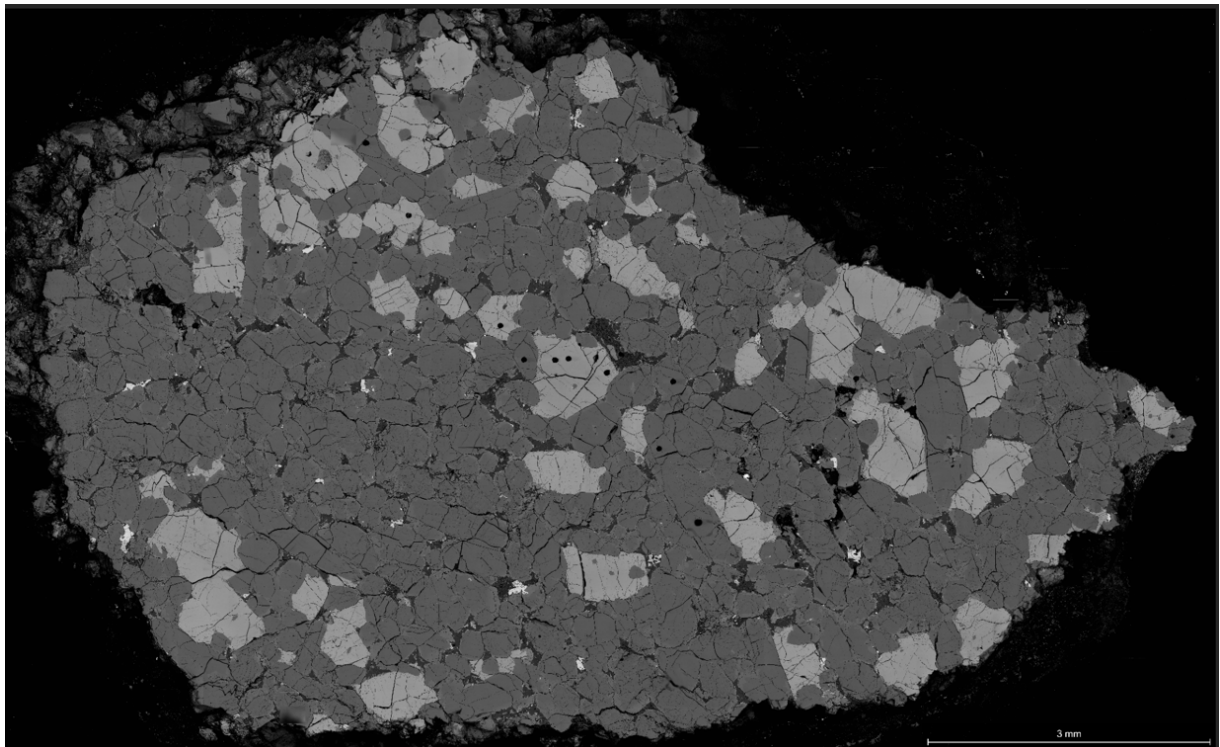


# CISUP ESEM-FEG laboratory: 2023 activity report

Luigi Folco, Randa Ishak, Gabriele Paoli, Maurizio Gemelli

Laboratory web-page: <https://cisup.unipi.it/labs/FEI-Quanta-450-ESEM-FEG>



*Cover image: Nakhla martian meteorite BSE mosaic map (fov: 14 mm)*

## CISUP ESEM-FEG laboratory: 2021 activity report

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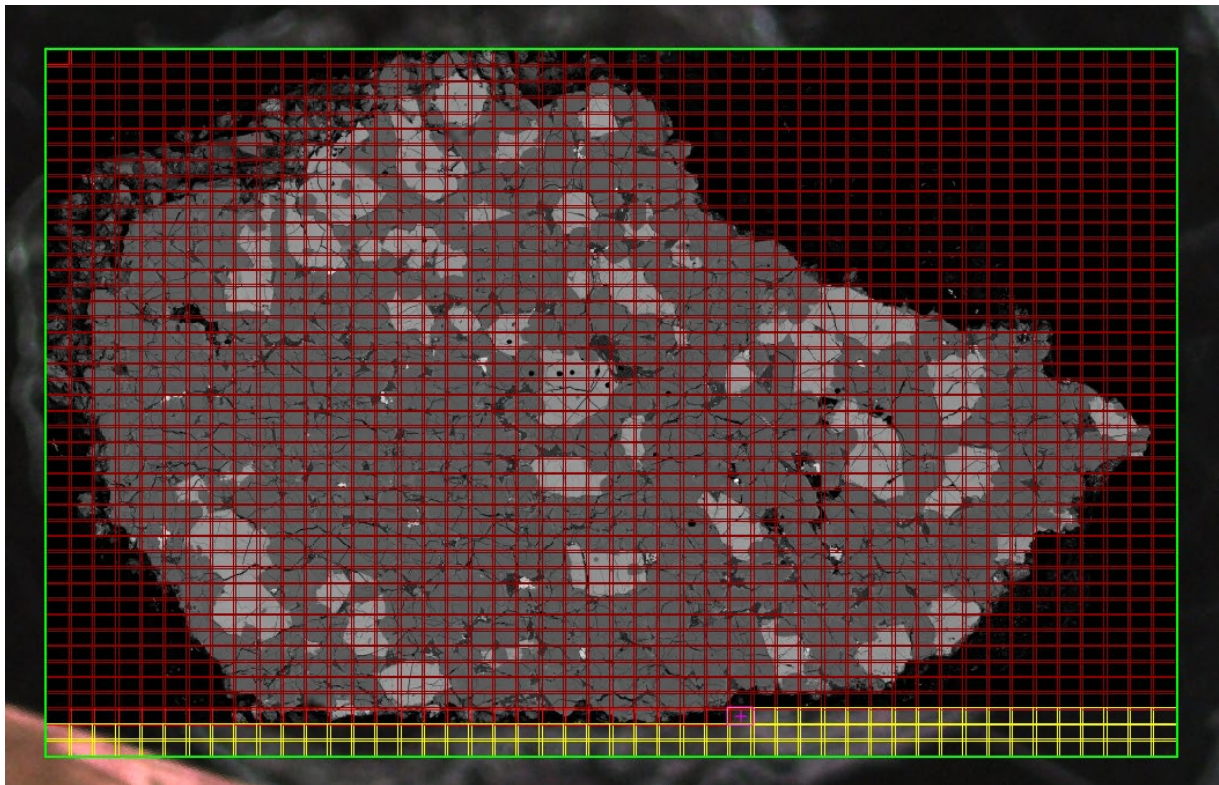
*Abstract* – This report serves to inform the UniPi community on the activities carried out by the CISUP ESEM-FEG laboratory during 2021, including: i) laboratory implementation; ii) hours worked; iii) user statistics; iv) research products; v) education and outreach; vi) issues and objectives. Unfortunately, despite the increased number of research teams/department (54/8) involved and educational activities, the lab, in 2023, worked only 386 hours. This is about 30% less than the average annual use in the previous six years (528 hours/year). Also the paper production has halved, according to the CISUP database. Reduced performance and reporting are the main issues we would like to address in the years to come.

**Table 1.** *The lab in numbers (the number of thesis and papers is underestimated, due to lack of reporting).*

Total hours worked	386	
Income (€ eq.)	16473	
Number of research groups	54	
Number of UniPisa departments	8	DICI, DST, DCCI, DII, DF, DB, DRT, DESTEC
Total hours worked for third parties	28	
Total hours worked for education	38	
BSc, MSc, PhD thesis	3	
Papers	6	

### 1. Laboratory implementation

**MAPS software** – Purchased in December 2021, the MAPS software for automated acquisition of high-resolution images from large areas is fully operational.



**Figure 1.** MAPS enables the navigation, tiling, stitching of image data. The area of interest is divided in multiple tiles which are recorded in a sequence and subsequently stitched to one single image. The size of the area is limited by the size of the stage rather than the image acquisition hardware. As a result, high resolution images of gigapixel size can be acquired.

## 2. Hours worked

The lab worked 386 hours in 2023. This is about 30% less than the average annual use in the previous six years (528 hours/year).

