

===== Lab Safety =====



Università di Milano-Bicocca: Safety

General Rules of Conduct

- never stay alone in the laboratory ¹⁾²⁾
- carefully read the instruction manuals of the instruments used
- before leaving the laboratory, always ensure that all instruments are in safe condition ([check-list](#))
- use helmets, gloves, and protective goggles when necessary
- record all operations performed in the appropriate logbooks
- mark hazardous areas with the red-and-white chain or tape
- if it is necessary to access the laboratory outside the department's opening hours, two people must be present and the Supervisor must be informed in advance
- do not tamper with or remove safety devices
- keep clear access to the black doors that serve as the laboratory's emergency exits (do not block corridors or doors, ...)
- keep clear access to laboratory doors
- do not remove mezzanine railings
- wear suitable shoes (for example closed and without heels) to prevent accidents on stairs and protect against impacts or small accidental spills of cryogenic liquids

Reference Persons

- [Supervisor \(document in italian\)](#) for research and teaching activities: Marco Faverzani (tel. 2225)
- In the absence of the supervisor, the most experienced person is responsible for laboratory activities: normally Elena Ferri (tel. 2354)
- Head of Prevention and Protection Service (RSPP), University of Milano-Bicocca: Francesca Peltrera (tel. 6109) (email [\[servizio.prevenzione@unimib.it\]](mailto:servizio.prevenzione@unimib.it))(<mailto:servizio.prevenzione@unimib.it>)
- Head of [Prevention and Protection Service \(RSPP\)](#) (INFN Milano-Bicocca Section): Giuseppe Bestiani (tel. 2330)
- Qualified Expert, Department of Physics: Stefano Giunti (external); for issues related to radioprotection, contact Marco Faverzani
- Cryogenic liquids manager: Roberto Gaigher (tel. 2312)
- Personnel authorized to use lifting equipment: Giancarlo Ceruti, Angelo Nucciotti

Emergencies

- **accident/injury**: reception (2099) and 112
- **large fire**: reception (2099) and 112 (make sure the fire alarm has been triggered)
- ALWAYS FOR ANY EMERGENCY: reception (2099)
- [University\]\(https://www.unimib.it/ateneo/sicurezza-ateneo/caso-emergenza|University\)](https://www.unimib.it/ateneo/sicurezza-ateneo/caso-emergenza|University)
[Emergency Page](#)
- [University Emergency Page](#)
 - Practical Guide in Case of Emergency (document in italian)

- For maintenance requests contact Marco Faverzani or Elena Ferri
 - University Emergency and Evacuation Plan (document in italian)
- [List of emergency and first-aid personnel TO BE UPDATED](#)
- [U2 Building Emergency Procedures for External Operators](#)
- [Evacuation Plan -3](#)

In Case of Oxygen Deficiency Alarm

* leave the laboratory immediately * immediately report the alarm to the supervisor * do not disable the alarm * in any case, do not re-enter the laboratory until the external display shows that oxygen levels have returned to normal (>20%) and until the visual alarm outside the lab has been turned off * do not tamper with safety systems:

- do not bypass the solenoid valve that intercepts the gaseous nitrogen line
- do not damage oxygen sensor capsules by exposing them to solvent vapors or gas flows

* immediately report any anomalies in the oxygen sensors to the supervisor

In Case of Blackout

* in case of blackout, the [UPS](http://172.17.47.144/UPS)(<http://172.17.47.144/UPS>) (Uninterruptible Power Supply) system, thanks to its battery backup, will ensure the operation of cryostats, oxygen sensors, certain lights, and other equipment connected to panels with a red label until the batteries are depleted (actual duration depends on total load) * computers connected to the UPS will automatically shut down after a few minutes * in case of blackout, the air conditioning and ventilation system ³⁾ stops immediately * once UPS backup ends, the oxygen monitoring system will no longer be active * in case of a prolonged blackout, if necessary, use the UPS time to safely secure cryogenic systems and leave the laboratory; otherwise, leave immediately * in any case, once UPS backup ends, leave the laboratory immediately

Regulations

* Workplace Safety ⁴⁾

- Legislative Decree 626 of 1994
- Ministerial Decree 363 of 1998
- Regulation for Implementation of DM 363/1998 in Bicocca
 - Legislative Decree 230 of 1995
 - Legislative Decree 81 of 2008 (Workplace Safety)
 - Legislative Decree 101 of 2020 (Radiation Protection)

