# LLE Supervisor Safety Training

**This training is:**

- **For those who are not directly exposed to LLE's lab hazards, but supervise those who are. It is also applicable for staff who enter labs to perform work not directly related to the hazards in the area (ex. IT)**
- **Only available to those who have taken the full version of *all* applicable trainings (G_001B, C_001, E_001, L_001, M_001) at least once previously**
- **Required once every two years**

# Outline

- Overview
- General Laboratory Safety
- Laser Safety
- Mechanical Safety
- Electrical Safety
- Chemical Safety

Overview

# Access to LLE is restricted to provide physical, personal and facility security

- Building access is controlled by card readers and receptionists
  - With badge access, everyone *must* swipe themselves in - no piggy-backing
- All persons are required to wear UR/LLE issued ID or visitors badge, where it is readily visible, while in the building
- Some specific lab spaces inside LLE require an escort to access
- Everyone must sign in and out at a reception desk when in the facility during non-working hours
- Never allow people to enter LLE to use the phone, bathroom, get a drink, etc. unless they are personally known or escorted by you.
- Before you leave the building, make sure the path to your vehicle is safe. Wait inside the building if you observe unusual vehicles or suspicious activities.
  - *The number to UR Dept of Public Safety is on the back of your badge*
- Report instances of suspected unauthorized building entry or any suspicious activity to UR/LLE Facility Security Officer (FSO)

**Call UR Public Safety (585) 275-3333 (or use a Blue Light Phone) to request an escort to your car or report a campus crime.**
**Call 911 off-campus**

# Emergency phone numbers

| | |
|---|---|
| LLE Receptionist<br>(East lobby) | (585) 275-5101 |
| UR Public Safety<br>*campus blue phones connect to public safety directly | (585) 275-3333 |
| Local emergency services (Fire, Police, Ambulance) | 911 |
| Blood exposure hotline | (585) 275-1164 |

**Add these emergency contact numbers to your cell phone now**

**The stickers on lab/desk phones provide dialing instructions for internal phones, specifically**

# Carefully control information you have access to, and items assigned by LLE/UR

**This includes, but is not limited to:**

- **University/Visitor ID badge**
  - **If you misplace your ID badge, report it immediately to LLE's FSO and The Director's Executive Assistant**
- **Computer accounts & passwords**
- **Confidential information**
- **Radiation badges**
- **Keys**
- **Mobile devices**

**The University enforces strict policies regarding handling of confidential information. University IT Policies are found here, including:**

- Data Security Classifications Policy
- Mobile Computing Device Security Standards

**Individuals are personally responsible for appropriate use of these items.**

# LLE's Computer and network policies are designed to prevent costly problems

**LLE's Information Technology (IT) group has identified key things you should know about accessing or using computer or network resources:**

1. **Never connect or disconnect cables from a computer or network device without explicit permission from IT. Limit your activities to specific cables, devices, and network ports you are authorized to work on.**

2. **Do not change the network settings on any LLE network device without IT approval.**

3. **Computers that connect to ANY University network must be up to date with security patches and have University approved anti-virus protection.**

4. **Treat all email as suspicious until proven otherwise. Don't click links or open attachments unless you recognize the sender and understand why they sent you a link / attachment.**

# Computer and Network Safety (cont.)

5. Do not leave desktop computers powered off without contacting IT.

6. Save important LLE files on network shares, not on your computer.

7. Mobile devices (phones, tablets, laptops, etc.) that access any UR/LLE resources (mail, files, etc..) must be password protected by a strong screen lock.

8. Passwords or passphrases used for LLE accounts should not be used for other accounts (personal or business). University IT recommends the use of the password manager/vault, "Keeper."

