D4.3

Report on dissemination activities and reports on conferences

Project information

Project full title	MHz rate mulTiple prOjection X-ray MicrOSCOPY
Project acronym	MHz-TOMOSCOPY
Grant agreement no.	101046448
Instrument	
Duration	42 months
Website	https://tomoscopy.eu/

Deliverable information

Deliverable no.	Deliverable 4.3
Deliverable title	Report on dissemination activities and reports on conferences
Deliverable responsible	UPJS
Related Work-Package/Task	Task 4.3
Type (e.g. report; other)	Document / report
Author(s)	Peter Szeles, Jozef Uličný, Daniel Moško
Dissemination level	PUB - Public
Document Version	1.2.0
Date	

MHz - Tomoscopy

Document information

Version no.	Date	Author(s)	Comment
1.0.0	07.10.2025	Peter Szeles	First version
1.1.0	21.11.2025	Peter Szeles, Jozef Uličný, Daniel Moško	Writing content
1.2.0	26.11.2025	Juliane Marauska	Corrections.

Table of Contents

Abstract

This report presents the dissemination and exploitation achievements of the *MHz-TOMOSCOPY* project. A comprehensive strategy was implemented to communicate project outcomes to scientific, industrial, and public audiences. Key dissemination measures included regular internal knowledge exchange, the development of the tomoscopy.eu website, participation in major international conferences, and contributions to peer-reviewed open-access publications. Public outreach events increased project visibility to general public and non specialists. Exploitation activities focused on producing targeted communication materials and engaging with potential user communities to demonstrate the value of MHz-TOMOSCOPY technology. In parallel, an Intellectual Property Management Plan and Data Management Policy were established to ensure responsible handling of results and datasets. Together, these actions enhanced the accessibility, impact, and future uptake of the project's technological innovations.

Task WP4 description: Dissemination and communication

Within the first 3 months the web-portal to the MHz-TOMOSCOPY project will be established addressing three target groups - wide public, scientific community and potential industrial users. During the M3-6 the explicit consensus rules for the OpenScience conformancy will be formalised, taking into account the need to protect the IP of consortial partners as well as the widest possible impact for interested public and future users. Within the first month, we will draft a communication and dissemination plan for MHz-TOMOSCOPY, which will identify the target groups, key messages, and the best dissemination channels to achieve maximum dissemination to the general public as well as scientific and industrial scientists including:

- Set up and operate a dedicated project web-portal, as well as social media accounts (Twitter, Instagram, ResearchGate, LinkedIn) to disseminate and communicate the progress and results of the project; establish links with other interesting projects.
- Dissemination of project results via active participation in international conferences and workshops, peer-reviewed open-source publications, and organisation of two workshops on imaging to address the science community as future users of the developed instrument.
- Design of materials, such as flyers, posters and brochures, to address stakeholders via defined channels.
- Connect with possible application communities and demonstrate the benefits of using the MHz-TOMOSCOPY technology.
- Data management plan: Experiments will produce massive amounts of data taken mostly at EuXFEL and DESY. A web-portal will facilitate access by providing relevant information such as data format, metadata, protocols and access tools.
- Objectives:
    - Assure maximum dissemination and communication of the project.

1. Dissemination and Exploitation

During the reporting period, the MHz-TOMOSCOPY project achieved significant progress in both disseminating its results and preparing the ground for effective exploitation of its technologies. A coordinated dissemination strategy was implemented to ensure that project outcomes reached all relevant stakeholder groups, from the scientific community to the general public.

Dissemination Channels

To maximise visibility and ensure continuous knowledge exchange, the consortium employed a diverse set of dissemination channels:

- **Internal knowledge sharing**: Regular internal meetings were organised to maintain alignment across the consortium and facilitate the exchange of expertise.

- **Project website**: The official website (tomoscopy.eu) was developed and continuously updated to provide accessible information on project activities, results, and societal impact.

- **Social media outreach**: Active profiles were established on

    - **Twitter/X**: https://x.com/tomoscopy_eu and **LinkedIn**: https://www.linkedin.com/company/mhz-tomoscopy/about/. These channels enabled real-time communication with a wider audience and enhanced engagement with the broader research and innovation community.

