Pausiris - MONA
Volume Visualistion

Paul Bourke

iVEC
@UWA

Contents

- iVEC
- Visualisation @ iVEC
- Some history
- Ta-Sheret-Min
- Volume visualisation
- Cat
- Pausiris
- Live example
- MONA exhibition

iVEC

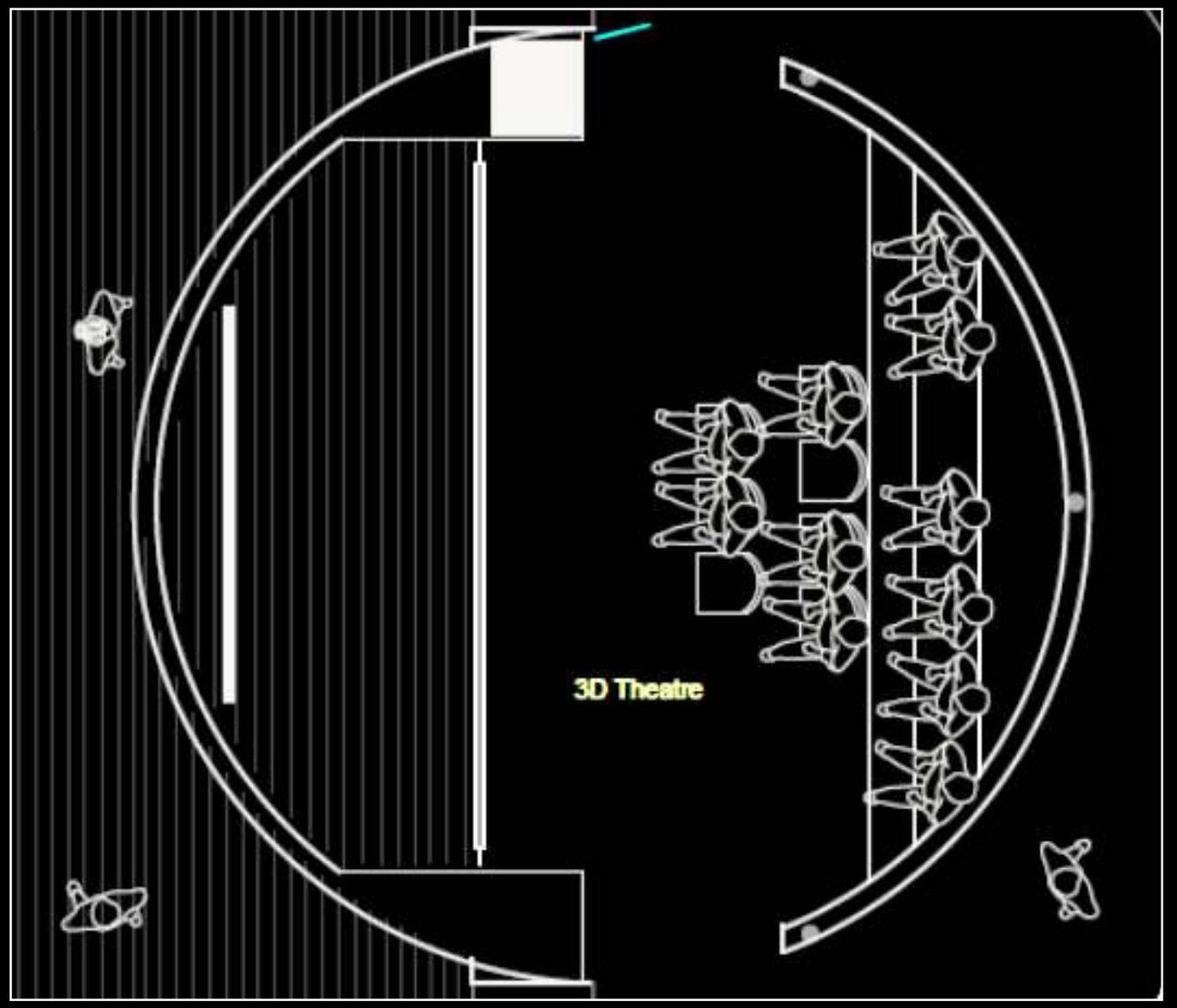
- Unincorporated joint venture between the 5 public research organisations in Western Australia
  UWA - Curtin - Murdoch - ECU - CSIRO
- Main teams: supercomputing - data - visualisation
- Managing the Pawsey facility, providing the compute for the Square Kilometer Array Pathfinder

Visualisation @ IVEC

- Visualisation is around the use of advanced computer graphics and algorithms to provide researchers with insight into their datasets.
- An interesting mixture between hard core computer science, engineering and technology but there is also a creative aspect.
- Outcomes include
  - revealing something new in a dataset
  - providing understanding faster than by using lower order techniques
  - revealing errors, for example in simulation data
- In addition to pure research, visualisation used
  - to convey research to colleagues
  - convey research to peers at conferences
  - visuals for papers
  - public outreach and education
  - outreach through museums, science centers
  - artistic expressions

History: Tasmania Museum and Art Gallery

- TMAG - Islands to Ice exhibition.
- Artist: Peter Morse.
- Reasonable scale stereoscopic 3D theatre installed in 2006.
- Cleaned up and presented a number of high resolution stereoscopic photographs by Frank Hurley.



Islands to Ice

- Wonderful collection of stereoscopic pairs on glass plates.
- Scanned and “cleaned up”.

Ta-Sheret-Min

- Relatively low resolution 3D CT scan.
- 2008-2009
- Egypt, Late Period, end 26th – 28th Dynasty, c. 66
  399 BCE;
- Human remains, linen wrappings, wood, plaster,
  pigment.

