Material Decomposition in X-ray Phase-Contrast Imaging with Coherent Sources

Fact Sheet

Project Information

DEPICT

Grant agreement ID: 101125761

DOI
10.3030/101125761

EC signature date
13 December 2023

Start date
1 March 2024

End date
28 February 2029

Funded under
European Research Council (ERC)

Total cost
€ 2 620 750,00

EU contribution
€ 2 620 750,00

Investment in EU policy priorities

Digital agenda	◐	Clean air	○
Artificial Intelligence	○	Climate action	○
Biodiversity	○		

Coordinated by
TECHNISCHE UNIVERSITAET MUENCHEN
Germany

Objective

X-ray microtomography is increasingly popular at synchrotron sources worldwide. The high flux and excellent beam properties allow for a fast three-dimensional visualization of various kinds of specimens at micrometre spatial resolution and

exceptionally high image quality. But all these imaging instruments use the unique synchrotron sources merely to depict the objects' internal structure. All further quantitative information encoded into the data remains unused. The reason is a lack of an image retrieval method, which accurately models the whole image formation process with highly-coherent radiation on the micrometre scale to extract all contained information from a single exposure. Consequently, these microtomographic images always contain a mixture of different signals based on various interaction effects – namely attenuation, refraction and scattering. Accurately separating all the signals will allow to quantify concentration and microstructure of materials of interest and to locate them inside the object, which is unattainable in a single exposure at the moment.

The main goal of this project is to enable simple and fast X-ray microtomography at highly-coherent sources to fully exploit the disregarded information contained in the imaging data. My team will develop a robust algorithm for accurate signal separation modelling all interaction effects and demonstrate the benefit of material decomposition for highlighted applications. With this tool at hand our ambition is to fundamentally change the way of imaging at modern synchrotron sources: Imaging will no longer be solely a morphological method, as quantitative and material-specific information will become standardly available in fast microtomography at all coherent sources worldwide.

Keywords

quantitative imaging | material decomposition | coherent sources | phase retrieval

Programme(s)

HORIZON.1.1 - European Research Council (ERC) MAIN PROGRAMME

Topic(s)

ERC-2023-COG - ERC CONSOLIDATOR GRANTS

Call for proposal

ERC-2023-COG

See other projects for this call

Funding Scheme

HORIZON-ERC - HORIZON ERC Grants

Host institution

TECHNISCHE UNIVERSITAET MUENCHEN

Net EU contribution

€ 2 620 750,00

Total cost

€ 2 620 750,00

Address

Arcisstrasse 21
80333 Muenchen
Germany

Region

Bayern > Oberbayern > München, Kreisfreie Stadt

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Beneficiaries (1)

TECHNISCHE UNIVERSITAET MUENCHEN

Germany

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Last update: 26 December 2023

Permalink: https://cordis.europa.eu/project/id/101125761