Cryogenic Liquids

* Liquids used in the laboratory

- Liquid helium ($T=4K$)
- Liquid nitrogen ($T=77K$)

* risk of cold burn

- always use cryogenic gloves
- wear protective goggles
- do not touch cold parts with bare hands (especially metals)

* risk of asphyxiation ⁵⁾

- pay attention to oxygen sensors: in case of alarm, leave the laboratory immediately and report the risk
- keep liquid helium containers connected to the copper recovery line

* risk of explosion ⁶⁾

- check the opening of safety valves
- check the closure of vent valves
- always check pressure difference before opening a valve

* keep all containers vertical * do not use dewars to pour liquid * always close containers with proper lids * beware of ice plugs formation (possible high pressure) * in doubt, call the responsible person *

Safety chapter extracted from "Handbook of Cryogenic Engineering", J. Weisand

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Inventory of cryogenic liquids and evaluation of evaporation impact

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Liquid Nitrogen Safety Data Sheet

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Liquid Helium Safety Data Sheet

Pressurized Gases

* gases distributed in the laboratory: compressed air, nitrogen, and helium * high pressures may also occur in dilution refrigerator circuits * always close both valves at the take-off points * before opening valves, set the regulators to minimum * keep regulators below 500 mbar * use suitable hoses for gas withdrawal and always check their condition before use * do not tamper with safety valves * always check pressure difference before opening a valve

Radioactive Sources

* Students are not authorized to handle radioactive sources * Do not touch with bare hands * Do not touch the active part * Keep at a safe distance from body and hands * Protect eyes * Limit exposure time * Handle with tongs * Always clearly label sources (indicating type and activity) * Store unused sources behind lead shielding * Study documentation before use * Sources used in the laboratory:

- ^{60}Co
- ^{55}Fe

- ^{22}Na
- ^{109}Cd
- ^{57}Co
- ^{241}Am

Lifting Equipment

* overhead crane, electric hoist, forklift, and pallet truck may only be used with support from authorized personnel * when working with suspended loads, wear protective helmets

Electrical System

* it is strictly forbidden to tamper with electrical systems * access to electrical panels is allowed only for maintenance staff * it is strictly forbidden to tamper with electrical connections of instrumentation * do not leave computers or control panels open * electrical connections of equipment must only be made by electricians * do not overload power strips; always check the maximum rating * do not connect multiple power strips in series * do not leave power strips on the floor, especially near areas where cryogenic liquids are used

Procedures

* **New Safety Procedures for UNIMIB Research Laboratories (10/02/2023)**
Forms](<https://www.unimib.it/ateneo/sicurezza-ateneo/modulistica-e-procedure|Forms>) and Procedures * General operating procedures provided by the Prevention and Protection Service

- [poplab001en-it.pdf](#)
- [poplab002aspec.pdf](#)
- [poplab005.pdf](#)
- [poplab012_utilizzo_gas.pdf](#)

* Complete documentation [procedure_applicabili_lab_criostati.zip](#)moduli.zip * [here](#) you can find specific procedures for all operations involving various risks * Each laboratory user must review

- all general Operating Procedures listed above
- the specific rules, instructions, and procedures for the Cryostats laboratory available on this page or through links

* Each laboratory user must sign [Form 052](#) (Acknowledgment of receipt of safety and health information) * Each laboratory user must print and sign this page

Bibliography (to read!)

* "Safety Matters", Oxford Instruments * "Practical Cryogenics", Oxford Instruments

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The undersigned

declares to have **read and understood** the information contained in this page, in the attached documents, and in the linked pages.

Date

Signature

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Would you like me to produce a **bilingual version** (Italian + English side by side or section by section)? It's often useful for safety documentation.

¹⁾

all equipment can be remotely supervised

²⁾

Under no circumstances may students remain without supervision

³⁾

Status](http://artico.mib.infn.it/cgi-bin/utareport_html|Status) of the Air Treatment Unit, UTA (accessible only from the mib.infn.it domain)

⁴⁾

students, undergraduates, PhD students, and research fellows are considered full workers

⁵⁾ ⁶⁾

,
the volume change from liquid to gas is about 700 times: 1 liter becomes 0.7 m³

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