Synthetic holograms

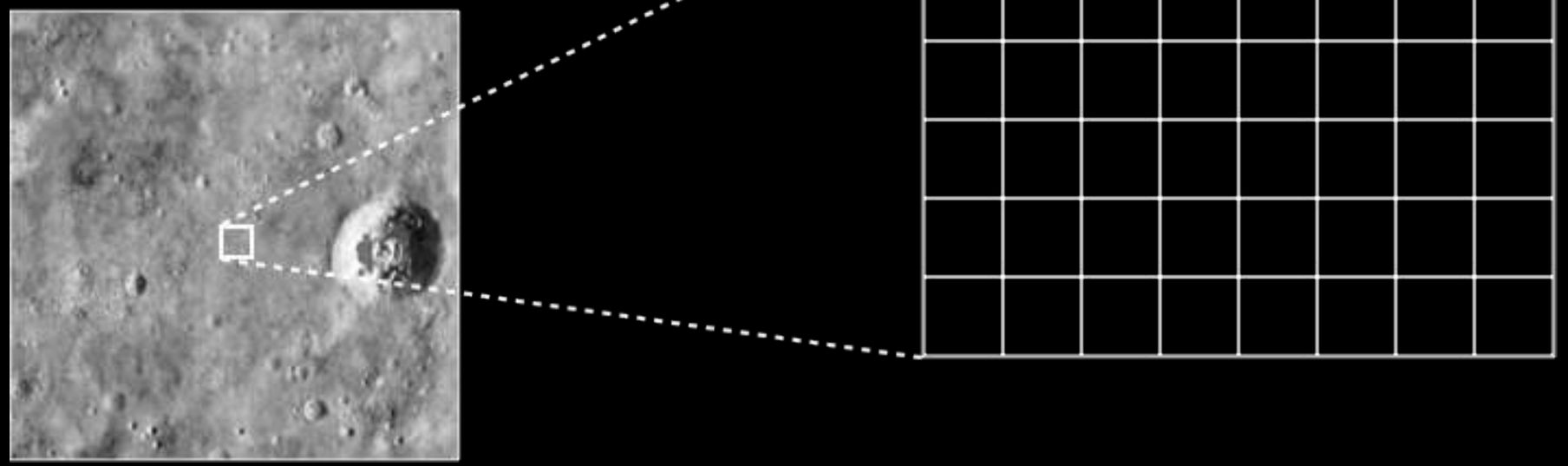
Crystal prints

Volume Visualisation

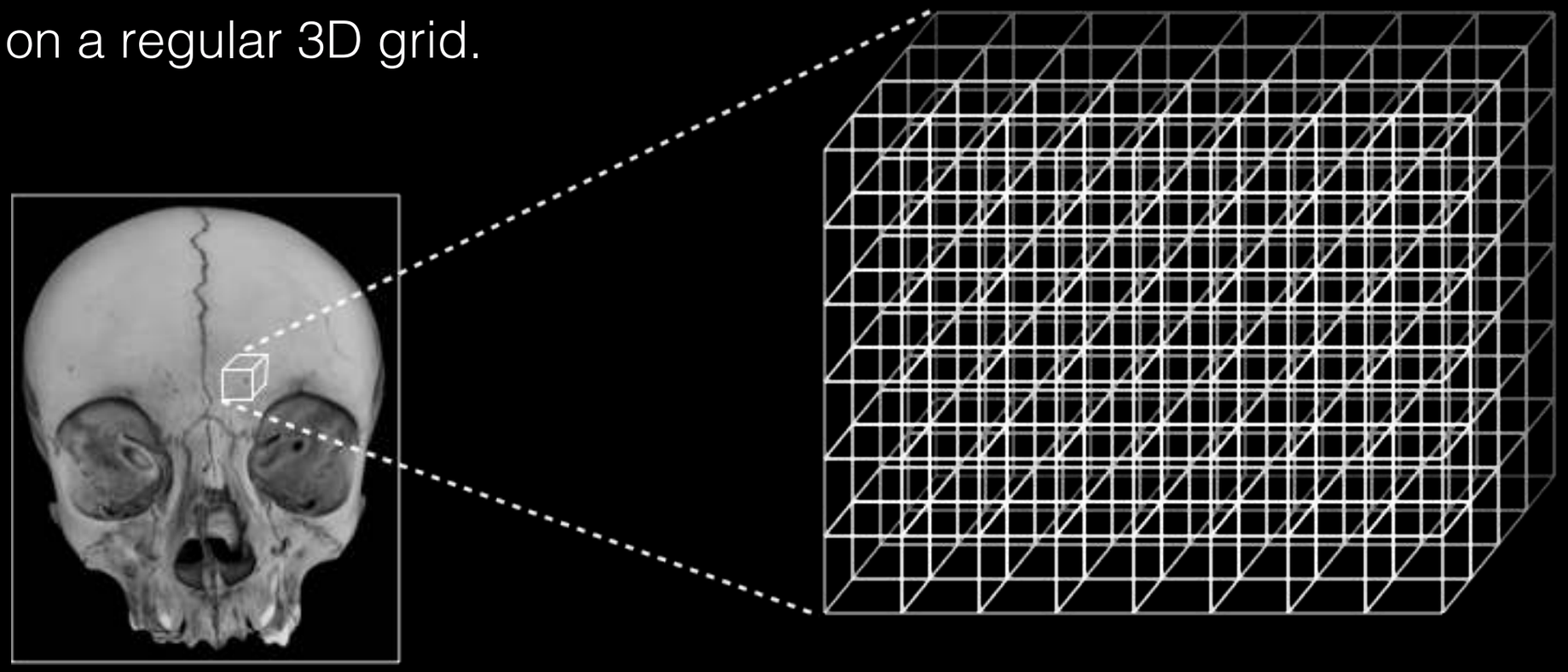
- Volumetric data is now very common to a very wide range of disciplines.
- 3D scanning of physical objects. For example MRI, CT, MicroCT.
- Representations of simulations. For example fluid dynamics, cosmology, finite element techniques in engineering.

Voxels

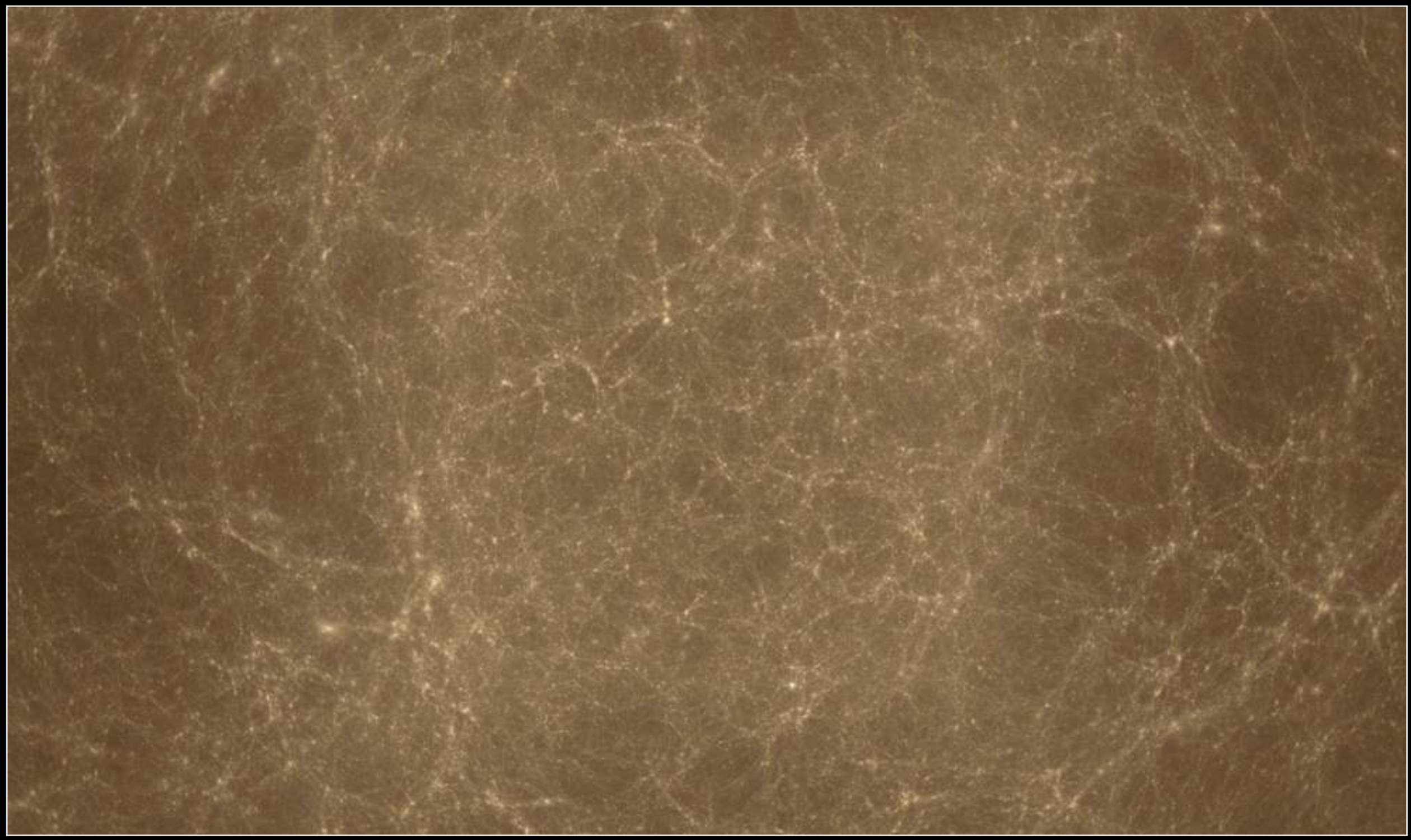
- A digital image contains some quantity sampled on a regular grid on a 2D plane.



- In a volumetric dataset there is some quantity sampled on a regular 3D grid.



