

===== 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 \(document in italian\)](#)
- [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](#) (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⁾
 1. Legislative Decree 626 of 1994 (document in italian)
 2. Ministerial Decree 363 of 1998 (document in italian)
 3. Regulation for Implementation of DM 363/1998 in Bicocca (document in italian)
 4. Legislative Decree 230 of 1995 (document in italian)
 5. Legislative Decree 81 of 2008 (Workplace Safety) (document in italian)
 6. Legislative Decree 101 of 2020 (Radiation Protection) (document in italian)

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
 - Inventory of cryogenic liquids and evaluation of evaporation impact
 - Liquid Nitrogen Safety Data Sheet (document in italian)
 - Liquid Helium Safety Data Sheet (document in italian)

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:

1. 60Co
2. 55Fe
3. 22Na
4. 109Cd
5. 57Co
6. 241Am

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 and procedures \(website in italian\)](#)
- General operating procedures provided by the Prevention and Protection Service
 - [poplab001en-it.pdf](#)
 - [poplab002aspec.pdf](#) (document in italian)
 - [poplab005.pdf](#)
 - [poplab012_utilizzo_gas.pdf](#) (document in italian)
- Complete documentation [procedure_applicabili_lab_criostati.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 (must 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

1)

all equipment can be remotely supervised

2)

Under no circumstances may students remain without supervision

3)

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)

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

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