## 3. User statistics

The users of the ESEM-FEG laboratory over the year 2023 year include 54 research groups from 8 departments of the University of Pisa (DICI, DCCI, DST, DF, DII, DRT, DESTEC and DB) accounting for ~73% of the total workload; the remaining ~13% consisted of services for other research institutes (i.e., CNR), privates, educational activities and outreach. The DICI and DST boasts the largest volume of laboratory work (~37% of the total each), followed by DCCI (23%) and the others.

## 4. Research products

The database of the CISUP publications available at CISUP web-page <https://cisup.unipi.it/publications/> records **6 peer-reviewed papers** (see list below) out of the whole CISUP record of 25. Please double check your record in the CISUP database!

1. Anand S., Azimi B., Lucena M., Ricci C., Candito M., Zavagna L., Astolfi L., Coltelli M.B., Lazzeri A., Berrettini S., Moroni L., Danti S., Mota C. (2023). Chitin nanofibrils modulate mechanical response in tympanic membrane replacements. *Carbohydrate Polymers*, 310. [DOI](#)
2. Folco L., Carone L., D'Orazio M., Cordier C., Suttle M., van Ginneken M., Masotta, M.. (2023). Microscopic impactor debris at Kamil Crater (Egypt): The origin of the Fe-Ni oxide spherules. *Geochimica et Cosmochimica Acta*. 335. [DOI](#)
3. Folco L., Rochette P., D'Orazio M., Masotta, M.. (2023). The chondritic impactor origin of the Ni-rich component in Australasian tektites and microtektites. *Geochimica et Cosmochimica Acta*. [DOI](#)
4. Froh V., Bose M., Suttle M. D., Nava J., Folco L., Williams L.B., Castillo-Rogez J. (2023). Water-rich C-type asteroids as early solar system carbonate factories. *Icarus*, 391. [DOI](#)

5. Shisseh T., H. Chennaoui Aoudjehane, J.A. Barrat, B. Zanda, R.H. Hewins, C. Agee, L. Folco, E. Jacquet, S. Pont (2023). Fluid-Assisted Metasomatic Processes On Planetary Bodies: Evidence From Vestan Lithologies. *Geochimica et Cosmochimica Acta* (IF 5) [DOI](#)
6. Suttle M.D., F. Campanale, L. Folco, L. Tavazzani, M.M.M. Meier, C.G. Miller, G. Hughes, M.J. Genge, T. Salge, J. Spratt, M. Anand (2023). Fossil micrometeorites from Monte dei Corvi: Searching for dust from the Veritas asteroid family and the utility of micrometeorites as a palaeoclimate proxy. *Geochimica et Cosmochimica Acta*, 355, 75-88 [DOI](#)

## 5. Education and Outreach

The lab supported teaching classes for several courses provided by DST, DB, DICI and DCCI. According to our logbook (unfortunately hardly completed by the users – see below), in 2023, the lab provided support for MSc thesis (2 - DST), PhD thesis (1 – DST), ERASMUS KA107 Visiting Students (3 – DST).

No outreach activities undertaken in 2023.

## 6. Issues and objectives

**6.1 Performance.** The number of worked hours is not sustainable. Improving the quality of the service is mandatory. Many users complain about the quality of EDS analyses. The EBSD system is still unused! Too bad! We seek researchers with expertise in EBSD and *in situ* heating-cooling tests to help up in making these techniques usable to the community.

**6.2 Reporting.** We need to improve the activity/products reporting system with the help of all users. The ***fucking logbook*** accessible from the desktop of the EDS system PC must be filled by all users as it complements the dataset of the on-line booking system. Unfortunately, only one of us (LF) does so; as a result, we loose vital information for the sustainability of our lab. Please collaborate!

**6.3. Cite our lab in your work.** The papers which benefited of the work carried out in our FEI QUANTA 450 ESEM-FEG laboratory listed above do acknowledge our lab correctly in their methodology chapters (and acknowledgements) ad we are most grateful to that. We strongly encourage to carry on with this far practice because beneficial to the entire CISUP community. Please check our laboratory web page, to correctly cite our lab/instrument in your papers using – for instance - a sentence like the following one:

*“Scanning electron microscopy analyses were performed using a FEI QUANTA 450 ESEM-FEG at the Centro per la Integrazione della Strumentazione della Università di Pisa (CISUP)”*

Thanks!

**Acknowledgments** –The ESEM-FEG image used for this report’s cover is by LF.