9. Never open a computer chassis without assistance from IT.

10. Log off or lock your computer screen when you are away from your desk.

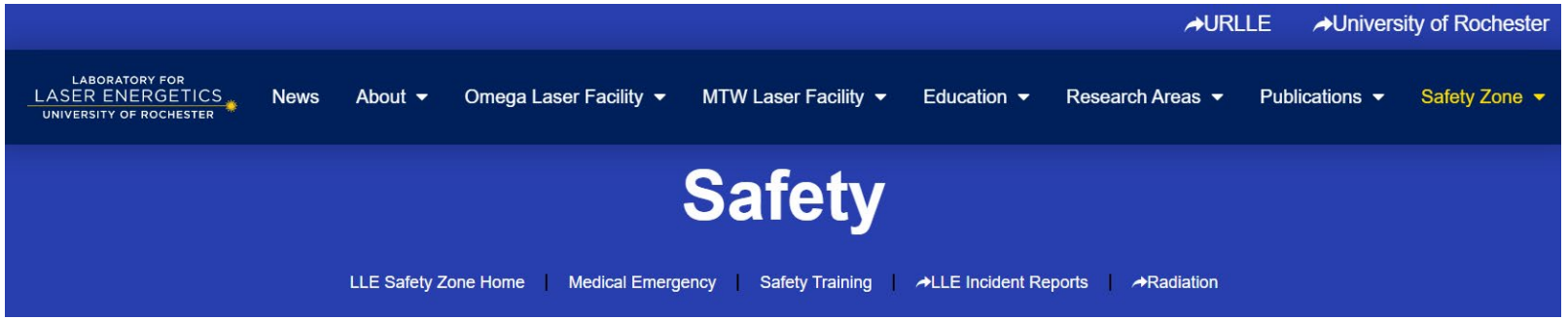
11. Disconnect VPN when access to the LLE computer network is not needed

**If you have any questions about ANY of these rules, contact IT for answers and/or clarification**

# Safety is everyone's responsibility

- **Hazards** exist throughout the workplace and change over time
- Restrict your activities to those for which you are trained, qualified, and **Authorized**
- **Stop Work** if an abnormal event occurs or if an activity seems unsafe and **report it *immediately***.
- **Be Prepared**. Know how to respond in an emergency
- **Prevent Unauthorized Access** to LLE
- Understand **Computer and Network Policies**
- **Prevent unauthorized dissemination** of controlled items

# LLE safety information is available on the “Safety Zone”




**The Safety Training Page – houses resources such as:**

- **Safety Trainings - providing more detailed information on specific topics**
- **Blank JHA forms – available any time when job responsibilities change**
- **Safety Action Items Log – to review outstanding safety concerns pertaining to you/your areas**
- **Training requirements and status – for you and your direct reports**

**The Safety Team - comprised of subject matter experts available to help navigate safety concerns**

**Contact The LLE Safety Team with your questions and concerns**

# The LLE Safety Office (Rm 4206) provides…

- Information, assistance and support
- PPE
  - Safety Eyewear
  - Hearing protection
  - Gloves
  - Hard hats

- Reference texts
  - Safety Data Sheets (SDS)
  - CHP binder
  - National Fire Codes
- Safety supplies
  - Lens cleaners
  - Sharps disposal
  - Eyewash flush logs

# Policy Against Discrimination, Harassment, and Discriminatory Employment/Service Practices (PADH)

**The Policy Against Discrimination and Harassment (PADH) applies to:** Faculty; staff; residents; fellows; postdoctoral appointees; student employees; students, interns (paid or unpaid); volunteers; and to all visitors (including patients, contractors, and vendors) to any University campus, facility and/or property, and to University sponsored activities and events, whether on University premises or not.

The University is governed by multiple state and federal laws that prohibit discrimination and harassment based on various protected classes and this policy is intended to comply with all of them. These laws may require that certain complaints filed under this policy be addressed under another University policy (for example, the University's Title IX policy). The University's Office of Equity and Inclusion will assess all complaints made under this policy and determine the most appropriate process for addressing the individual's concerns.

**Reports can be made by emailing PADH@Rochester.edu.**

# Guidelines for Guest Workers:

**Guest Workers are not permitted to :**

- **Perform work requiring a respirator**
- **Work in the Machine Shop**
- **Use ladders > 6 feet (1.8 m) tall, rolling stairs, aerial lifts, or perform activities requiring fall protection**
- **Perform chemical processes (unless provided explicit permission with training from a LLE Chemical Safety Officer)**
  - **small quantities of low toxicity reagent use is allowed**
- **Operate the High Pressure LN2 Fill Station**
- **Lift items ≥ 50 lbs = 22 kg (requiring safety shoes)**
- **Operate hoists or cranes, or perform rigging operations**
- **Service energized equipment, unless following written, LLE-approved procedures**
- **Remove "Danger - Do Not Operate" tags**
- **Modify, or authorize changes to equipment, software, or procedures**

**LLE hosts are responsible for escorting and their Guest Workers' safety**

# Workers need to be aware of work area hazards

**LLE supervisors are expected to inform workers of the hazards they will be exposed to in labs by training, signs, and other communications**