- **Public engagement**: The project was presented at outreach event such as Science Night, successfully raising public awareness and promoting the relevance of MHz-TOMOSCOPY innovations.

Dissemination Activities

A wide spectrum of dissemination activities was carried out to promote scientific exchange and ensure high visibility of project achievements:

- **Conference participation**: Partners presented the project at major international conferences and workshops, demonstrating the capabilities and impact of MHz-TOMOSCOPY technology such as https://www.sri2024.eu/
- **Scientific publications**: Several peer-reviewed open-access articles were published in leading scientific journals. A detailed list can be found in the **Publications** section of the report.
- **XFEL user meetings**: The project was showcased at European XFEL user meetings, highlighting its potential for advanced high-speed imaging applications.
- A complete overview of all dissemination actions is provided in the table "**List of Dissemination Activities**".

Exploitation Activities

To support future uptake of the technology, several exploitation-oriented actions were undertaken:

- **Targeted materials**: The consortium designed and produced communication materials—including posters, roll-ups, and 3D models—tailored for specific stakeholder groups. Examples are presented in the **Dissemination Materials** section below.
- **Engagement with application communities**: Partners reached out to potential user groups and demonstrated the added value of MHz-TOMOSCOPY for various scientific and industrial applications.

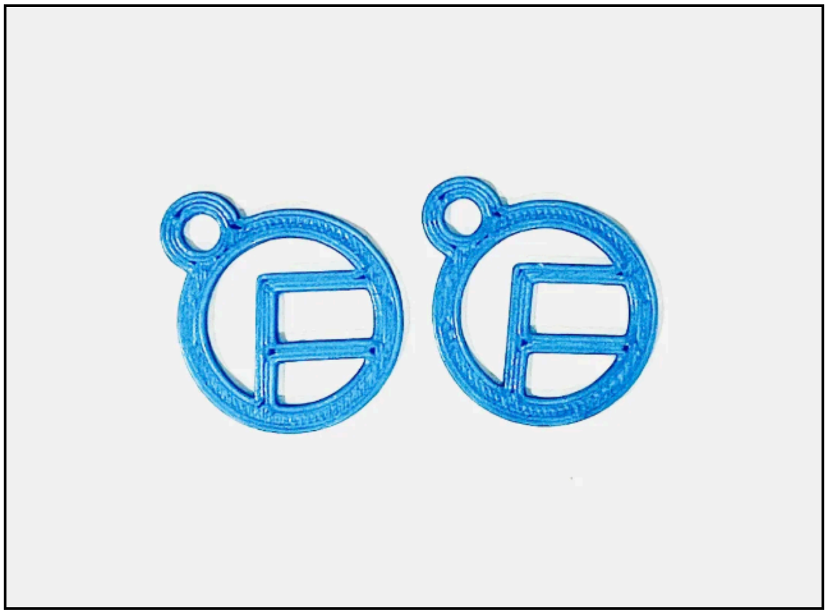
Data Management Policy:

A comprehensive Data Management Policy was implemented to guarantee efficient, FAIR-aligned data handling and sharing within and beyond the consortium.

