THE UGCT CORE FACILITY: RECENT DEVELOPMENTS AND APPLICATIONS

Matthieu N. Boone
WHO WE ARE

**Radiation Physics**
Prof. Dr. L. Van Hoorebeke
Prof. Dr. ir. M. Boone
Fundamental CT research
Scanner design & construction
Novel source & detector technology
CT software development
Application related research

**Pore-scale Processes in Geomaterials**
Prof. Dr. V. Cnudde
Geological applications of CT, mainly in-situ imaging

**Laboratory for Wood Science**
Prof. Dr. ir. J. Van Acker
Prof. Dr. ir. J. Van den Bulcke
Wood related applications of CT

UGCT: Centre for X-ray tomography
User facility and Centre of Expertise which makes UGCT expertise and hardware available to other researchers (for academic purposes)
VALORIZATION

Inside Matters NV
Est. 2008
Services and software solutions for tomography communities.

XRE NV
Est. 2017
A new alternative for 3D X-ray imaging
Dynamic solutions for your lab
- Design and manufacturers of high performance micro-CT platforms
- CT Scanning Services and Software

Centre for X-ray Tomography (UGCT)
Est. 2006
Ghent University Center of Excellence

X-ray Engineering bvba
Est. 2011
Developers of innovative micro-CT platforms
UGCT – XMI SETUP
UGCT COMMERCIAL SCANNER

UGENT.BE/iMATCH

AUGent imaging methods
AUGent application research
Market demand

UGENT.BE/iMATCH
3 pillars for research & industrial collaboration

- **Structural imaging and analysis (SIA)**
  - Research Focus: Multi-scale 3D imaging

- **Dynamic imaging, modelling and analysis (DIMA)**
  - Research Focus: Fast 4D imaging

- **Multimodal imaging and analysis (MIA)**
  - Research Focus: 3D Chemical characterization
PILLAR 1

Structural imaging and analysis (SIA)
Research Focus: Multi-scale 3D imaging

Dynamic imaging, modelling and analysis (DIMA)
Research Focus: Fast 4D imaging

Multimodal imaging and analysis (MIA)
Research Focus: 3D Chemical characterization
CONVENTIONAL SYSTEMS
ETNOGRAPHICAL OBJECTS

See also presentation at ‘From Forests to Heritage” (April 2022)
ETNOGRAPHICAL OBJECTS

31.5 cm
19 cm
18 cm

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CIBORIUM

INSIDEWOOD.LIB.NCSU.EDU
ETNOGRAPHICAL OBJECTS

LEGUMINOSAE
PAPILIONOIDEAE
Millettia laurentii
D Wild.
(Wenge)

INSIDEWOOD.LIB.NCSU.EDU
DARK-FIELD CONTRAST


Pfeiffer et al., Nature Mat. 7 (2008)
TUNABLE DARK-FIELD CONTRAST

TUNABLE DARK-FIELD CONTRAST

- Source
- Detector
- Sample stage
- Gratings

Visibility (%)
PILLAR 2

Structural imaging and analysis (SIA)
Research Focus: Multi-scale 3D imaging

Dynamic imaging, modelling and analysis (DIMA)
Research Focus: Fast 4D imaging

Multimodal imaging and analysis (MIA)
Research Focus: 3D Chemical characterization
DYNAMIC IMAGING: 4D-µCT

Dierick et al. (2014). Nucl. Inst. & Meth. 324 (0).
MICRO-PARTICLE VELOCIMETRY

INCREASING TEMPORAL RESOLUTION

fast dynamics

projection index

\sim \text{time}

200^\circ \text{ reconstructions}

window shift

48^\circ \text{ reconstructions}

window size

12^\circ \text{ reconstructions}
INCREASING TEMPORAL RESOLUTION

Goethals et al., WRR 58 (2022). DOI: 10.1029/2021WR031365
PILLAR 3

Structural imaging and analysis (SIA)
Research Focus: Multi-scale 3D imaging

Dynamic imaging, modelling and analysis (DIMA)
Research Focus: Fast 4D imaging

Multimodal imaging and analysis (MIA)
Research Focus: 3D Chemical characterization
COMBINED XRF AND CT
SELF-ATTENUATION

Gao et al., Anal Chem 170 (2021). DOI: 10.1021/acs.analchem.0c03828
THANK YOU!

http://www.ugct.ugent.be