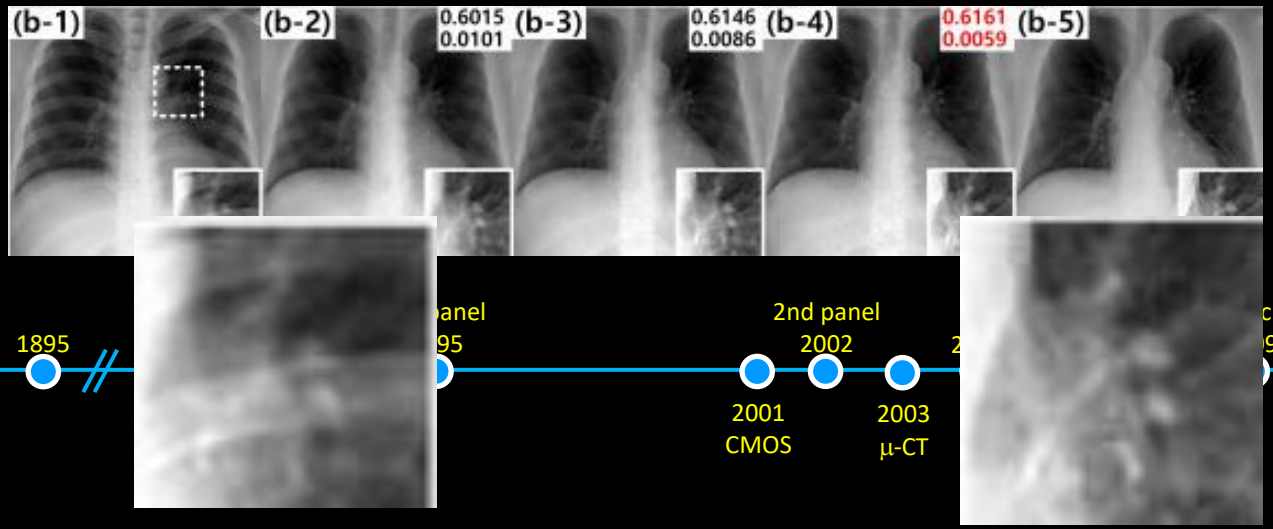


"Dose estimation"





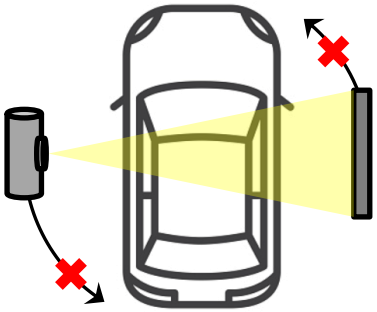




“Deep learning”

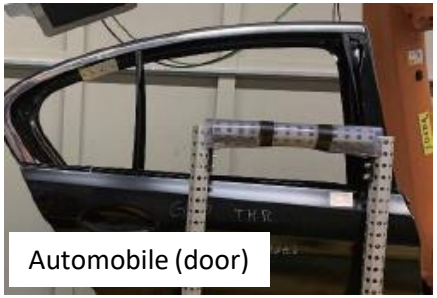
Problem due to the conventional circular trajectory