- **Each work area is dynamic and presents unique hazards**
- **Some of the hazards that may be present at LLE include:**
  - **Electromagnetic radiation (laser, x-ray, …)**
  - **Radioactive sources (neutron, beta, gamma, …)**
  - **High-pressure gas and large volume vacuum systems**
  - **Cryogenic fluids**
  - **Chemicals, beryllium, lead, silica dust**
  - **High voltage**
  - **Working aloft (e.g., ladders, lifts, platforms)**
  - **Rotating machinery**
  - **Rigging operations**

**Activities are restricted to those for which one is *trained, and authorized***

# “Stop work” policy

**Everyone has the right *and RESPONSIBILITY* to “Stop work” if they perceive an *Imminent Danger***

- **An imminent danger is a hazard that presents an unacceptable risk of injury, environmental impairment or property damage.**
- **No one should undertake a job that appears unsafe**
- **Hazards may result from:**
  - **defective equipment**
  - **failure to follow procedures**
  - **equipment or techniques that are unsuitable for a task**
  - **unforeseen circumstances**
- **Remind staff to Immediately notify you, the line-manager, and the Chief Safety Officer**

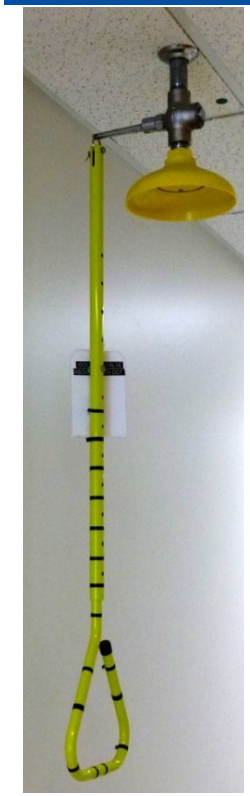
# LLE requires use of the Buddy System

- "Buddy System" means working with a partner when:
  - Using potentially hazardous equipment or processes or
  - Working in a potentially hazardous environment
- Buddies are responsible for
  - Being available to assist in an emergency
  - Verifying that safe work practices are used
  - Remaining in contact with partner, and knowing they are OK
- Workers must submit written plans for off-hours laboratory work to their Supervisor ***and*** obtain written approval prior to starting.
  - Review:
    - Planned work hours
    - Activities being performed
    - Specific buddy identified
- Sign in/out at the receptionist desk when working off-hours

# Know what to do and who to call when something goes wrong

## Injuries / emergencies / major spills

**Know where eye wash stations and safety showers are located and how to use them**



## In case of fire



**Emergency Numbers**

**<u>During working hours:</u>**

**55101**

**<u>After hours:</u>**

**9-911**


To dial from a cell phone: 275-5101
Desk phones require pressing “9” first to get an outside line: “9-911”

# Dump Buttons

**Dump button are used to immediately disable a potential hazards often laser propagation or high voltage**


**Understand the function of the dump button in the area in which you will be working**

# Medical emergencies require a rapid response

**Please note the location of the phone in any lab which you are working**

**Emergency Numbers**
**During working hours:**
**(x)55101**
**After hours:**
**9-911**


To dial from a cell phone: 275-5101
Desk phones require pressing "9" first to get an outside line: "9-911"

- **During working hours**
  - **Call the LLE receptionist to report it. The receptionist will notify the LLE's First-Responders**
    - **If no response, call 911**
- **Off-hours (nights, weekends)**
  - **Call 911**
    - **UR Public Safety will automatically be dispatched to assist with building entry**
- **Report all workplace injuries* to LLE Human Resources (HR)**
  - **HR will prepare and submit a UR Employee Incident Report**