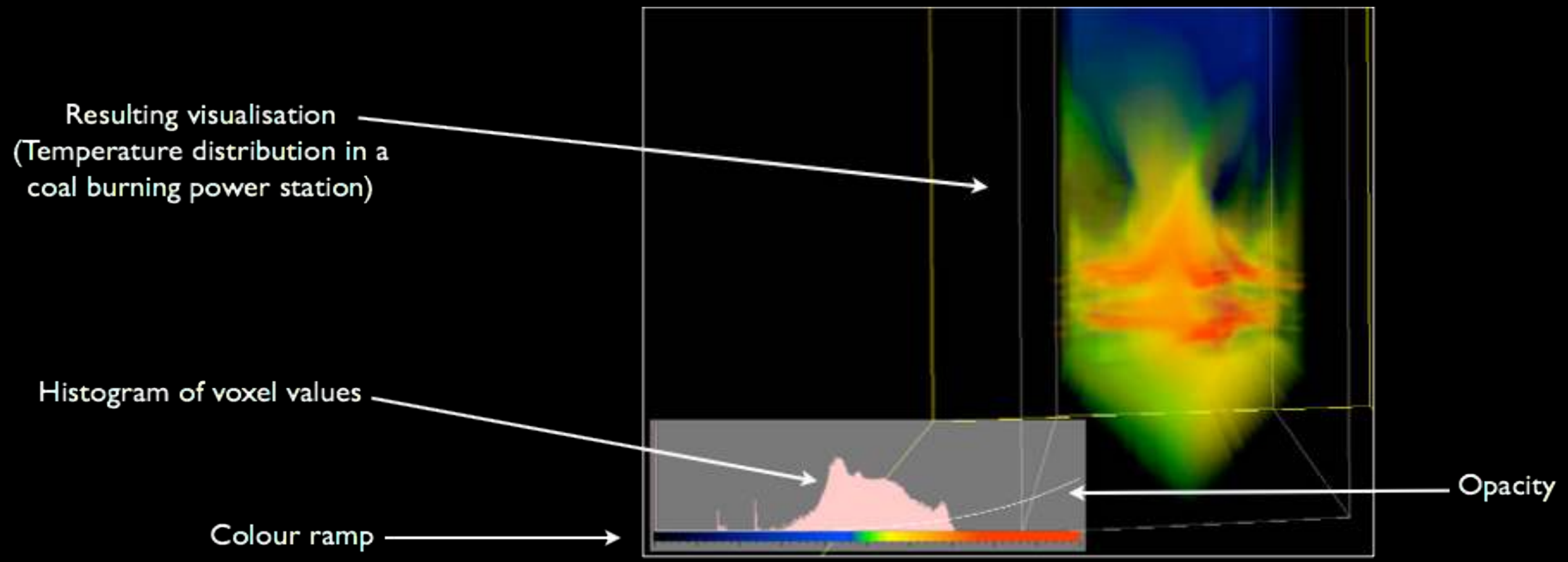
Examples of volume visualisation



Cosmological simulations

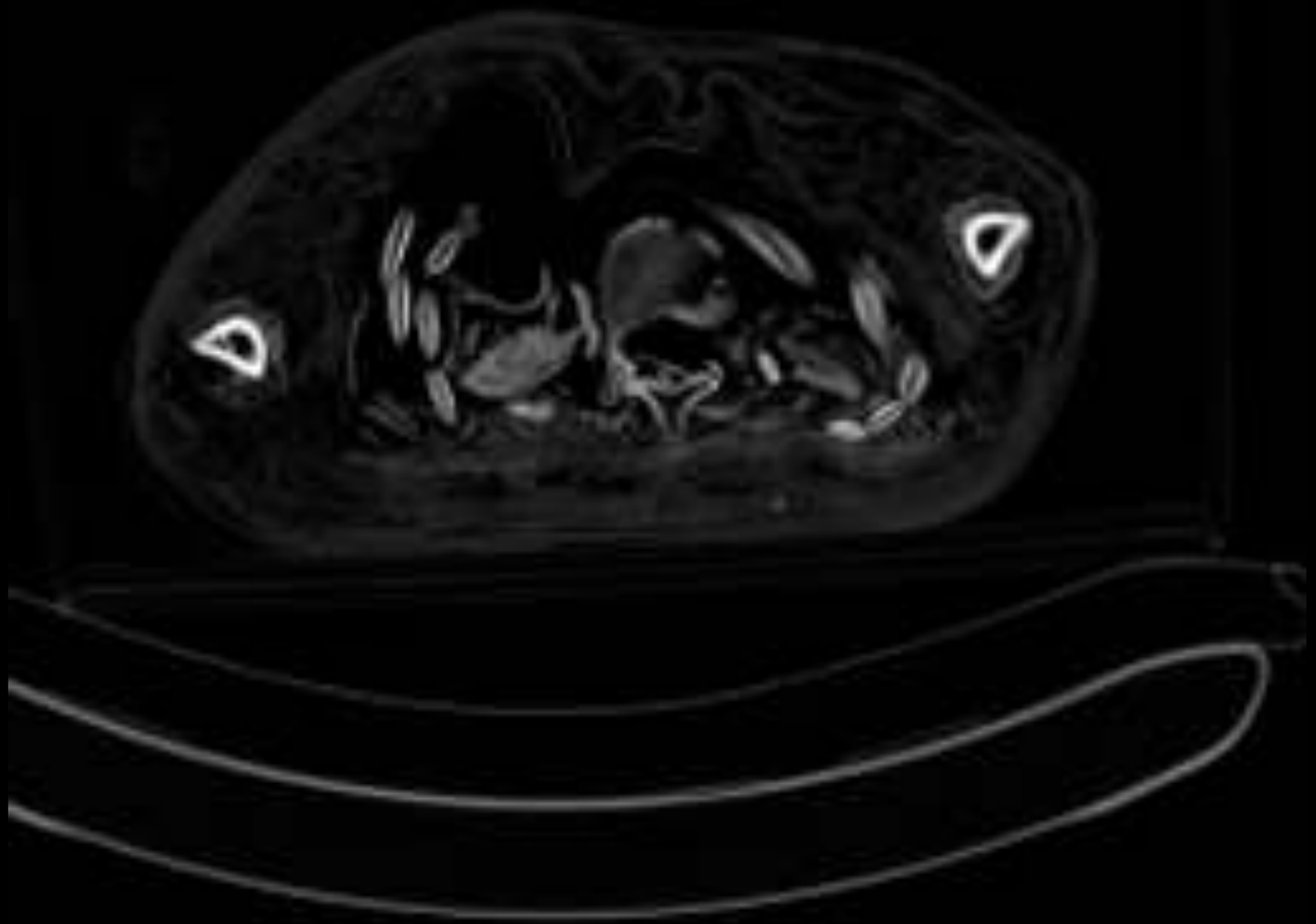
Volume visualisation

- The process of exploring and revealing the structure/interior of a volumetric dataset.
- The general approach involves a mapping between voxel values and colour/ opacity.

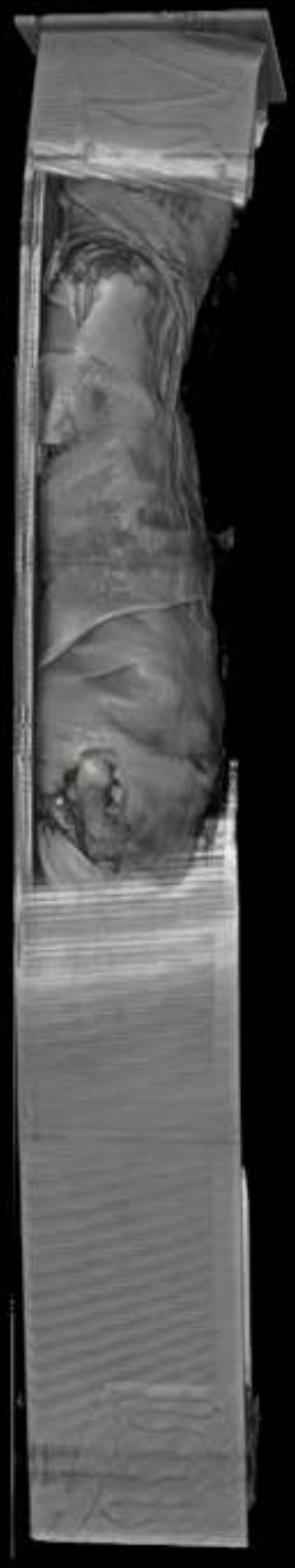


Medical research

Raw data







Cat

- Even lower resolution.
- Remember CT only gives density so all colours are fake.