- Lack of space
  - Large objects
  - Obstacles



Circular trajectory

Automobile



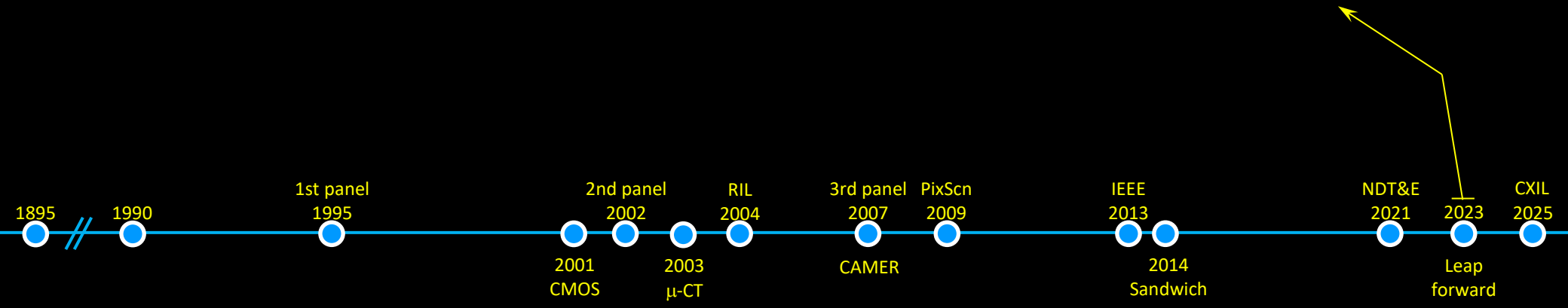
Automobile (door)

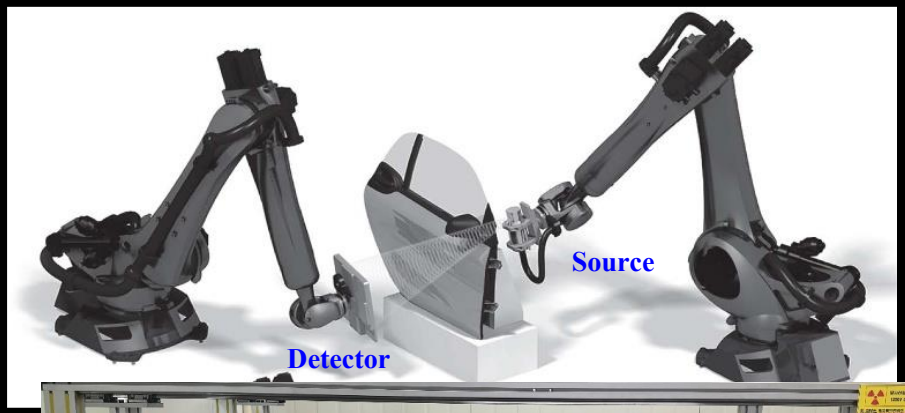
Automobile (Pilar)