*** see UR Policy 271 – Workers' Compensation Insurance**

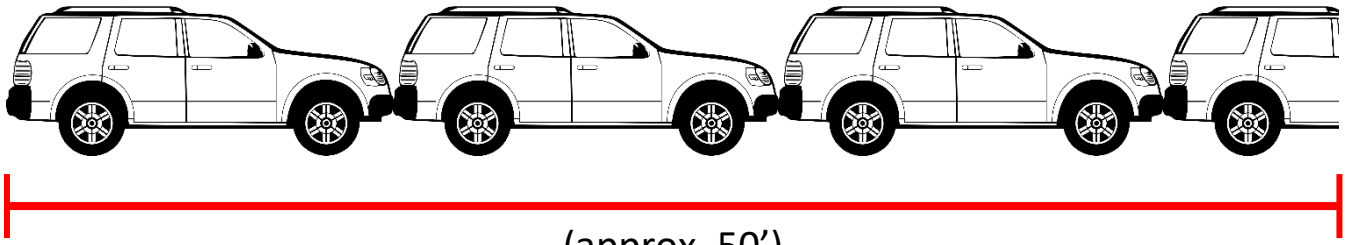
# Fire Safety


- Use ***only*** electromagnetic safety latches to hold fire doors open
- Maintain 18″ clearance around fire sprinkler heads
- Maintain clear access
  - ≥ 48″ through hallways, around doors
  - ≥ 36″ around electrical panels, fire extinguishers, and fire alarm pull stations
- Minimize storage of flammable materials
- Inform a Safety Officer of faulty safety equipment (exit light, fire extinguisher, etc..)

These boxes are too close to the sprinkler, limiting effective coverage

# Everyone must respond *immediately* to fire alarms

- **Evacuate and move at least 50 feet from the building and emergency equipment**




- **Failure to respond and evacuate as quickly as possible causes delays in response and re-entry into the building**
- ***DO NOT* re-enter the building until alarms are silenced and beacons are off**
- **LLE hosts are responsible for their guests during an emergency**

**Emergency evacuation may be required in response to a fire, bomb threat, gas leak, et al.**

# The UR Medicine Imaging is LLE's assigned meeting location during an emergency evacuation

**If an emergency prevents employees from re-entering LLE, employees may shelter at *UR Medicine Imaging* at 200 E. River Rd (first building east of LLE)**

# LLE seeks to minimize safety risks

- **Operational risks are mitigated to the maximum extent practical by:**
  - **Engineering controls (interlocks, guards, pressure relief valve, …)**
  - **Procedures and training**
  - **Administrative controls (restricting access, buddy system, …)**
  - **Personal protective equipment (PPE)**
- **Never alter, remove or defeat safety features; examples include software and hardware interlocks, guards on moving machinery, electrical and laser enclosures**
- **Do not deviate from procedure**
  - **Read and understand procedures before starting work**
  - **Stop and obtain clarification for procedures that are unclear or inaccurate**
  - **Any deviation from procedure must be formalized by the applicable section leader(s) or Subject Matter Expert (SME) as an Advance Change Notice (ACN) and authorized by The Laser Facility Manager (LFM)**

# Good housekeeping is essential to maintaining a safe work environment

- **Promptly correct, or report, slippery conditions on walkways and work surfaces**
- **Keep aisles and passageways unobstructed.**
- **Set up barriers when passage is encumbered by work-in-progress or activities prevent safe passage**
- **Promptly remove all clutter, tools, hardware, packaging and similar material**
- **Maintain a 3 foot (1 m) clear area around circuit breaker panels**
- **Eliminate trip hazards. Secure hoses, cables and other potential trip hazards overhead, under walkways, or cover them with a cable ramp**

**Everyone must help maintain a clean and organized work environment**

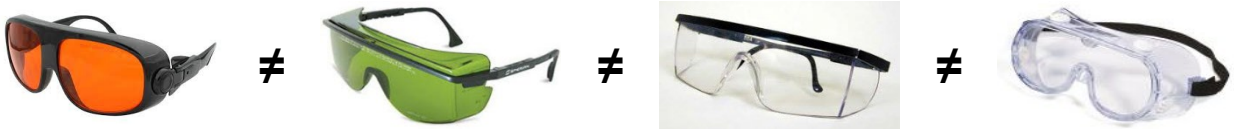
# Personal Protective Equipment (PPE) is your LAST form of protection

- When safety barriers fail, PPE is critical
- PPE is effective only when worn correctly and properly maintained
- Many types of PPE are designed to withstand a single catastrophic event (e.g., hard hats, impact-resistant eyewear, fall arresters)
  - If such an event occurs, or if the PPE appears to be damaged, remove it from service immediately!
- Some PPE is designed for single-use to prevent spread of contamination (e.g., disposable gloves, mask, lab coat, ear plugs)
  - Discard single-use PPE after use
- Areas within LLE have signs indicating the specific type of PPE required.
- Each worker must know/understand what PPE is required ***prior to starting*** a task. Contact the work-area supervisor or a Safety Officer if there is any question about what PPE is needed

