UNIVERSITY *of* TASMANIA

Physics

Teaching Laboratory Safety Information

• Laboratories are potentially dangerous places. To maximize the safety of everyone in the laboratory and minimize the risk of injury, it is critical that you understand the appropriate procedures and practices for safe operation of all the equipment you will use *before* you undertake any experiment. **It is your responsibility to know the correct operating procedures and the proper response in the event of an incident or emergency.**

• One of the goals of physics practical teaching is to instruct students in the safe use of equipment and materials commonly encountered in research and industrial laboratories. We have designed these exercises and spaces and developed operating procedures to make the lab as safe as possible for you.

• Prevention of injury to yourself and others is the foremost concern in any workplace environment. This is a matter of being aware of potential hazards and treating the apparatus and materials used with respect and in accordance with the instructions of demonstrators. There is a "safety kiosk" in every laboratory that contains details of the emergency evacuation procedures, hazards, material safety data sheets, and required personal protective equipment in use. Your lab demonstrator will inform you about the location of the safety kiosk, and you should familiarise yourself with it the first time you do any work in a particular laboratory.

• **Duty of care** is the term for the moral responsibility that a person has not to cause harm to another person that could be reasonably foreseen. If you're a science fiction fan, this concept may be familiar to you as a paraphrase of one of Isaac Asimov's "laws of robotics", namely: you may not harm another person, or through inaction allow a person to come to harm. The University and your demonstrators have a duty of care towards you, and you also have a duty of care to yourself, your fellow students, and your instructors.

• In order that duty of care be respected, we will give you a safety induction into the laboratory environment.

> ***You must give written confirmation to your demonstrator that you have received and understood the safety briefing material and that you will act with care toward the equipment and your fellow students before you will be allowed to begin your lab work.***

• This information is general. There will also be safe operating procedures associated with each specific experiment that you do, and any notable hazards will be identified, along with the way to minimise whatever potential risks exist.

• Operating procedures have been developed based on information from experienced users of the equipment and in accordance with University police for safety, health & wellbeing. Where relevant, the appropriate legislation and codes of practice have been consulted.

• If you have any health conditions or concerns that could potentially affect your ability to use the lab equipment here, recognise a potential hazard, or respond in a timely fashion to an incident, please communicate these concerns to your demonstrator(s). We are committed to treat any health information with appropriate concern for your privacy.

• The information contained here is not intended to stand on its own, but is additional to the University of Tasmania Safety, Health & Wellbeing policy and procedures. The University is committed to ensuring the health and safety of its students when undertaking study, research or other work at a University campus or facility or undertaking approved fieldwork activities. For further information, see https://www.utas.edu.au/safety-and-wellbeing/students

Physics Laboratory Safety: Essential Information

The following is a summary of the most basic rules for safe work in physics laboratories. For detailed safety instructions on individual experiments, particularly those involving high voltage, lasers, radioactive sources, liquid nitrogen, or strong magnetic fields, **consult the experiment notes and a demonstrator.**

The rules listed here, in the experimental procedures, and including the instructions of the demonstrators, are here for your (and our) safety. **The ability to follow these rules and work safely is a laboratory skill and constitutes part of your assessment for the practical component of your physics unit. If you do not follow these rules as communicated verbally and in writing, you may be removed from the lab.** As a reminder, you cannot obtain a passing mark in physics without passing the practical component, which will be impossible if you are removed from the laboratory for safety reasons.

General rules:

- **Never work alone** in the laboratory.
- **Always wear adequate foot covering**; bare feet, thongs, open-toed or backless shoes are not permitted. High-heeled shoes are discouraged.
- **No food or drink are permitted to be consumed** in the laboratory.
- **Never run** in the lab.
- **Long hair or very loose clothing or jewelry may be a hazard** around experiments with fast-moving or heavy parts, or machinery. There are not many such situations in our laboratories, but demonstrators may require you to remove dangerous items or tie back your hair before approaching potentially hazardous equipment.
- **Immediately clean any spill of water or other liquids**. Few of the experiments involve liquids, and no drinks are allowed in the lab, but as a reminder: **water and electricity don't mix**. Water must never be placed where it could potentially spill onto electrical equipment.

Before starting any experiment:

- **Always read the standard operating procedures** (written experiment notes) and familiarise yourself with the safe operation of relevant equipment including any potential hazards.
- **Always check with a demonstrator** about any potential hazards specific to the experiment, and learn the approved procedure to minimise/eliminate the risks.
- **Learn the location of the exits, the lab manager's office, any personal protective equipment required, the first aid kit, and the fire extinguisher**.