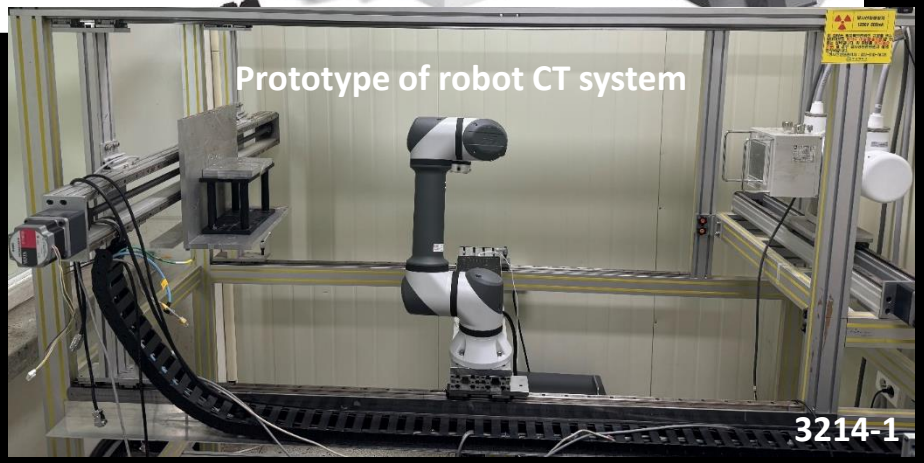
Turbine blade

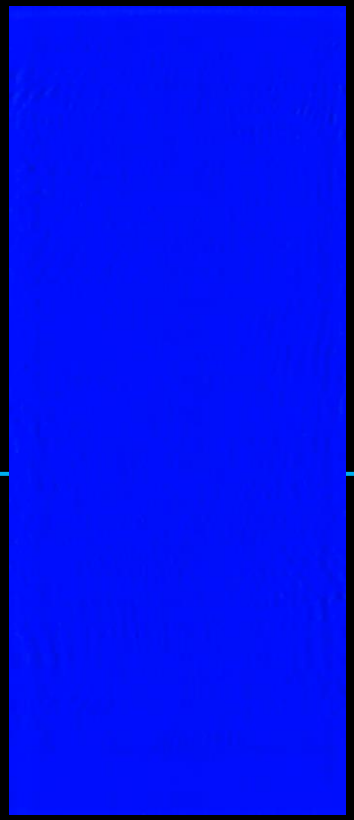
Aerospace

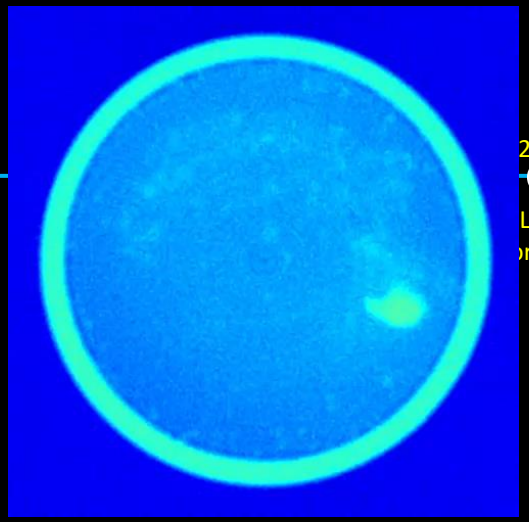
Aerospace (Engine)



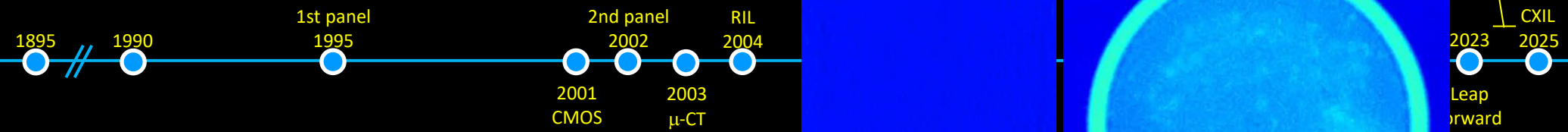

Source
Detector


Prototype of robot CT system
3214-1



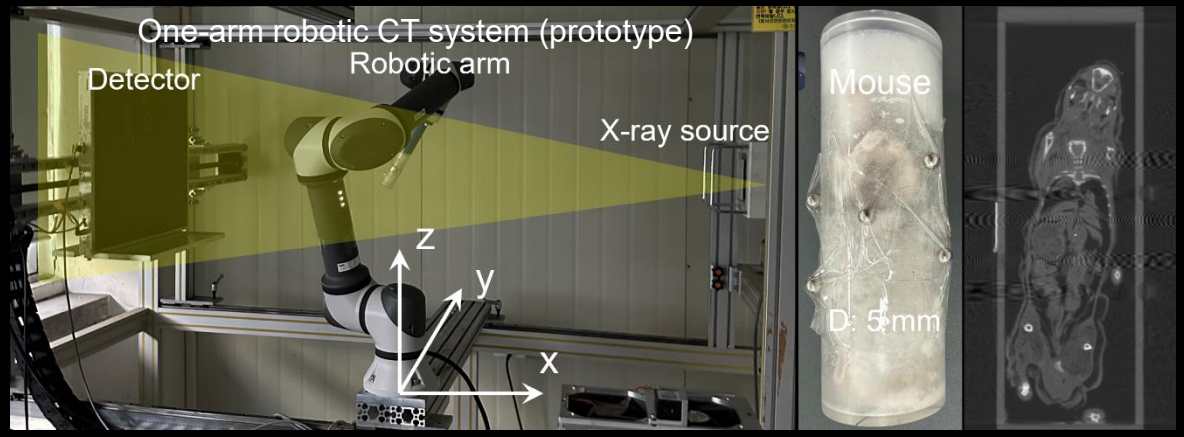


“Robot CT”