**Know the capabilities and limitations of the PPE you use, and use it accordingly**

# The user is responsible for inspecting PPE before *every* use

- Inspect PPE for wear and damage before each use
- Keep PPE clean and in good working order
- Verify the PPE selected affords the required protection
- Immediately remove damaged PPE from service; return it to the work area supervisor who will dispose of it and replace it
- Return PPE to the point of origin. Do NOT transfer PPE from one laboratory to another
  - For example: do not “upgrade” your laser safety eyewear from another lab, the wavelengths may not be compatible



**Not all safety equipment is interchangeable!**
**Laser safety glasses ≠ Mechanical safety glasses ≠ Chemical safety goggles**

# Alarms inside individual labs indicate the potential for an oxygen deficient atmosphere


**If alarm sounds:**

- **Exit the area *immediately***
- **Call 9-1-1 if anyone is unable to exit the space**
- **Call a responsible person listed on the door sign to report the issue**

**No LLE employee or guest worker is permitted to enter an oxygen deficient atmosphere**

# Lasers are classified according to the hazard they present to your eye or skin

| Laser Class | Hazard Level |
|---|---|
| 1 | Incapable of causing injury during normal operation |
| 1M | Incapable of causing injury unless optical system is used to collect light |
| 2 | Visible light laser incapable of causing injury in 0.25 seconds |
| 2M | Visible light laser incapable of causing injury in 0.25 seconds unless optical system is used to collect light |
| 3R | Safe when handled carefully. Can cause flash blindness and disorientation. **Extended viewing could cause damage.** Less than 5 mW of visible light (400-700nm) |
| 3B | Can cause eye injury |
| 4 | Class 4 lasers have the greatest potential to cause injury. Can cause skin injury or ignite a fire |

**Knowing the laser class allows you to know the relative hazards of a laser.**

- **Class 3 and 4 can cause eye or skin injury**
- **Other classes will not cause eye or skin injury when used according to manufacturer's instructions**

# Laser radiation exposure can cause *irreversible* damage to the eyes and skin

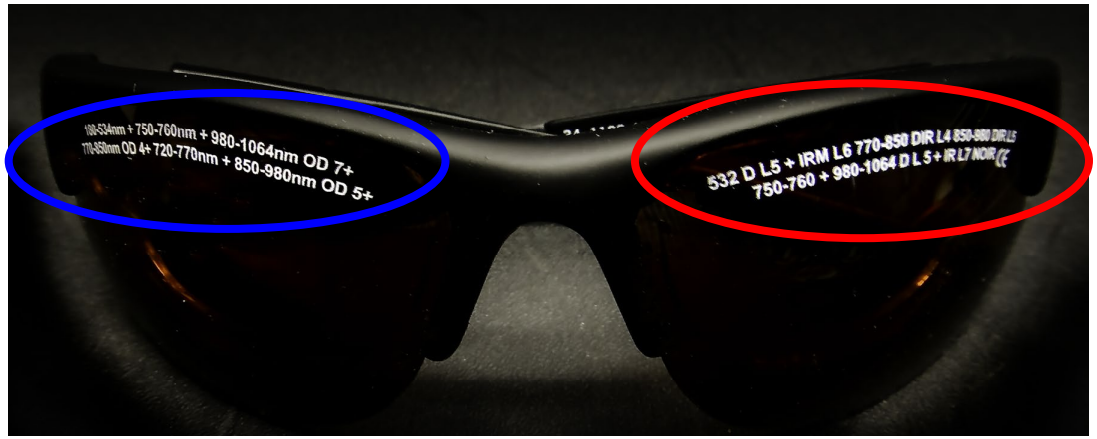
- **The eye can intensify (focus) light 100,000 times making eye exposure the principal hazard associated with laser radiation.**
- **The principal cause of tissue damage is thermal in nature**
  - **Thermal effects are caused by absorption of laser energy**
- **Maximum Permission Exposure (MPE) is the maximum level of laser radiation that does not cause adverse biological changes in the eye or skin. Laser Protective Eyewear is specified to reduce laser energy to below the MPE (See next slide for more information)**

**Contact the Safety Office immediately if you suspect eye exposure to laser has occurred or you have received a skin burn**

