

**Università degli Studi di Pisa
CISUP**

ZEISS Crossbeam 550 FIB-SEM-litho laboratory

<https://cisup.unipi.it/labs/zeiss-crossbeam-550-fib-sem/>

Laboratory Rules

1. Equipment

- FIB-SEM consisting of FEG *Gemini II* SEM Column and *Ion Sculpture* FIB Column and equipped with:
 - Built-in Detectors (imaging): In-lens SE (secondary electron detector within column), In-Lens EsB (energy-selective backscattered electron within column), In-chamber SE (Everhart-Thornley), BSD six sectors (backscattered electron, retractable).
 - Analytical detectors (composition, texture, phase identification): EDS (energy dispersive system), EBSD (electron backscatter diffraction).
 - Pattern Generator (electron and ion beam lithography).
 - Multiple gas injection system, GIS (electron-ion-assisted deposition): platinum, carbon, water vapor.
 - Kleindiek MM3A-EM Micromanipulator (nano-manipulation, TEM film lift-out)
 - Flood gun (charge compensator system).
- Uninterruptible power supply (UPS).
- Technical gas cabinet (N₂).

2. Location

The CISUP ZEISS Crossbeam 550 FIB-SEM-litho laboratory is hosted by Istituto Nazionale di Fisica Nucleare (INFN) c/o Dipartimento di Fisica, Università di Pisa, Italy

Address: INFN - Dipartimento di Fisica, Area Pontecorvo, Largo B. Pontecorvo 3, I-56127, Pisa, Italy. Room #15a. webpage: <https://cisup.unipi.it/labs/zeiss-crossbeam-550-fib-sem/>

The laboratory consists of a room (room #15) hosting the Crossbeam 550 FIB-SEM-litho instrument located in the INFN clean room facility Advanced Technology Laboratories (LABAT). The instrument room is accessible through one of the LABAT airlocks (room #16) (personnel) and a service door (service). Part of the technical room (room #L/2) of the INFN LABAT facility (detached from the facility) is used as technical space for the Crossbeam 550 FIB-SEM-litho air-compressor and chiller.

3. Management

CISUP Chair

Prof. Simone Capaccioli

The *CISUP Chair* is the institutional representative member of the CISUP. See the CISUP Constitution Act @ <https://cisup.unipi.it/governance-2/>

Lab Management Board

Coordinator: Prof. Luigi Folco

Members: Proff. Giovanni Pennelli, Stefano Roddaro, Alessandro Tredicucci, Gabriele Paoli, Francesco Forti, Andrea Tartari.

The *Lab Management Board* regulates the use of the instrument, evaluates requests for the implementation of novel processes/configurations, examines the application of candidates for the position of *Experienced Users* (to be approved by the CISUP council), assesses technical upgrades and equipment development, and promotes collaborative research agreements for the use of the laboratory, in accord with the CISUP policies.

The *Lab Management Board* operates with the objective of guaranteeing the most efficient and widespread use of the instrument for research, education, and outreach, within the UniPi community and beyond.

The *Lab Management Board* redacts the laboratory activity annual report, to be submitted to the CISUP council. The *Lab Management Board* reports to the CISUP Chair.

The Coordinator of the *Lab Management Board* convenes the meeting of the *Lab Management Board* when necessary and at least once a year.

RAR

Dott. Andrea Tartari

The *RAR* ensures the daily operation of the lab according to Università di Pisa regulations. In particular, The *RAR* is responsible for safety-related aspects and periodical controls and ensures that every user has received the appropriate induction training on safety guidelines and laboratory protocols at first entrance in the laboratory. The *RAR* coordinates the daily management of the laboratory, ensuring its efficiency, and approving work schedule and lab access. In this regard, the *RAR* works in conjunction with the local INFN unit, to ensure the respect of INFN regulations and safety standards, and that INFN is constantly updated on the list of lab users. The *RAR* coordinates the *Technical Specialists* so that appropriate staffing levels based on laboratory usage is guaranteed and that the laboratory is maintained in full functionality.

The *RAR* operates in the foremost interest of safety and in constant cooperation with the *Lab Management Board Coordinator*. The *RAR* promptly reports to the *Lab Management Board* any problem, necessity, etc. that might arise. Specific requirements and needs of the activities will be agreed with the *Lab Management Board*. Maintenance that requires interruption of the lab service (unless in case of potential immediate hazards) must be approved by the *Lab Management Board*.

The *RAR* of the laboratory is appointed by the *Lab Management Board* in agreement with the *CISUP Chair* and the Director of the INFN-Pisa unit.