1895
1990
1st panel
1995
2001
CMOS
2nd panel
2002
2003
μ-CT
RIL
2004
2023
CXIL
2025
Leap
orward

Trajectory optimization

Artifact reduction



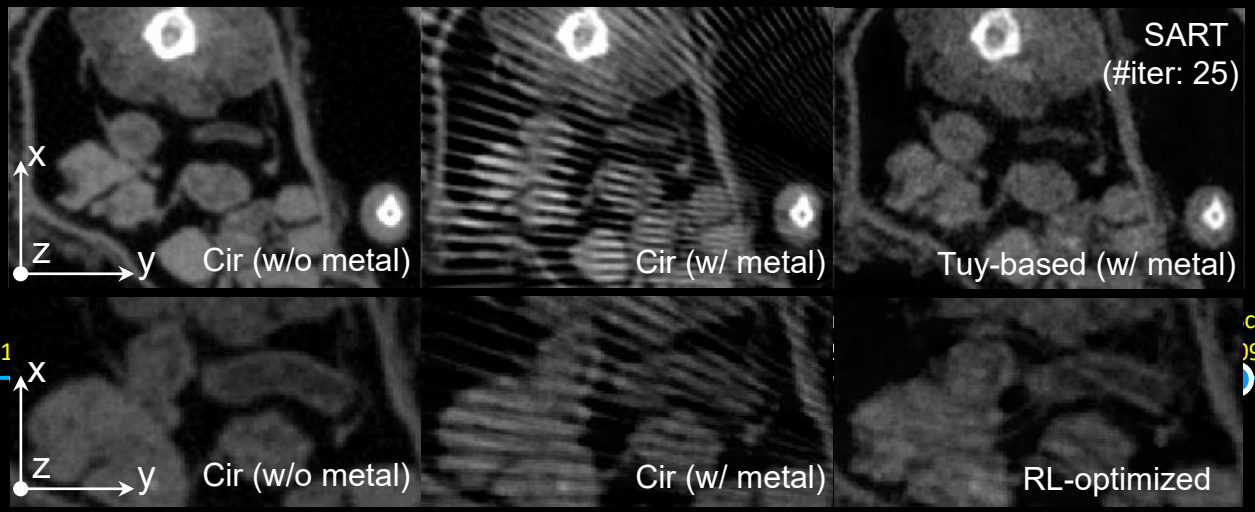


