



XMT-MaTeLiS Workshop

Correlative Imaging, Information Theory and Characterization

08-10 July 2026

KIT Campus North, IMT - Building 301, Room 405 (Seminar Room)

Organized jointly by X-ray Micro Technologies (KIT-IMT-XMT) and the KIT Materials Center MaTeLiS.

Access to KIT Campus North: Admittance is only permitted with a valid visitor's pass or KIT pass. Visitor's passes are issued at the Registration Desk upon presentation of a valid identity document.

Hands-on requirements: Please bring a laptop with access to Google Colab or Jupyter Notebook and approximately 2 GB of free disk space.

Programme Schedule

Time	Contribution	Presenter (Organization)
Day 1 - Imaging and Characterization		
10:00-10:30	Registration and welcome coffee	Danays Kunka (KIT-IMT, XMT)
10:30-10:40	Workshop opening	Venera Weinhardt (KIT-IMT, XMT)
Session 1 - X-ray Nanoimaging, XRF Data Analysis and Phase Retrieval		
10:40-11:00	Hard X-ray nanoimaging at synchrotron	Dmitry Karpov (Université Grenoble Alpes / CEA IRIG MEM)
11:00-12:30	Hands-on: Denoising of XRF data and general denoising workflows	
12:30-13:30	Lunch break	
13:30-14:50	Talk and hands-on: AI-guided iterative phase retrieval algorithms	Edwin Fohntung (Rensselaer Polytechnic Institute / LANL)
Session 2 - Magnetic Resonance and Single-Shot Multicontrast X-ray Imaging		
14:50-15:20	Peeling the Layers: Multilayered Information from Magnetic Resonance	Vlad Badilita (KIT-IMT, MSI)
15:20-15:40	Single-shot multicontrast X-ray imaging for the CORREL laboratory	Danays Kunka (KIT-IMT, XMT)
15:40-16:00	Coffee break	
16:00-16:20	Multicontrast X-ray imaging through spatial harmonic analysis	Jorge L. Beltran (KIT-IMT, XMT)
16:20-17:00	Hands-on: Spatial Harmonic Imaging workflows with Shimexpy	Jorge L. Beltran (KIT-IMT, XMT)
17:00-17:30	Thesis / research project / internship topics Discussion of suitable samples for X-ray imaging	Danays Kunka / XMT team (KIT-IMT, XMT)



Day 2 - Information Theory, AI and Data Processing		
Session 3 - Information Theory, AI and Data Analysis		
09:30-09:50	Entropy-driven data analysis in real-life applications	Ernesto Estévez Rams (UH / PLEROS)
09:50-10:10	Topology engineering in reservoir computing neural networks	Daniel Estévez (MPI-PKS / PLEROS, UH)
10:10-10:30	Brain connectivity and functional activity through information theory	Ania Mesa (MPI-PKS / PLEROS, UH)
10:30-11:00	Coffee break	
11:00-11:20	High-performance computing algorithms for entropic measures in distributed systems	Efren Aragón (KIT / former PLEROS member)
11:20-11:40	AI-driven smart smoothing techniques in data analysis	Roberto Bernal (KIT / former PLEROS member)
11:40-12:00	Data recovery and smart data reduction in X-ray processing	Karel García (FAU / PLEROS, UH)
12:00-13:00	Lunch break	
Session 4 - Automated X-ray Data Analysis		
13:00-14:00	Automatic segmentation of X-ray data	Kristaps Kairiss (KIT-IMT, XMT)
14:00-14:20	Automated Analysis Pipeline for Soft X-ray Tomography to Map Chromatin Remodelling in Human CD4 TCells	Venera Weinhardt (KIT-IMT, XMT)
14:20-14:50	Coffee break	
14:50-15:30	Thesis / research project / internship topics Discussion of suitable samples for X-ray imaging	XMT team (KIT-IMT, XMT)
Day 3 - Integration and Follow-up Discussion		
Session 5 - From Methods to Applications		
09:30-10:30	Connect imaging, characterization, information theory and data analysis	All contributors (KIT / UH / FAU / MPI-PKS / PLEROS)
10:30-11:30	Discussion of possible applications to future joint proposals	All contributors (KIT / UH / FAU / MPI-PKS / PLEROS)
11:30-12:00	Coffee break and networking	XMT team
12:00-13:00	Lab visits	XMT team
Session 6 - Wrap-up and Next Steps		
13:00-13:30	Wrap-up and next steps	Danays Kunka, with XMT and invited contributors

KIT - Karlsruhe Institute of Technology
IMT - Institute of Microstructure Technology, KIT
XMT - X-ray Micro Technologies, IMT-KIT
MaTeLiS - KIT Materials Center
UH - University of Havana
PLEROS - research group associated with the University of Havana
MPI-PKS - Max Planck Institute for the Physics of Complex Systems
FAU - Friedrich-Alexander University Erlangen-Nürnberg
CEA IRIG MEM - Grenoble, France
LANL - Los Alamos National Laboratory

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