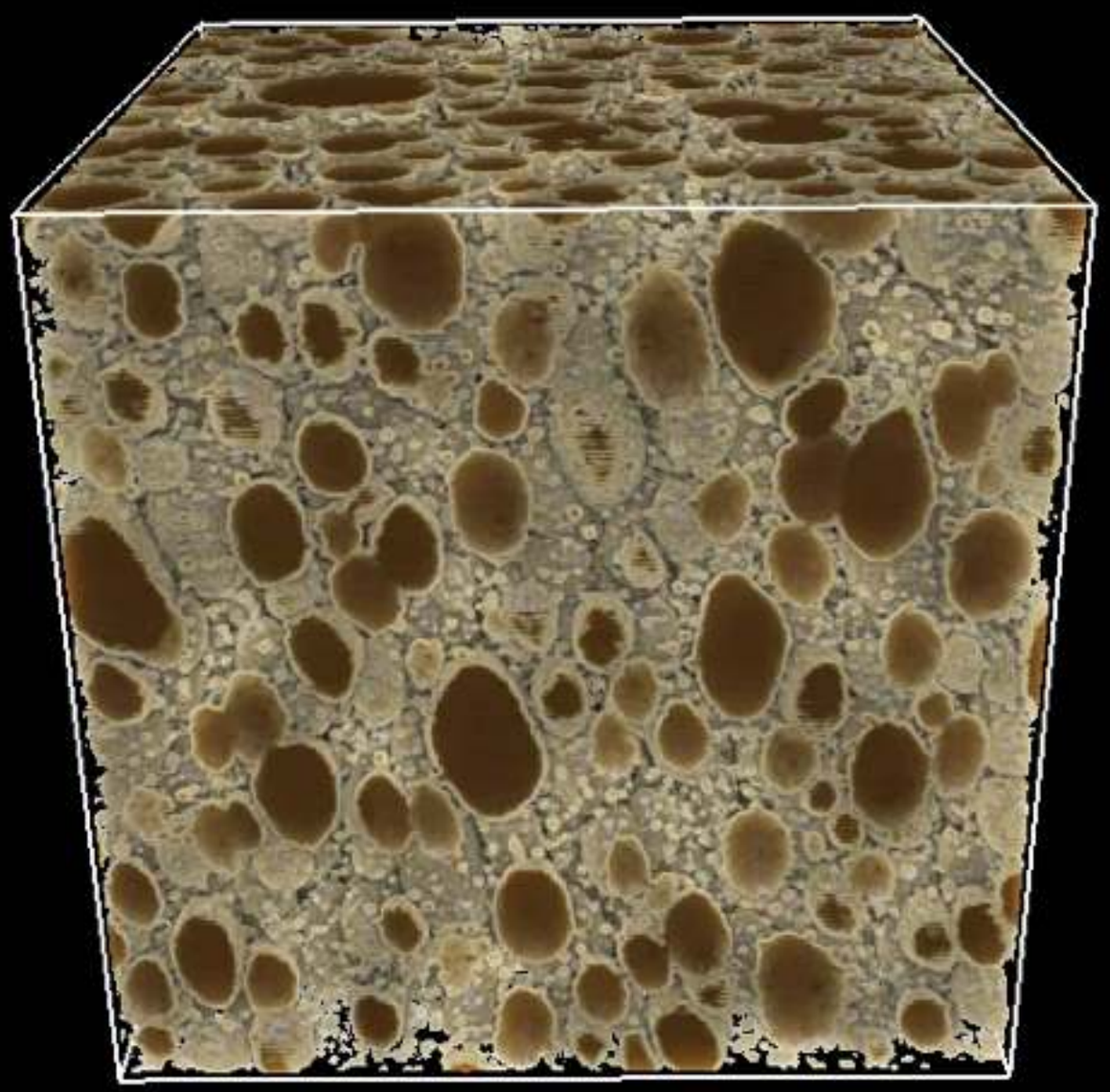
Pausiris

- Egypt, Ptolemaic to Roman Period, 100 BCE – CE 100.
- Human remains encased in stucco plaster with glass eyes, incised and painted decoration.
- Provenance and identity had been confirmed.
- Skeletal structure was intact, unopened.
- Finally a high resolution CT (Computed Tomography) scan from the Hobart hospital newly acquired scanner.
- Scanned in 3 parts, needed to be reassembled.