Image quality enhancement

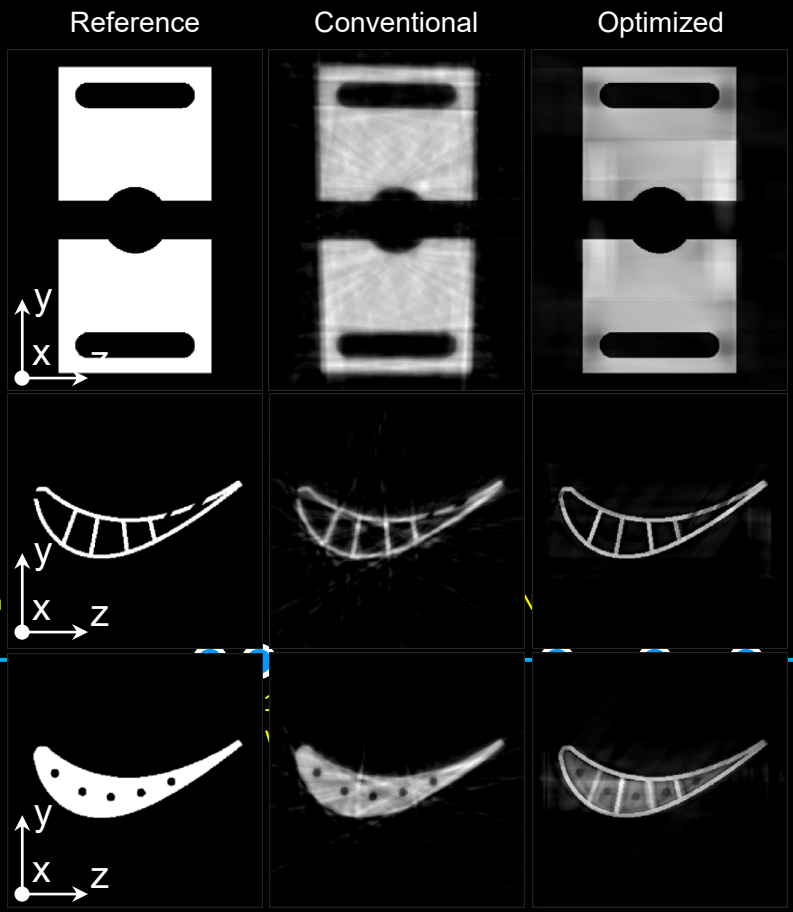
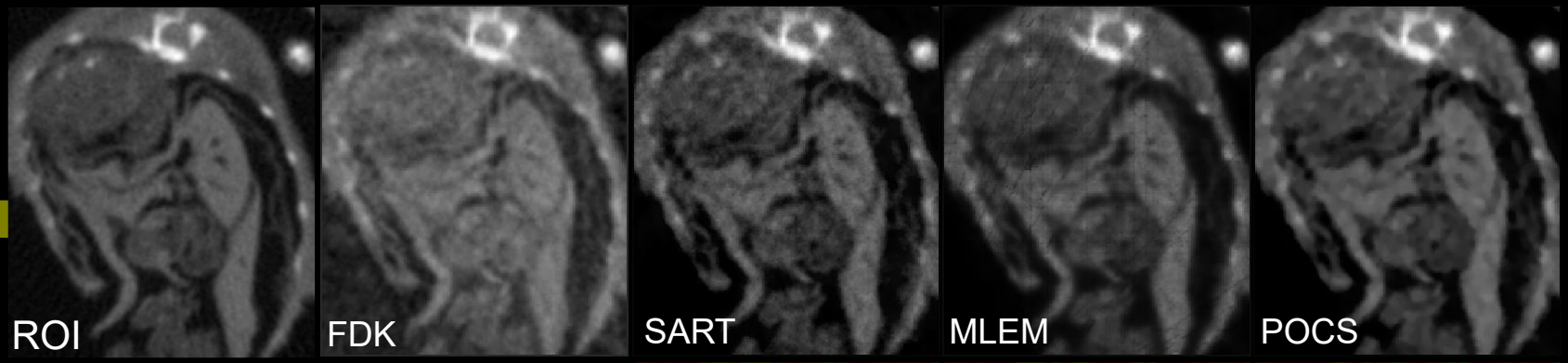
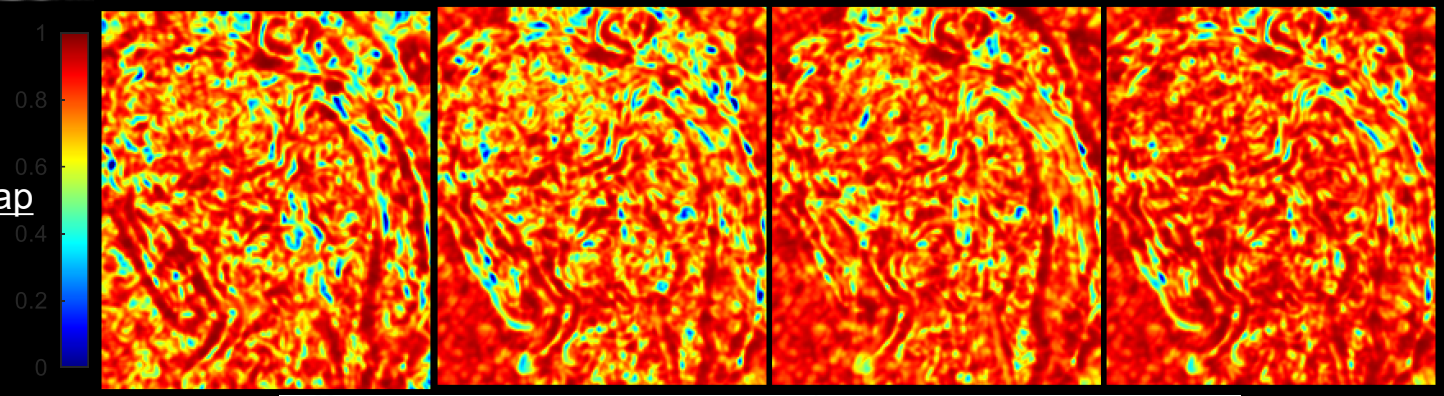
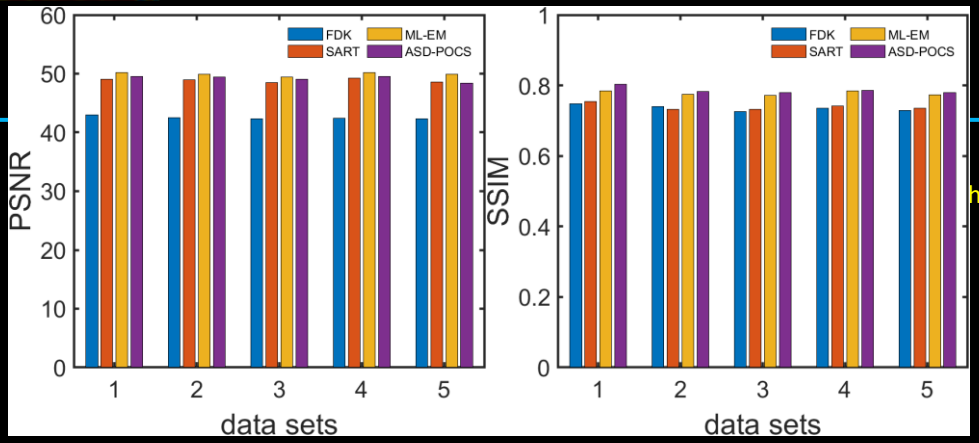


