

### Safety and Health Guidelines for the Modern and Thermal Physics Laboratory Modern and Thermal Physics Laboratory Safety Manual

Experimental physics encourages instructors and students to innovate new techniques and devices and use them to demonstrate both old and new ideas. Therefore, it is impossible to predict all the specific hazards that may arise in the study of physics. While eliminating creativity for the sake of safety is not preferable, instructors must blend their creativity with constant vigilance against potential dangers. Common sense can go a long way toward providing a safe environment.

Here is this guide which provides general rules for ensuring a safe environment inside the Modern and Thermal Physics Laboratory:

1. **Careful Handling of Heat Sources:** When working with thermal expansion or thermal conductivity experiments, use heat sources cautiously and ensure equipment has cooled down before touching it.
2. **Using Thermometers Carefully:** When measuring temperatures using gas or platinum thermometers, handle them carefully to avoid breakage and exposure to chemicals.
3. **Prevention of Electric Shocks:** In experiments involving electro-thermal phenomena or measuring specific heat capacity electrically, take necessary precautions to avoid electric shocks.
4. **Safe Handling of Chemicals:** Use gloves and safety glasses when handling chemicals, such as in experiments involving the melting point of paraffin wax.
5. **Caution When Using Gases:** In experiments such as Boyle's Law and Gay-Lussac's Law, handle gases carefully to avoid explosions or fires.
6. **Correct Handling of Electrical Devices:** When conducting experiments involving electricity, ensure electrical devices are used according to safety information and disconnect power after use.
7. **Avoid Direct Exposure to Radiation:** In experiments such as the Compton effect using X-rays, use appropriate protection to avoid direct exposure to radiation.
8. **Monitoring Experimental Conditions:** Monitor temperatures, pressures, and any other important factors during experiments to maintain safety.
9. **Training on Equipment Use:** Ensure all participants in the laboratory are trained on how to use devices and tools correctly and safely.
10. **Controlling Hazardous Experiments:** In experiments such as the specific charge of the electron ( $e/m$ ) or the Franck-Hertz experiment, ensure they are conducted under direct supervision and in a controlled environment.
11. **Safe Waste Disposal:** Dispose of chemical and electronic waste safely according to local guidelines and laws to ensure no environmental pollution.
12. **Proper Ventilation:** Ensure the laboratory is well-ventilated, especially when conducting experiments that may produce fumes or gases that could be harmful if inhaled.
13. **Keeping Emergency Equipment Accessible:** Ensure easy access to fire extinguishers, eye wash stations, and first aid kits in case of an emergency.
14. **First Aid Training:** All individuals in the laboratory should be familiar with how to provide first aid for burns, cuts, or other injuries.