Technical Specialists: (minimum two, to max four part-time persons)

Technical Specialists are qualified for proper use and care of all the tools, equipment and facilities in the laboratory. They run the laboratory, ensure its ordinary maintenance, its efficiency, and access. The *Technical Specialists* provide analytical assistance to the laboratory users, perform and verify basic training and regular refresher to users, as well as in-depth training on specific applications for perspective candidates to the *Experienced Users* position. *Technical Specialists* ensure qualified support to ZEISS engineers for on-site and on-line service. The *Technical Specialists* report to the *RAR* and management board.

Administration

Dott. Luigi Rivetti

Dott.ssa Roberta Toma

4. Access and users

The access to the laboratory is restricted to authorized personnel.

Five is the maximum number of people allowed in the laboratory at the same time during operation.

Laboratory access authorization is provided by the *RAR*, in compliance with the rules and standards of the INFN, which is informed in advance of the names and affiliation of any new authorized personnel.

Access to the laboratory is allowed during the standard opening hours and according to the rules of the host institution, following a specific agreement between the CISUP Chair and the Director of the host Institution taking into account the document <<linee guida per funzionamento strumentazioni CISUP e ospitalità presso i Dipartimenti (Delibera n.18 del consiglio del CISUP del 8.07.2019). Access beyond standard opening hours (e.g., at night, weekends, holidays) is possible, but must be approved by the *CISUP Chair*, the Director of the host Institution and the *RAR*.

Access to the laboratory is managed through the on-line booking system available at the ZEISS Crossbeam 550 FIB-SEM laboratory web-page:

[link here](#)

In compliance with the CISUP laboratory rules, users who can have the authorization to enter the laboratory include:

- *Internal Users* from the Università di Pisa or Unipi-associated;
- *External Users* from other universities and research institutes
- *Non-academic users* (industry, etc.).

There are two user types: *Users* and *Experienced Users*.

Users can access the laboratory only if assisted by the *Technical Specialists* or by authorized *Experienced Users*. *Users* are not allowed to operate the laboratory instrumentation. *Users* instruct on their needs the *Technical Specialists* or *Experienced Users* who provide full technical and analytical assistance. Access is granted by the *RAR*. They report to the *Technical Specialists*.

Experienced Users are allowed to access the laboratory and use its instrumentation without lab staff technical assistance. *Experienced Users* are trained personnel in the proper use and care of the tools, equipment and facilities in the laboratory. Given the dual-nature of the instrument, the status of *Experienced Users* can be acquired for the SEM only, or in both SEM and FIB. The *RAR* can authorize senior *Experienced Users* to perform selected training duties and/or assist regular *Users* in place of the *Technical Specialists* when suitable.

The *Experienced Users* notify the *Technical Specialists* or the *RAR* at the beginning and end of their work session. In case of any kind of technical problems or anomalies in the instrument they stop the session and do not take any action but report the situation to the *Technical Specialists* to examine the situation and restore the service.

The *Experienced Users* are nominated by the *Lab Management Board* and officially recognized as such by the *CISUP* governance. Access is granted by the *RAR*. They report to the *Technical Specialists*.

All users must fill in the laboratory logbook, briefly reporting on the analytical session (used tools, running conditions, etc.) and highlighting issues, if any.

All users must use the on-line booking system to notify of any accompanying person.

5. Machine time allocation

The *Lab Management Board* establishes a monthly calendar for operating the ZEISS Crossbeam 550 FIB-SEM-litho laboratory reserving suitable periods for TEM-film preparation and analysis on one side, and nanofabrication on the other.

Booking of more than three consecutive days is subject to availability.

Users can book the lab within 30 days starting from the date of booking. This limitation no longer applies for educational and training sessions, external users (e.g., visiting fellows), private entities, and maintenance.

Cancellation of booked laboratory sessions are accepted only if communicated in due time (ideally two days in advance); otherwise, the user will be charged the due lab fee.

In principle, machine-time allocation is prioritized according to the following order:

1. Education, training, extraordinary maintenance
2. Internal Users
3. External Users
4. Non-academic
5. Ordinary maintenance and analytical/fabrication tools development.

6. Lab Fees

The *CISUP Advisory Board* (La Giunta) approves the price list for the use of the laboratory defined by the *Lab Management Board*. Lab fees are calibrated to cover the annual maintenance contract and running costs, and possibly for generating small budgets for the implementation/upgrade of the instrumentation in the laboratory.

The updated price list is given in the webpage of the laboratory.

<https://cisup.unipi.it/booking/booking-crossbeam-550/>