Image reconstruction



SSIM map

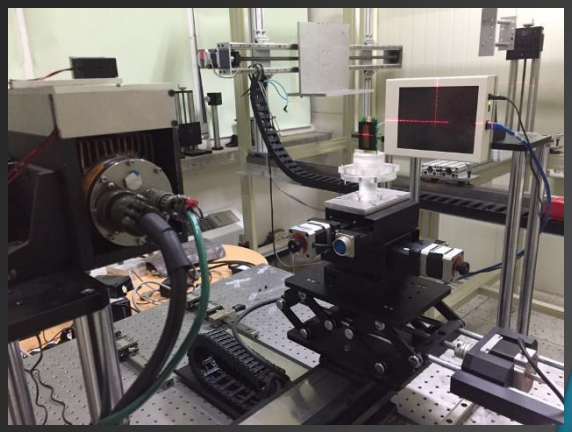




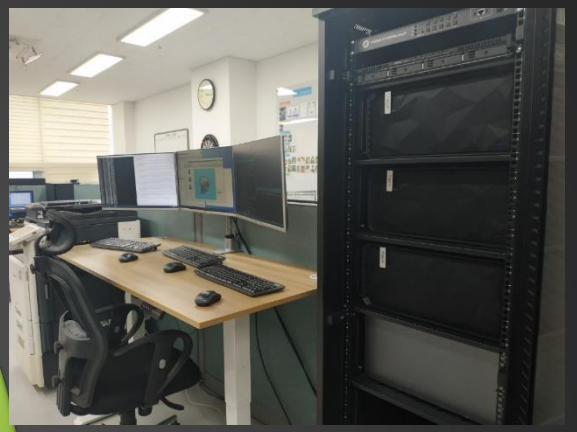
1895 // 1990 — 1st panel 1995 — NDT&E 2021 — 2023 Leap forward — CXIL 2025