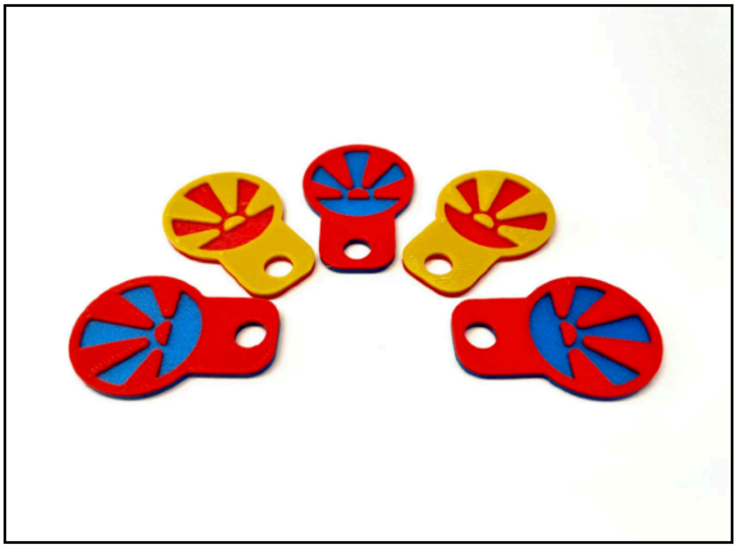
	Dissemination activity	Place	Date
1	DESY, EuXFEL and UPJS partners present HE project MHz Tomoscopy at the SFEL 2022	Liptovský Ján, Slovakia	8th November 2022
2	MHz Tomoscopy project presented by UPJS in Brussels	Brussels, Belgium	7th December 2022
3	MHz Tomoscopy project at EuXFEL User Meeting 2023 by Prof. Jiawei Mi from the University of Hull (UK)	Hamburg, Germany	25th January 2023
4	MHz Tomoscopy project meeting with project members	Hamburg, Germany	24th January 2023
5	MHz Tomoscopy annual meeting 2023	Tokaj, Slovakia	20-22th June 2023
6	MHz – Tomoscopy presentation at Budapest X-ray school	Budapest, Hungary	3-6th October .2023
7	FATRA Application (WP2.2) presented at University of Pavol Jozef Safarik.	Kosice, Slovakia	29th May 2024
8	MHz-Tomoscopy at Cavitation Symposium 2024	Chania, Greece	2-5th June 2024,
9	Presentation of EuXFEL on 3rd Summer School of Condensed Matter	Liptovský Ján, Slovakia	11th June 2024
10	Data processing presentation at European XFEL.	Hamburg, Germany	21st August 2024
11	Megahertz X-ray multiple projection imaging at the European XFEL - Initial Installation and commissioning (SRI 2024 conference)	Hamburg, Germany	26-30th August 2024
12	2nd Annual Meeting of HE EIC MHz Tomoscopy project	Bratislava, Slovakia	4-6th September 2024
13	School of XFEL and Synchrotron Radiation Users 2024	Liptovský Ján, Slovakia	14-18th November 2024
14	Slovak – British collaboration in ultrafast X-ray imaging	London, UK	19th March 2025
15	Science virtuosos in Aurelium during Science Night 2025	Bratislava, Slovakia	26th September 2025
16	Final annual Meeting 2025	Hamburg, Germany	3-5th November 2025
17	Series of seminars “processing of MHz Tomoscopy data”	UPJS, Institute of Informatics, Kosice, Slovakia	2023-2025

List of dissemination activities

2. Dissemination Materials



FATRA coin https://www.printables.com/model/1482151-fatra-shopping-cart-coin



Tomoscopy coin https://www.printables.com/model/1469444-mhz-tomoscopy-shopping-cart-coin

Poster: Megahertz X-ray multiple projection imaging at the European XFEL - Initial Installation and commissioning. Presented by Jayanath Koliyadu at SRI2024 conference in Hamburg

Poster: Development of MHz X-ray phase contrast imaging at European XFEL, (EuXFEL Users meeting 2025)

MHz - Tomoscopy

FATRA Fast Train Review Application

European XFEL Users' Meeting, 2025

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2 Center for Free-Electron Laser Science (CFEL), DESY, Hamburg, Germany
3 European XFEL GmbH, Schenefeld, Germany

In case of interest scan our QR code to connect with us! SCAN ME

FATRA (Fast Train Review Application) was developed as a data visualization tool for multi-projection X-ray imaging within the **MHz TOMOSCOPY** project. This software helps researchers analyze data from scientific cameras by providing an intuitive interface for visualizing and reviewing large datasets. It specifically addresses challenges associated with accessing data from Shimadzu cameras at the European XFEL facility, but its flexibility allows it to be applied to any type of camera or research facility. The software is integrated with the Karabo framework (https://github.com/European-XFEL/Karabo) and leverages PyQt for a user-friendly interface. Key features of FATRA include real-time monitoring, playback, offline analysis capabilities, and the ability to export data to videos for further review.