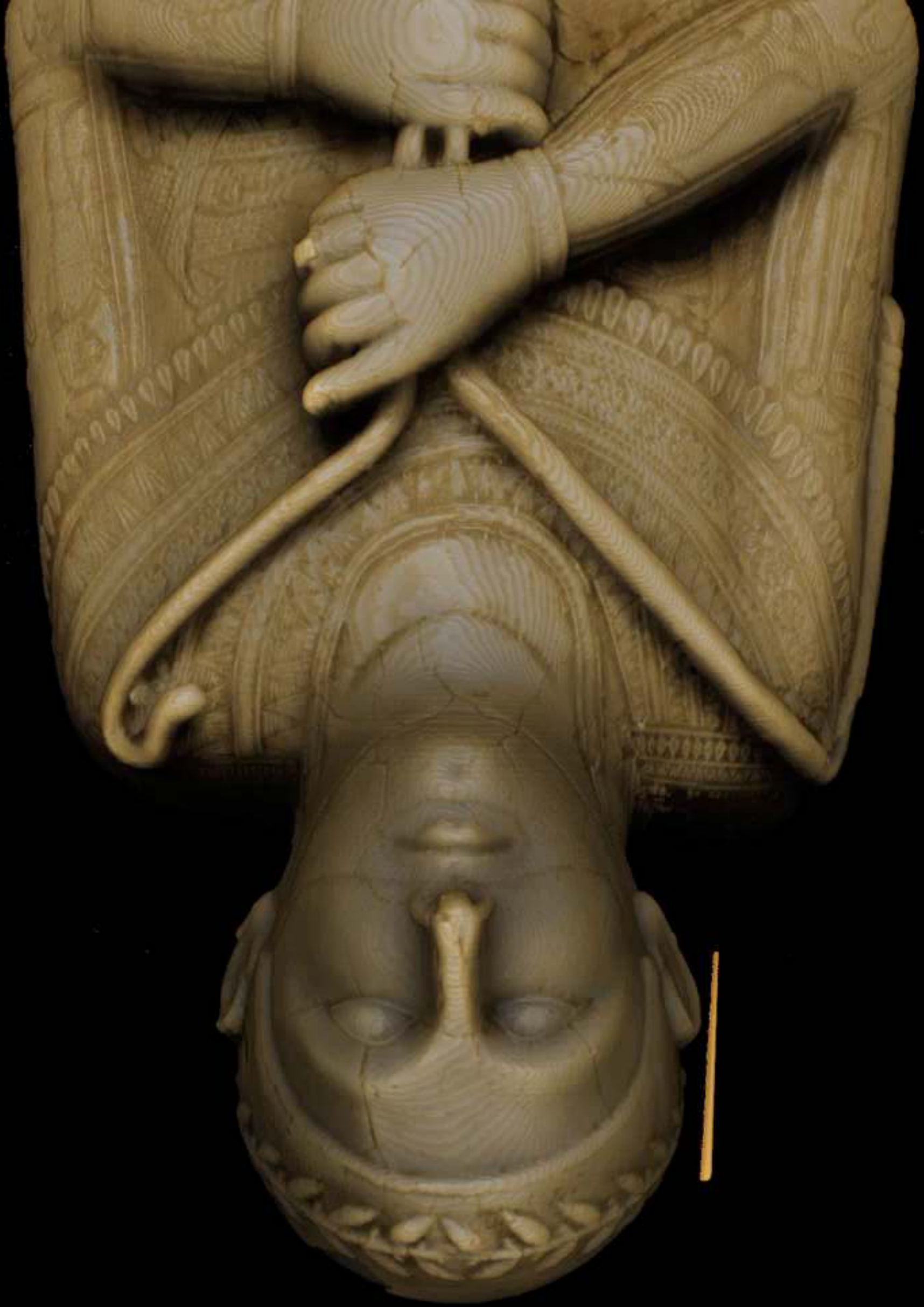
Whole mummy visualisation

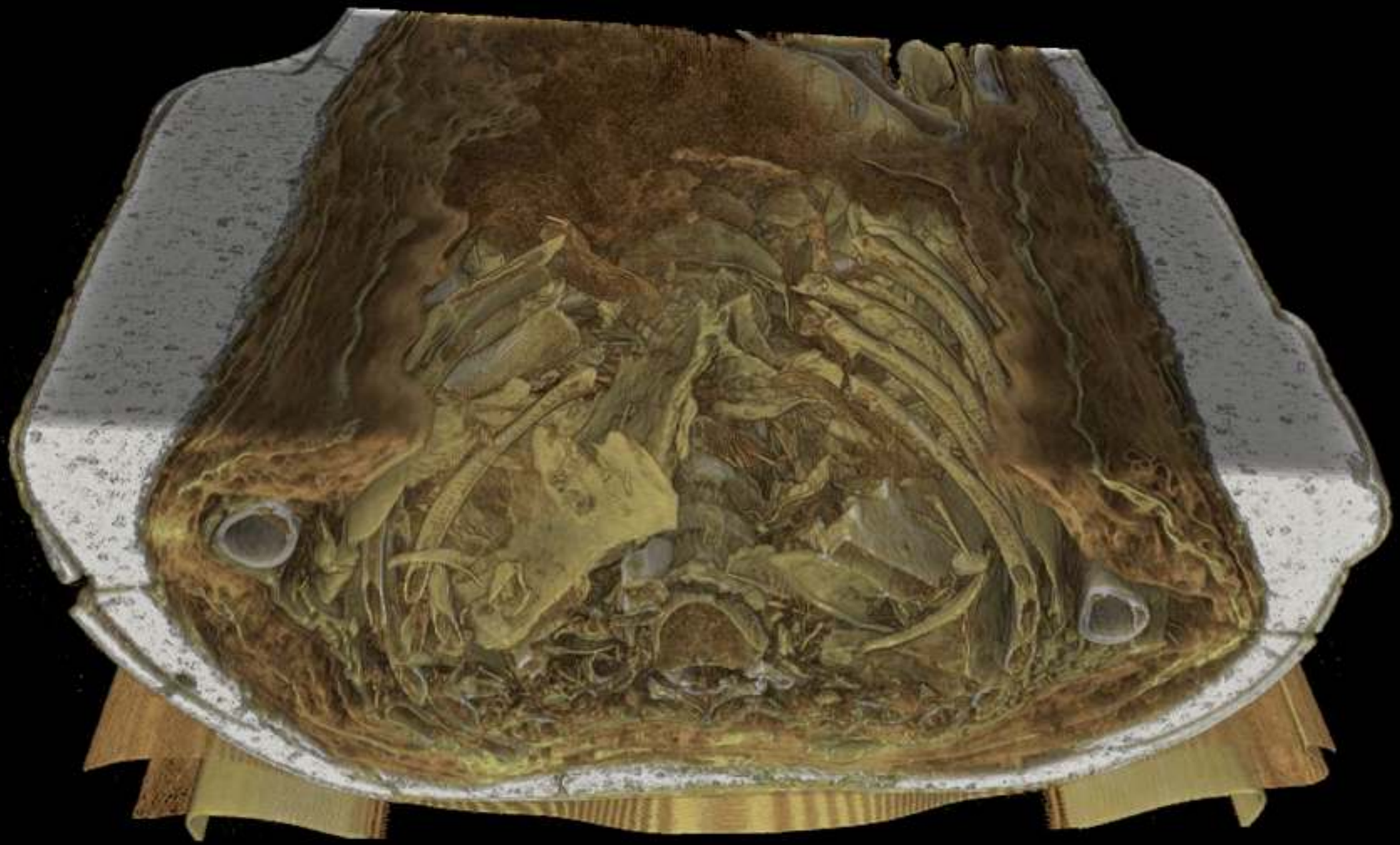
Porosity

- Volume rendering can also be applied to small samples for forensic or materials testing.
- 1cm ^3 sample.