# Laser Safety Signs and Laser Protective Eyewear (LPE) refer to the OD.

- **Optical Density* (OD) characterizes the fraction of light blocked (absorbed) by laser protective eyewear**
  - **When OD=1 at a wavelength, 90% of the incoming light *at that wavelength* is blocked. 1/10$^{th}$ of the light transmits**
  - **When OD=5 at some wavelength, 99.999% of the incoming light *at that wavelength* is blocked. 1/100000$^{th}$ of the light transmits**

- **Make sure that the OD listed on the eyewear is *equal to or greater than* the OD required *for every wavelength listed on the sign***
  - **The OD can be specified for a single wavelength or a range of wavelengths**




**A higher OD value means the eyewear will provide greater protection at the specified wavelength(s)**

# Warning signs are made for each laboratory to alert you to the presence of laser hazards


- Many labs are equipped with illuminated style signs
  - Warning only applies when the illuminated sign is flashing
- Signs that are *printed* are applicable whenever *they are visible*

**Before activating a laser, verify the sign is active and other personnel in room are notified**

# The most common causes of laser-related *ACCIDENTS* are easily mitigated

| Cause | Mitigation |
|---|---|
| Misaligned optics and upwardly directed beams | Align with low power, terminate all beam paths |
| Unanticipated eye exposure during alignment | See above |
| Equipment malfunction | Perform regular maintenance. Provide additional controls before bypassing safety features |
| Improper methods of handling high voltage | Operator training, written procedures, de-energize when servicing |
| Unintentional exposure of unprotected personnel | Controlled access |
| Operators unfamiliar with laser equipment | Qualify all operators |
| Lack of protection for ancillary hazards | Failure mode analysis. Understand potential hazards and mitigate by design |
| Improper restoration of equipment following service | Repairs performed by trained, qualified personnel |
| Failure to follow operating procedures | Read, understand & follow procedures |

**THE PRIMARY CAUSE OF LASER EYE *INJURIES* IS UNSAFE WORK PRACTICES *COMBINED* WITH THE *FAILURE TO USE PROTECTIVE EYEWEAR* PROPERLY!**

# Numerous mechanical hazards exist at LLE

- Tripping
- Falling objects
- Cutting/abrasion
- Pinch points
- Elevated work surfaces
- Bump hazards
- Noise
- Slipping …


**Situational Awareness – The best way to prevent an accident is to be aware of your surroundings**

# Stored energy is a common metric for evaluating the potential risk associated with equipment and systems

**Common mechanical energy storage mechanisms include:**

- **Gravity acting on any elevated mass**
- **Springs**
- **Compressed gases**
  - **Only persons who have completed compressed gas training (M_002) may assemble or operate a compressed gas system**
- **Vacuum vessels**
- **Pressure vessels**
- **Motors/actuators (any rotating machinery)**
- **Thermal sources**
  - **Heat**
  - **Cryogens**

**The uncontrolled release of stored energy can cause personal injury and collateral damage to nearby equipment**

# Safely-designed equipment can be made unsafe by altering its construction or operating conditions

**ME must provide explicit authorization for:**

- **Deviations from assembly procedure**
- **Material substitutions**
- **Changes to joint design, including fastener changes (material, grade, size, etc.)**
- **Changes to fastener torque specifications**
- **Ensure the safety of mechanical equipment and its use**
- **Inspect compressed gas and vacuum systems prior to operation**

# Electrical Safety Policies

- If it is 50 Volts or Greater, it is High Voltage (HV)
  - Additional training is required for anyone working on or repairing HV equipment
- Only Facility Electricians are permitted to:
  - Open/close/reset circuit breakers in electrical panels
  - Modify electrical distribution services
  - Service energized equipment, by permit and review by the Chief Safety Officer


# Physiological Effects of Electricity

**Effects of Electrical Current* on the Body[3]**

| Current | Reaction |
|---|---|
| **1 milliamp** | Just a faint tingle. |
| **5 milliamps** | Slight shock felt. Disturbing, but not painful. Most people can "let go." However, strong involuntary movements can cause injuries. |
| **6–25 milliamps** (women)† **9–30 milliamps** (men) | Painful shock. Muscular control is lost. This is the range where "freezing currents" start. It may not be possible to "let go." |
| **50–150 milliamps** | Extremely painful shock, respiratory arrest (breathing stops), severe muscle contractions. Flexor muscles may cause holding on; extensor muscles may cause intense pushing away. Death is possible. |
| **1,000–4,300 milliamps** (1–4.3 amps) | Ventricular fibrillation (heart pumping action not rhythmic) occurs. Muscles contract; nerve damage occurs. Death is likely. |
| **10,000 milliamps** (10 amps) | Cardiac arrest and severe burns occur. Death is probable. |
| **15,000 milliamps** (15 amps) | Lowest overcurrent at which a typical fuse or circuit breaker opens a circuit! |

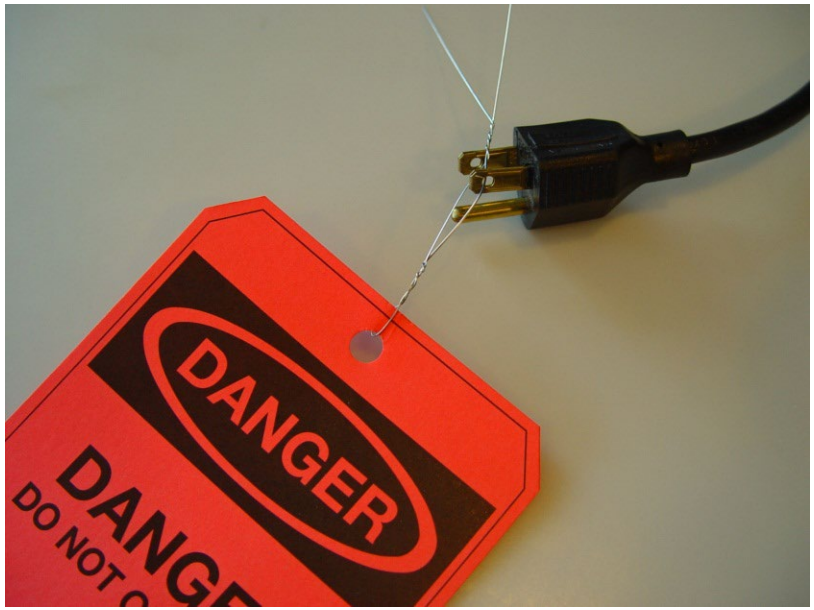
*Effects are for voltages less than about 600 volts. Higher voltages also cause severe burns.
†Differences in muscle and fat content affect the severity of shock.

**Electric shock victims suffering from ventricular fibrillation will die if they do not receive prompt, emergency medical attention**

# LLE Lockout / Tagout Policy

- **LOCKOUT - installation of a physical barrier or removal of a connecting link to prevent operation of component**
- **TAGOUT - placement of tag on breaker, switch, control device or valve stating "DANGER DO NOT OPERATE"**

- **Immediately notify Supervisor if equipment is suspected of presenting a hazard to personnel or other equipment.**
- **LLE staff are responsible for ensuring that equipment is properly locked/tagged out and recorded**
- **Guest Workers may not remove "Danger – Do Not Operate" tags**



# LLE electrical safety policies

- **Extension cords**
  - **500W maximum (UR policy)**
  - **May not be connected in series**

- **Equipment used at LLE must be UL certified, or have approval of LLE Electrical Safety Officer**

**Warn, damaged, frayed or deteriorated cord?**

**Ground pin missing?**

**STOP! Seek assistance**

# Common Sense Practices

- Allow proper ventilation for power dissipating equipment. Keep air filters clean.
- Investigate “hot” or unusual smells around equipment.
- Turn off unused equipment (excluding LLE-managed PC’s)
- Prior to activation of remote (OUT OF SIGHT) equipment verify clear and secure
- Never leave a potentially hazardous situation unattended for ANY REASON
- Recognize and mitigate hazards to others. Use simple warning signs to communicate dangers or possible risks
- Employ good housekeeping


**Ask for help before it is too late!**

# Chemical labeling follows the Globally Harmonized System (GHS) for hazard communication guidelines

## Container label:

**Signal Word**

**Hazard statements**

**Precautionary statements**

CHEMICAL NAME

UN####
CAS# XXXX-XX-X

**Product identifier**

Signal Word

"Danger" implies a higher hazard level than does "Warning"

Hazard statement

Statements assigned to a hazard class and category that describes the nature and degree of the hazards

Precautionary statements

Phrases which describe recommended measures that should be taken to minimize or prevent adverse effects resulting from exposures to a hazardous product

Pictograms

**Pictograms**

Company Name, Street Address, City, State, Zip, Country Phone number

**Supplier information**

## Cabinet label:

# *Pictograms* communicate chemical hazards

## Flame

* Flammables
* Self-Heating
* Self Reactives
* Organic Peroxides
* