LASER APPLICATIONS

Chapter Four

Hazards and Safety Conditions

- ✓ **Hazards in Laser Laboratories**
- ✓ **Guidelines of Working in Laser Laboratories (Safety Conditions)**

Assist.Prof. Dr. Sahar Naji Rashid

CHAPTER FOUR: HAZARDS AND SAFETY CONDITIONS

4-1) Hazards in Laser Laboratories

The risks that workers in laser laboratories may be exposed to fall into four categories:

1) Radiation Hazards:

1- Laser radiation can affect the eye, causing damage to the cornea or retina, which may lead to permanent blindness. Shorter wavelengths are the most damaging.

2- Laser radiation can affect the skin. The effects of visible light lasers are less severe if their power is lower, such as He-Ne lasers and semiconductor lasers.

2) Electrical Power Hazards:

1- The effect of high electrical power from the power supply.

2- Electric shock from connection points and cables.

3) Explosion Hazards:

1- Flash lamp explosions in solid-state and liquid-state lasers.

2- Capacitors in power supplies.

3- Chemical solutions in liquid-state or chemical lasers.

4) Poisoning Hazards:

1- Dissolved or solvents in liquid-state lasers.

2- Vapors produced in chemical lasers.

3- The use of liquid nitrogen.

4-2) Guidelines of Working in Laser Laboratories (Safety Conditions)

1- Place warning signs in areas exposed to laser radiation.

2- It is preferable to have more than one person working in the laser lab.

3- Install a warning light at the lab entrance that illuminates automatically when the laser is switched on to prevent people from entering the lab unexpectedly.

4- Determine the direction of the laser beam within the lab so that it does not interfere with the movement of workers.
5- The laser beam should be below eye level.
6- Do not place food or beverage bottles in the path of the laser beam, as they can cause it to reflect towards the eyes.
7- Ensure proper electrical grounding for the lab in general and the power supply in particular. Do not leave the lab floor damp, and ensure that the person operating the power supply does not stand on metal sheets or electrically conductive materials.
8- Place barriers and shields in front of explosive materials.
9- Do not smoke in the laser lab, as smoke can damage optical materials such as mirrors and lenses.
10- Wear protective eyewear appropriate for each type of laser, and have an eye exam every six months.
11- Gloves and safety glasses must be worn when handling chemicals, dyes, and solutions.

The symbol below indicates the presence of a laser device; therefore, all necessary occupational safety precautions must be taken when working in this area.

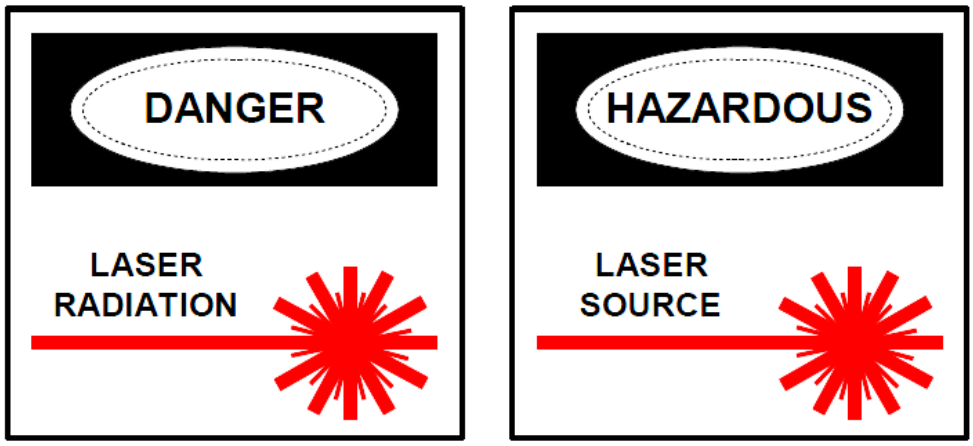

Figure (4-1): Warning sign due to the presence of a laser beam