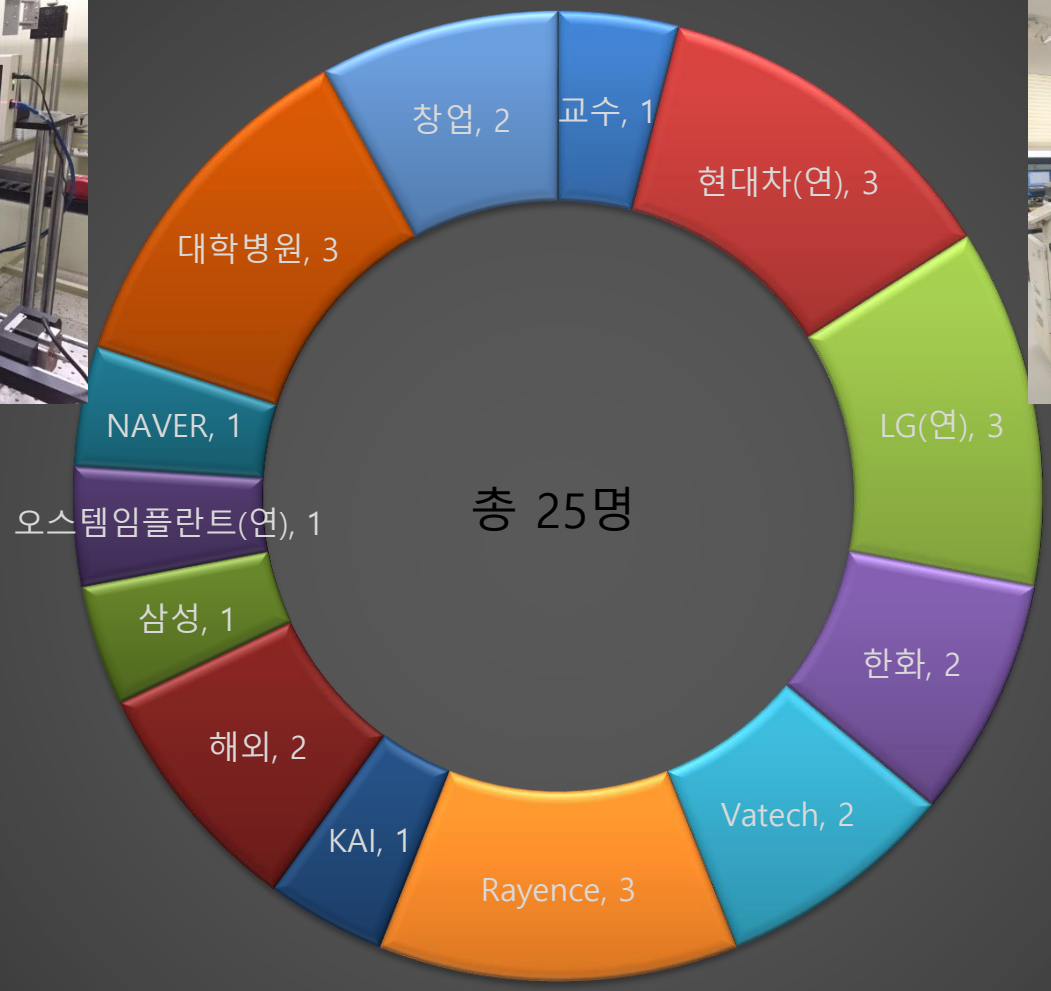
The Largest Eigenvalue = *Students*!

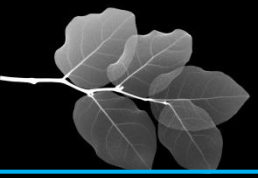
3214-1 for measurements



M120 for computation







Q&A