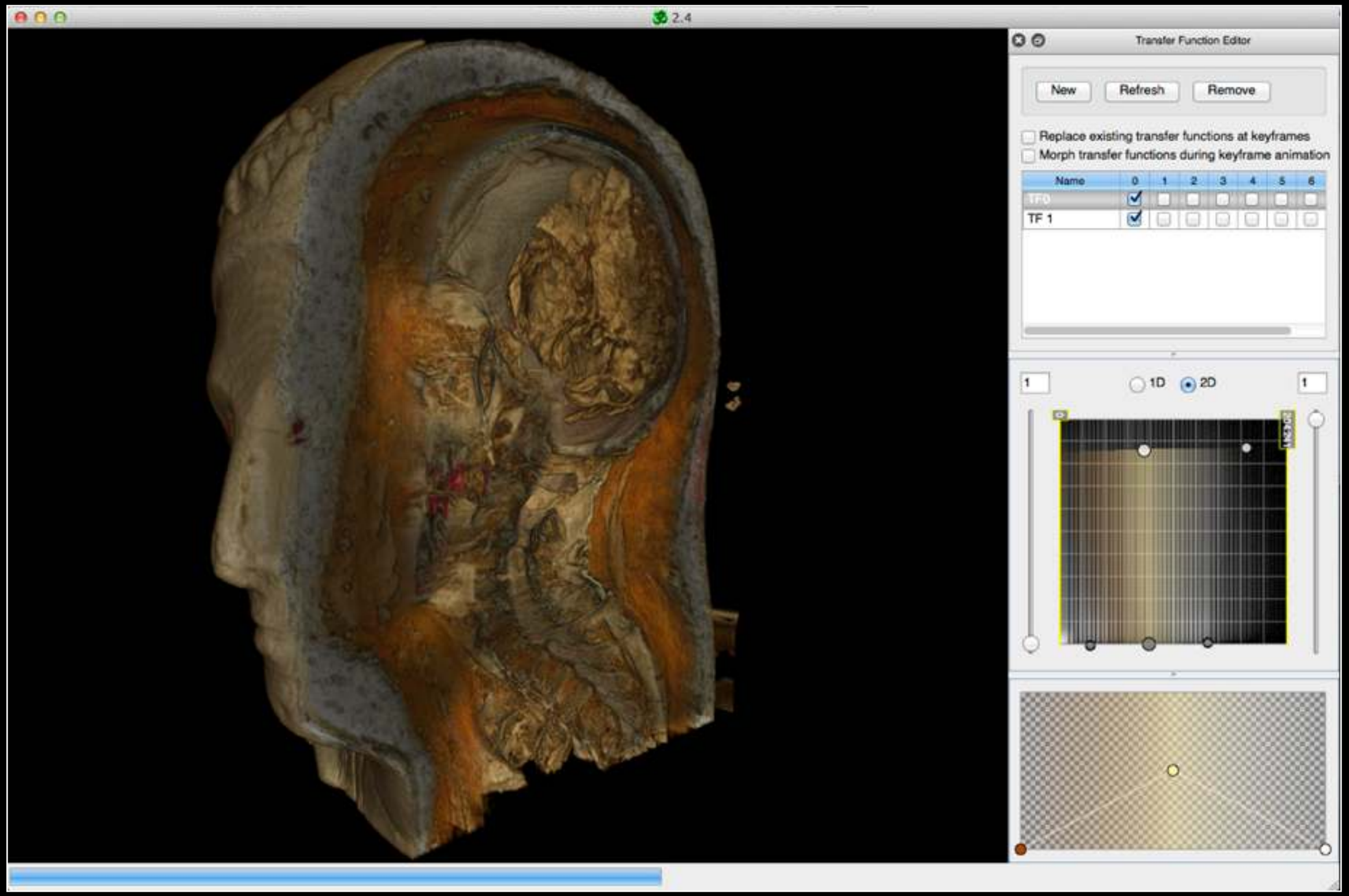


Animations

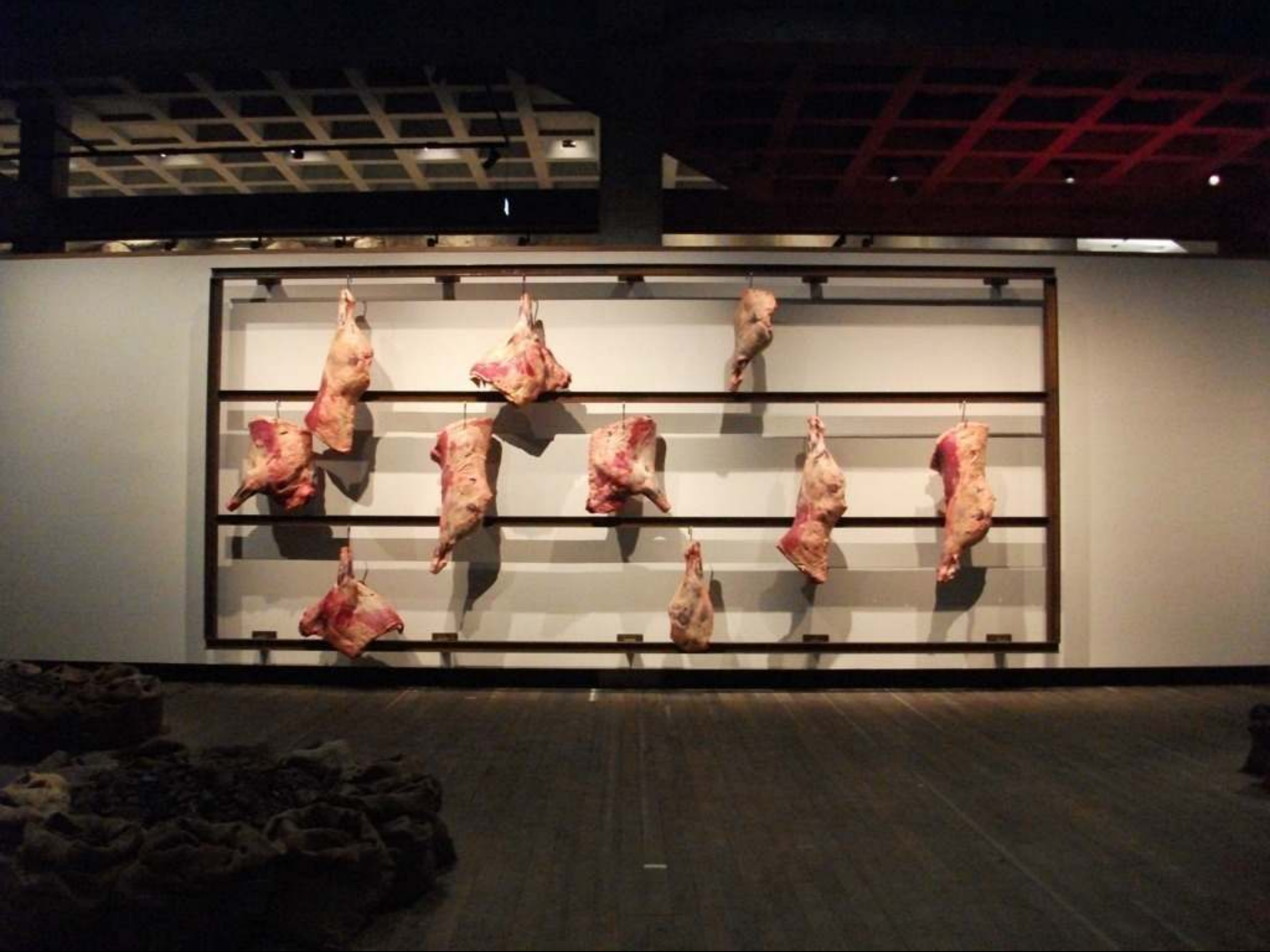




Live Example

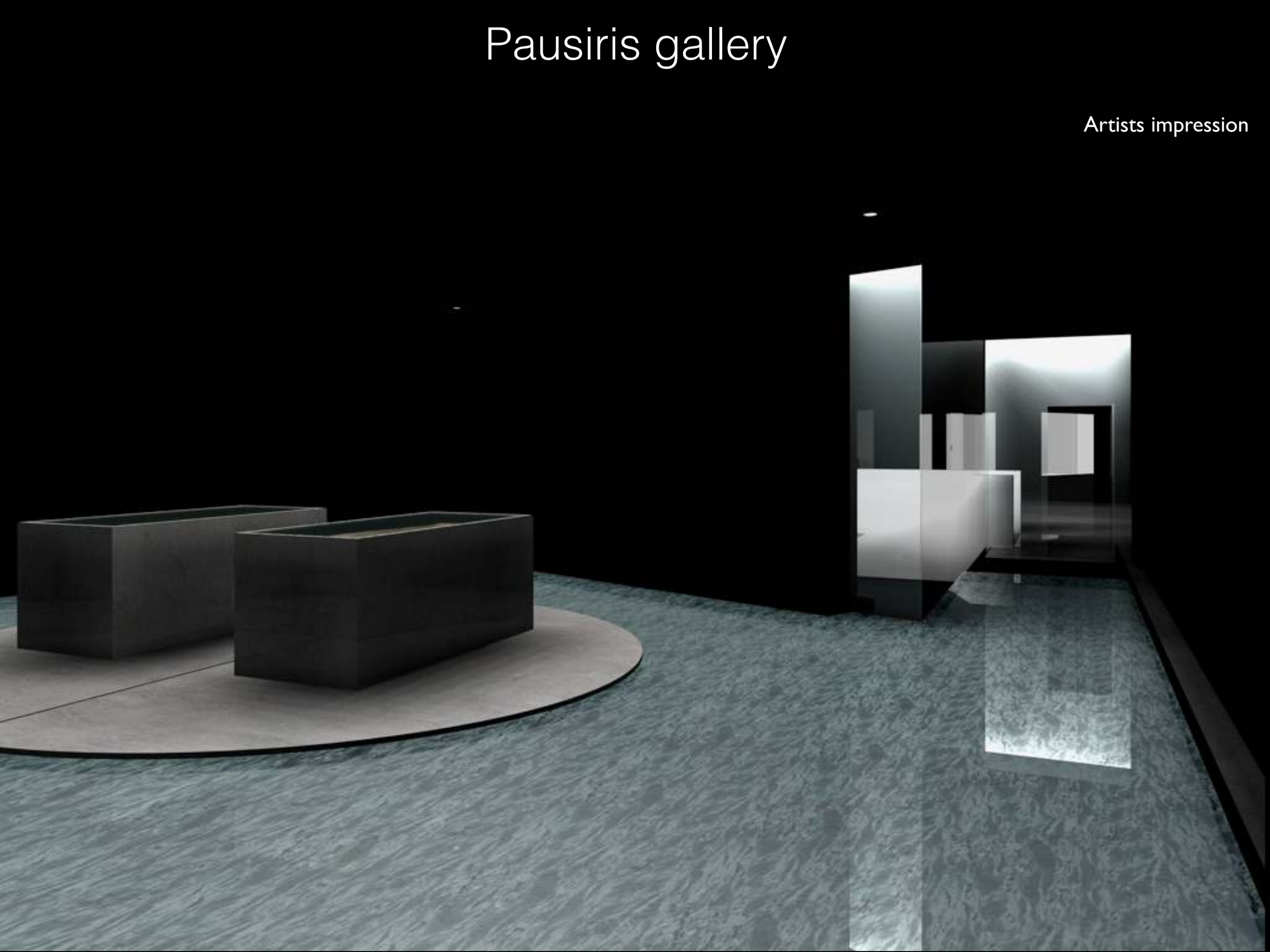


MONA

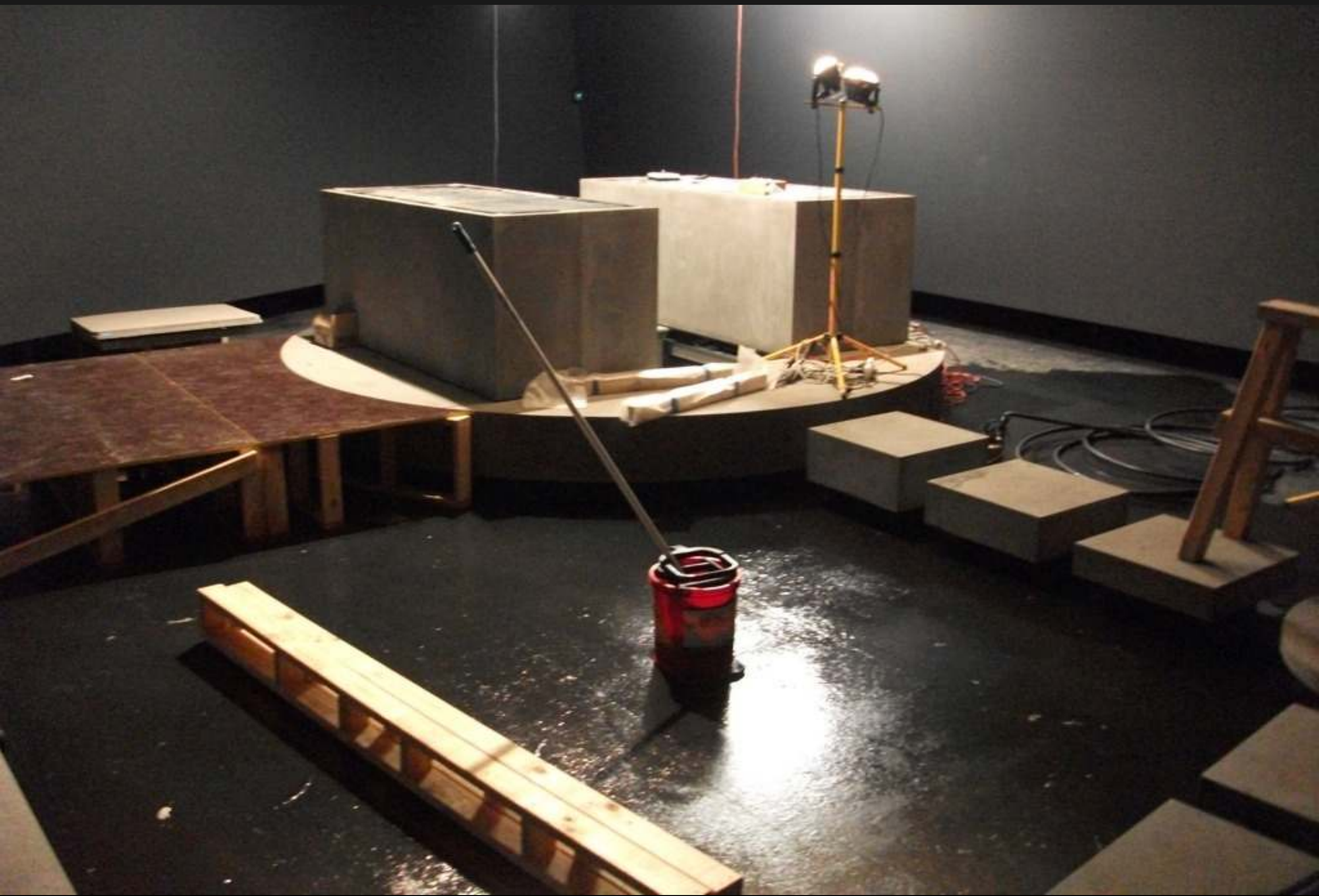


Pausiris gallery

Artists impression

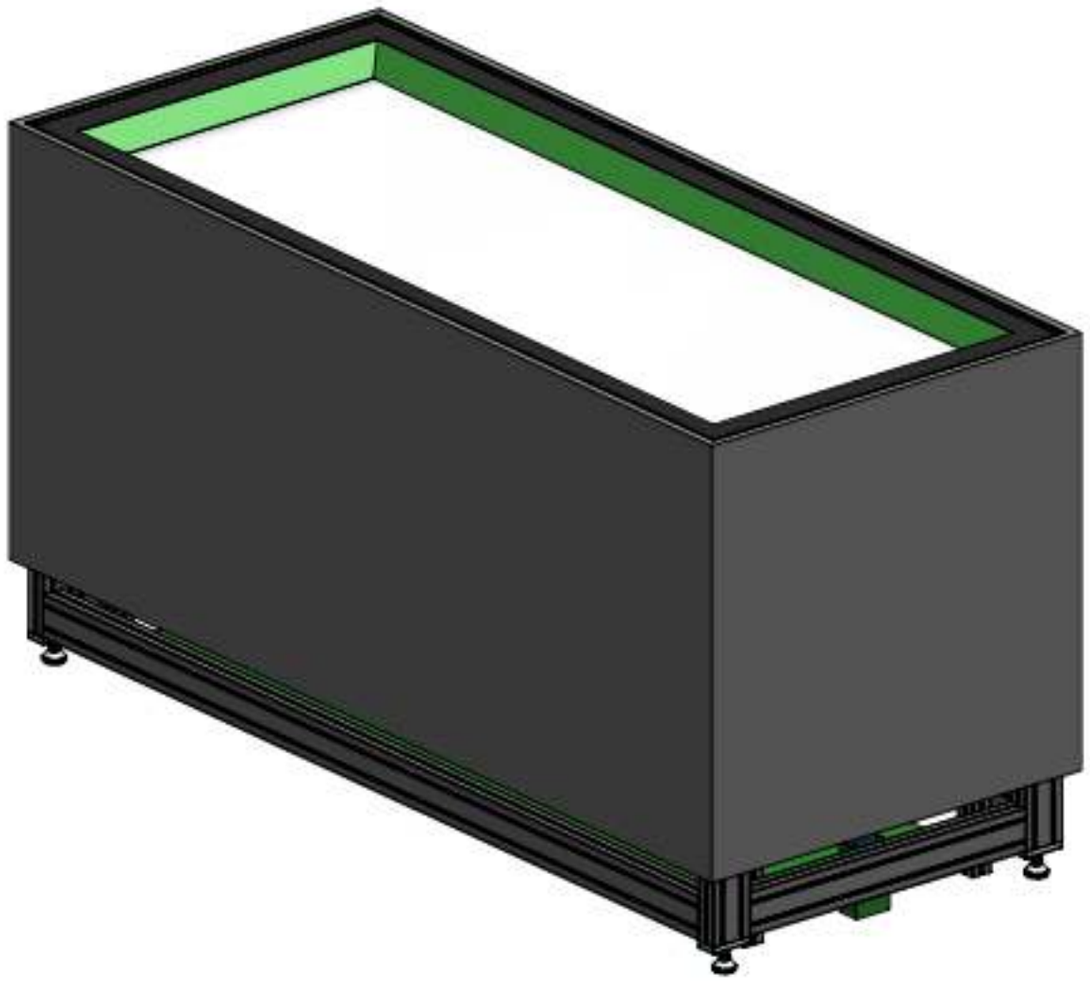


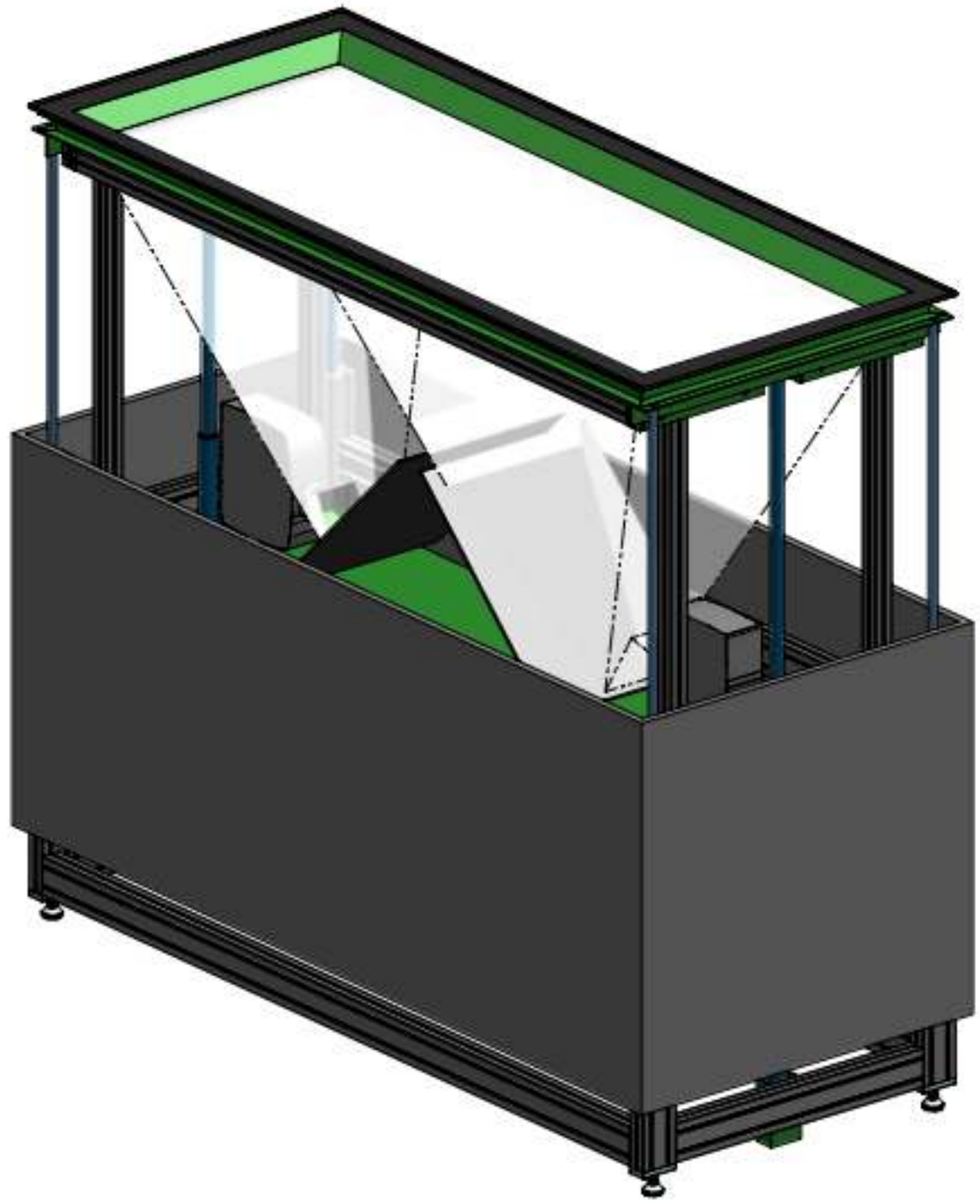
Pausiris gallery, 24 hours to go



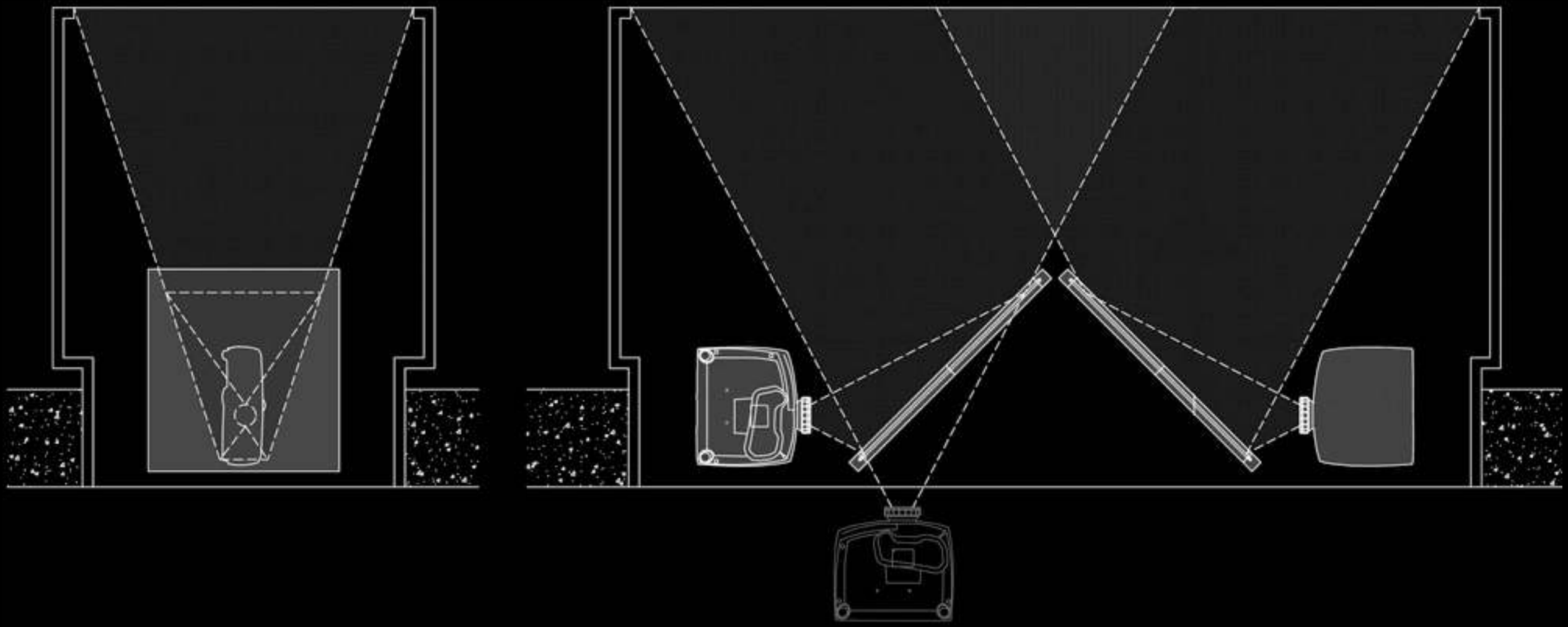
Pausiris gallery (final)

Cabinet





Cabinet



Cabinet

Pausiris gallery

- Andres Serrano.
- At what point does a dead person become an artefact rather than a person? A “he/she” vs an “it”?
- The Morgue (Blood Transfusion Resulting In Aids), 1992.

Questions?

After the break - 3D reconstruction from photographs