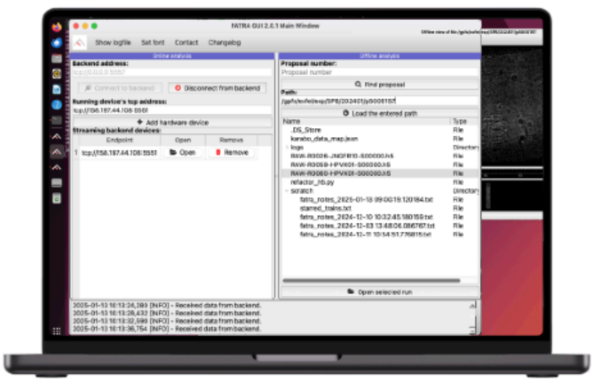


Fig 1. Screenshot of the FATRA software main window.

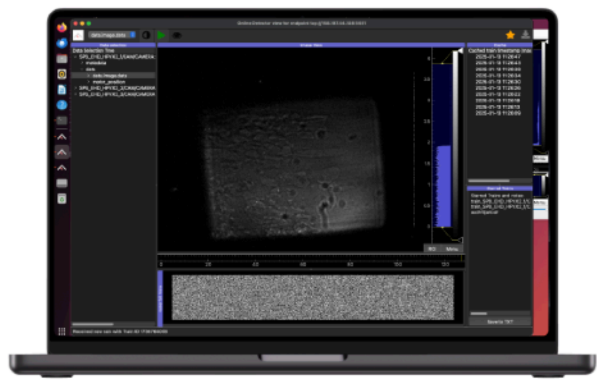


Fig 4. Screenshot of the Online data view (data from the experiment MHz X-ray multi-projection imaging of turbulent flows in the Venturi tube, with proposal number p007156)

Key Features:

1. **Graphical User Interface (GUI):**
   - Composed of three window types: Main Window, Detector Window, and Simulator Window.
   - Allows users to add FATRA backends at a specified TCP address.
   - Includes auto-play and normalization options for enhanced usability.
2. **Data Management:**
   - Unpacks incoming data from cameras (e.g., Shimadzu) into a hierarchical tree structure.
   - Enables users to select specific data for visualization, training, or image analysis.
3. **Interactive Features:**
   - Auto-play: Continuously streams and displays incoming images in real-time.
   - Normalization: Automatically adjusts image contrast and brightness for improved clarity.
4. **Data Storage and Export:**
   - Caches the preferred number of recent trains for data analysis.
   - Offers the option to export selected trains as videos locally, where the FATRA GUI is running.
5. **Edge Computing Capabilities:**
   - Runs on a cluster close to the hardware for maximum speed and efficiency.
   - Preparation for built-in filtering algorithms to reduce raw and irrelevant data.
6. **Flexibility and Scalability:**
   - Modular architecture allows management of multiple cameras and data streams simultaneously.
   - Supports connections to both live and offline data sources.

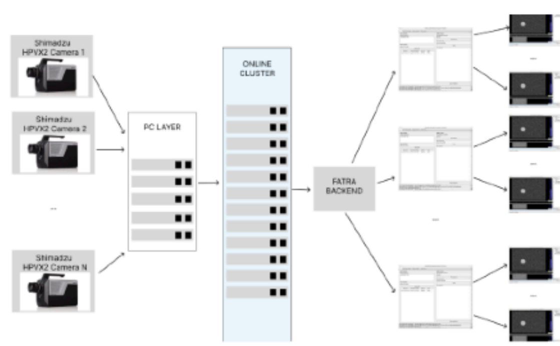


Fig 2. Visualisation of System Architecture of FATRA. Cameras images → PC Layer → Online Cluster (ZMQ) → FATRA Backend → GUI Instances.

References:

1. Vagovič, P., Yashiro, W., BELLUCCI, V. & VILLANUEVA PÉREZ, P. (2023). Global patent index ep4160623a1. Patent.
2. Jayanath C. P. Koliyadu et al. *MHz sampling; X-ray Phase Contrast Imaging; Pulse resolved imaging; Indirect MHz X-ray detector; 38 European XFEL*, accepted at Journal of Synchrotron Radiatio
3. https://tomoscopy.eu

Partners of MHz TOMOSCOPY project:

European Innovation Council

This work was performed within the HORIZON-EIC-2021-PATHFINDEROPEN-01-01, MHz--TOMOSCOPY project, Grant agreement: 101046448.

MHz - Tomoscopy

FATRA poster Presented on the European XFEL Users' meeting 2025

The first annual meeting of the MHz Tomoscopy project in Tokaj, Slovakia.
On the right side of the photo there is the projects official rollup.

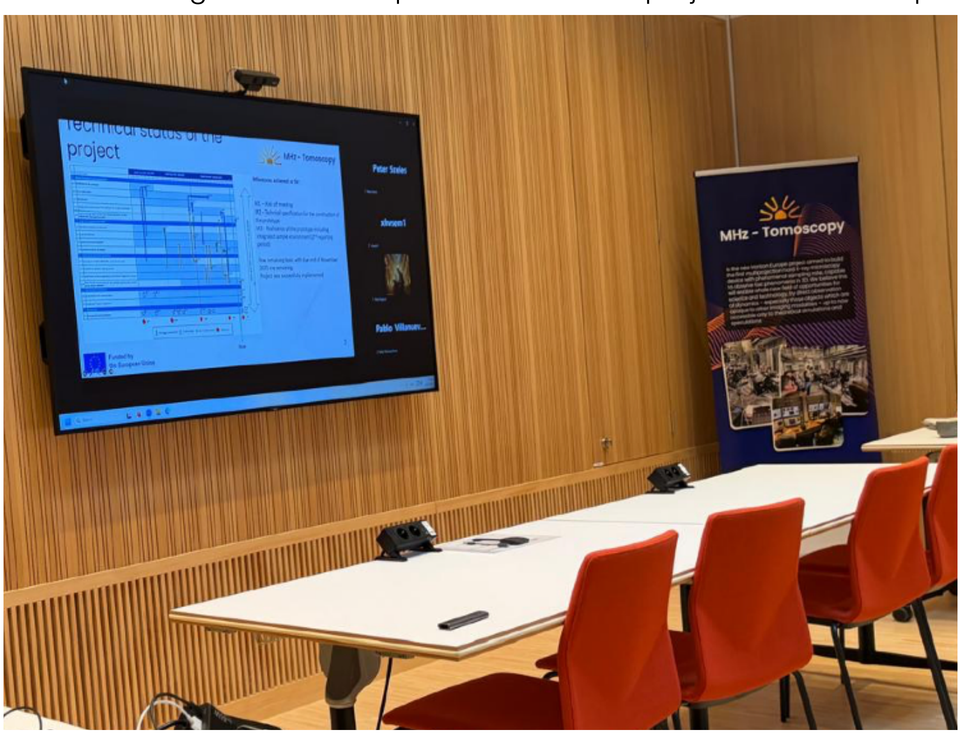
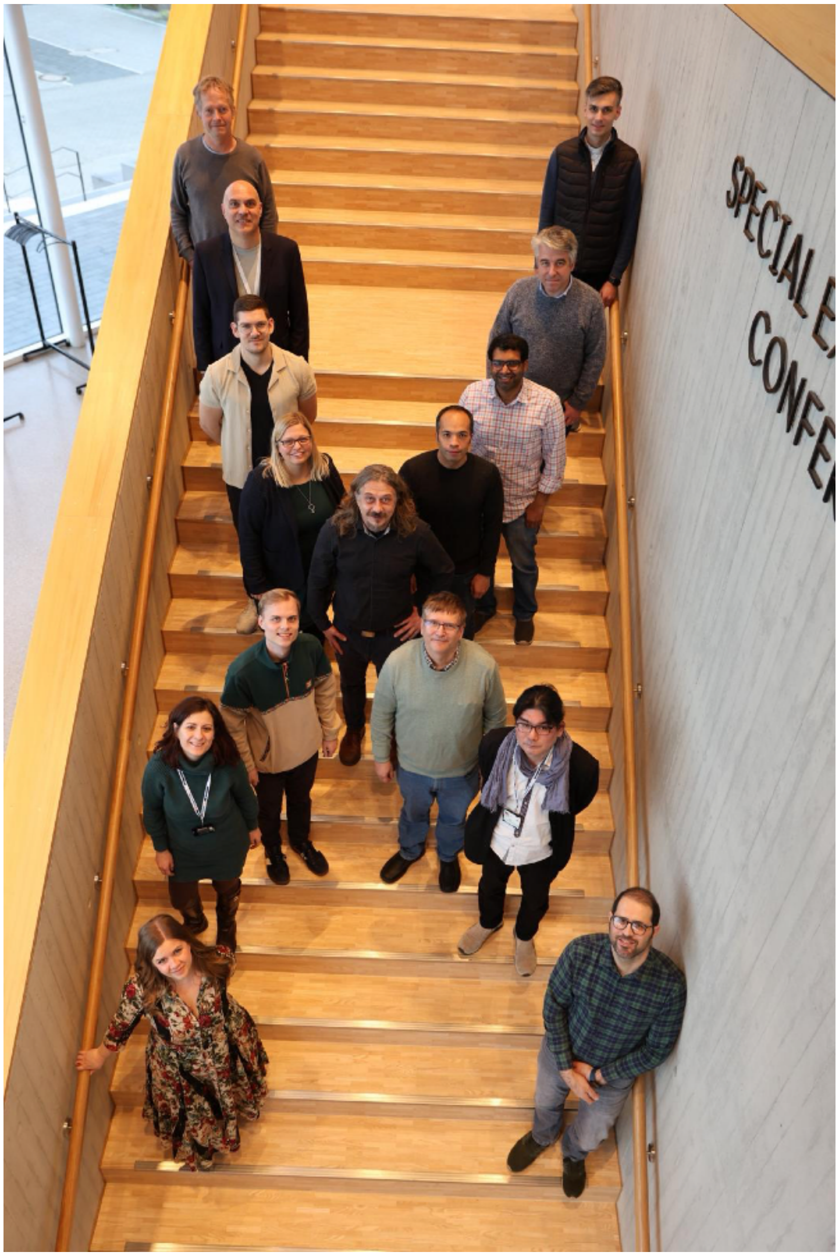


Photo of the meeting room at the project's annual meeting 2025.



MHz Tomoscopy Annual meeting 2025, Hamburg XFEL
Light House.

3. Publications

1. Koliaydu, J. , Mosko, D., Asimakopoulou, E.M., Bellucci, V., Birnsteinova, S., Bean, R., Letrun, R. Kim, Ch., Kirkwood, H., Giovanetti, G. , Jardon, N. , Szuba, J. , Guest, T. , Koch, A. , Gruenert, J. , Szeles, P. , Villanueva-Perez, P. , Reuter, F. , Ohl, C.D., Noack, M., Garcia-Moreno, F. , Soyama, H. , Eakins, D. , Korsunsky, A., Ulicny, J., Meents, A., Chapman, H. Mancuso, A., Sato, T., Vagovic, P. Development of Megahertz X-ray Microscopy at the European XFEL, accepted to Journal of Synchrotron Radiation (article YI5159)

2. Bellucci, V.; Birnsteinova, S.; Sato, T.; Letrun, R.; Koliyadu, J. C. P.; Kim, C.; Giovanetti, G.; Deiter, C.; Samoylova, L.; Petrov, I.; Lopez Morillo, L.; Graceffa, R.; Adriano, L.; Huelsen, H.; Kollmann, H.; Tran Calliste, T. N.; Korytar, D.; Zaprazny, Z.; Mazzolari, A.; Romagnoni, M.; Asimakopoulou, E. M.; Yao, Z.; Zhang, Y.; Ulicny, J.; Meents, A.; Chapman, H. N.; Bean, R.; Mancuso, A.; Villanueva-Perez, P.; Vagovic, P. Development of Crystal Optics for X-Ray Multi-Projection Imaging for Synchrotron and XFEL Sources. Journal of Synchrotron Radiation 2024, 31 (6). https://doi.org/10.1107/S1600577524008488.

3. Soyama, Hitoshi; Liang, Xiaoyu; Yashiro, Wataru; Kajiwara, Kentaro; Asimakopoulou, Eleni Myrto; Bellucci, Valerio; Birnsteinova, Sarlota; Giovanetti, Gabriele; Kim, Chan; Kirkwood, Henry J.; Koliyadu, Jayanath C. P.; Letrun, Romain; Zhang, Yuhe; Uličný, Jozef; Bean, Richard; Mancuso, Adrian P.; Villanueva-Perez, Pablo; Sato, Tokushi; Vagovič, Patrik; Eakins, Daniel; Korsunsky, Alexander M. "Revealing the Origins of Vortex Cavitation in a Venturi Tube by High Speed X-Ray Imaging."Ultrasonics Sonochemistry 101 (December 1, 2023): 106715. https://doi.org/10.1016/j.ultsonch.2023.106715.

4. Reuter, Fabian; Sato, Tokushi (佐藤篤志); Bellucci, Valerio; Birnsteinova, Sarlota; Deiter, Carsten; Koliyadu, Jayanath C. P.; Letrun, Romain; Villanueva-Perez, Pablo; Bean, Richard; Mancuso, Adrian P.; Meents, Alke; Vagovic, Patrik; Ohl, Claus-Dieter "Laser-Induced, Single Droplet Fragmentation Dynamics Revealed through Megahertz x-Ray Microscopy." Physics of Fluids 35, no. 11 (November 21, 2023): 113323. https://doi.org/10.1063/5.0171225.

5. Birnsteinova, S.; Ferreira de Lima, D. E.; Sobolev, E.; Kirkwood, H. J.; Bellucci, V.; Bean, R. J.; Kim, C.; Koliyadu, J. C. P.; Sato, T.; Dall'Antonia, F.; Asimakopoulou, E. M.; Yao, Z.; Buakor, K.; Zhang, Y.; Meents, A.; Chapman, H. N.; Mancuso, A. P.; Villanueva-Perez, P.; Vagovič, P. "Online Dynamic Flat-Field Correction for MHz Microscopy Data at European XFEL." Journal of Synchrotron Radiation 30, no. 6 (November 1, 2023): 1030–37. https://doi.org/10.1107/S1600577523007336.

6. Bellucci, V.; Zdora, M.-C.; Mikeš, L.; Birnšteinová, Š.; Oberta, P.; Romagnoni, M.; Mazzolari, A.; Villanueva-Perez, P.; Mokso, R.; David, C.; Makita, M.; Cipiccia, S.; Uličný, J.; Meents, A.; Mancuso, A. P.; Chapman, H. N.; Vagovič, P. Hard X-Ray Stereographic Microscopy for Single-Shot Differential Phase Imaging. Opt. Express 2023, 31 (11), 18399. https://doi.org/10.1364/OE.492137.

7. Xiang, K.; Huang, S.; Song, H.; Bazhenov, V.; Bellucci, V.; Birnsteinova, S.; de Wijn, R.; Koliyadu, J. C. P.; Koua, F. H. M.; Round, A.; Round, E.; Sarma, A.; Sato, T.; Sikorski, M.; Zhang, Y.; Asimakopoulou, E. M.; Villanueva-Perez, P.; Porfyrakis, K.; Tzanakis, I.; Eskin, D. G.; Grobert, N.; Mancuso, A.; Bean, R.; Vagovic, P.; Mi, J. Ultrasound Cavitation and Exfoliation Dynamics of 2D Materials Re-Vealed in Operando by X-Ray Free Electron Laser Megahertz Imaging. arXiv June 23, 2023. http://arxiv.org/abs/2305.08538 (accessed 2023-07-06, in review).

8. Villanueva-Perez, P.; Bellucci, V.; Zhang, Y.; Birnsteinova, S.; Graceffa, R.; Adriano, L.; Asimakopoulou, E. M.; Petrov, I.; Yao, Z.; Romagnoni, M.; Mazzolari, A.; Letrun, R.; Kim, C.; Koliyadu, J. C. P.; Deiter, C.; Bean, R.; Giovanetti, G.; Gelisio, L.; Ritschel, T.; Mancuso, A.; Chapman, H. N.; Meents, A.; Sato, T.; Vagovic, P. Megahertz X-Ray Multi-Projection Imaging. arXiv May 19, 2023. http://arxiv.org/abs/2305.11920 (accessed 2023-05-23, in review).

9. M. Shahsavari et al., "Experimental investigation of cavitation dynamics at mesoscale and microscale in swirled and non-swirled venturi tubes" 2025 (work in progress)

10. T. Guest, et al., "Wavefront Sensing at a High Repetition Rate X-ray Free Electron Laser" 2025 (work in progress)