Best practices (General):

- When objects are being accelerated or have the potential to be accelerated (falling objects, spinning objects, wires under tension, compressed gases, etc), it is advisable to position yourself safely and wear eye protection. Appropriate safety glasses will be provided.
- Any moving objects can cause injuries that could potentially damage hands or fingers. Always take care when reaching into a moving experiment!
- When using high voltage equipment, touch with one hand only to avoid involving yourself in the circuit path. Keep your other hand in a pocket or behind your back. Electrical charge always takes the path of least resistance to earth- ensure that path does not include you!

"Exotic" hazards in a physics lab: Most of what you do in a physics lab relies on common sense behaviour and the taking of care with items and materials that may be delicate or highly sensitive but are nonetheless "everyday" items. The following items are not "everyday" objects, and you should always work under the close supervision of a demonstrator or lab manager before handling or using them:

- **Lasers:** Most of the lasers used are classified as safe for use in schools and workplaces. Where needed, appropriate specialised eye protection will be provided. However, any laser can still cause eye damage if used inappropriately. Never look directly into the beam of any laser. Never aim a laser through a focusing optical system unless explicitly instructed by a demonstrator or experimental operating procedure that has been signed off and risk-assessed. Beware of stray reflections from shiny surfaces; it is advisable to remove metal jewellery or watchbands from your hands and arms when working around lasers. Maintain experimental setups at low height so that laser paths are well below the eye level of you and your colleagues.

- **Radioactive sources:** Unless otherwise noted, the sources used in our teaching labs are classified as safe for work in schools. However, any source of radiation can be hazardous if treated inappropriately. Where radioactive sources are used, minimise your exposure by maximising your distance, minimising your exposure time, and using appropriate shielding. Always follow standard procedures, and never eat or drink when using radioactive sources. Always wash your hands after handling radioactive sources and before eating or drinking.

- **Liquid nitrogen:** When using liquid nitrogen, always wear eye protection and protective gloves when transporting or transferring the liquid. Never mix with other liquids or pour down the sink. This should not come up very often- in fact you should always seek the assistance and advice of a lab manager or other staff member before any activity involving liquid nitrogen.

- **High magnetic fields:** Low-frequency electromagnetic fields are not known to damage living cells or DNA. However, they may damage sensitive mechanical objects like wristwatches. Individuals with certain medical devices (e.g., a cardiac pacemaker to control heart arrhythmias) must not enter areas of high magnetic fields (e.g., MRI machines or the immediate area surrounding a high-power electromagnet), at the risk of very serious health effects. Please consult your demonstrator before entering any lab area if you have any questions about a medical device or condition.

Physics Laboratory Safety: Hazards and Incidents

If a hazardous condition or incident occurs, **notify the lab demonstrator(s) immediately** so they can determine the appropriate response and quickly locate someone with first aid training if needed.

If someone else in the class is behaving unsafely, speak to them yourself if you feel comfortable doing so. If not, then report the behaviour to a demonstrator. If someone is acting unsafely they may be endangering themselves and others and so you have a moral duty to act.

Many potential hazards or incidents require nothing more than a little bit of clean-up. Always check with the demonstrator or printed information in the laboratory for the location of the appropriate supplies and ensure that you are not putting yourself or other students at risk through any actions you take.

If a lab demonstrator is not available, contact the **Physics Lab Manager**, who will be located in the Physics building, **Room 225**, on Level 2 (phone: **6226 2399**) during regular work hours.

If there is an event requiring intervention by campus security or if you feel at any point that you are in an unsafe situation, **Security** may be contacted on **6226 7600**.

In an emergency (ONLY an **Emergency**), telephone police, fire, or ambulance services on **000**.

Emergency Evacuation Procedure: for all Physics Laboratories, specific procedures will be located on the wall near the door. Proceed to the nearest fire exit and leave the building. There are exits at the northern end of the building (to the left of Labs 1 and 2, through the door at the end of the corridor). If the fire escape is blocked, an alternate route will be through the old maths building (access corridor immediately opposite the door to Lab 1/Room 235). If these routes are blocked, there is an exit on Level 2 opposite Physics Lecture Theatre 1, or on Level 1 to the Earl Street car park. The latter is the closest exit for labs in Room 140 (third-year labs only).

In an emergency, leave all belongings behind and exit the building in a controlled and orderly fashion. Comply with the instructions of any staff members or Fire Wardens. Upon exiting the building all students and staff should assemble at the designated meeting location (the central mall area outside Level 2 of physics, at a safe distance from the building), and await further instructions.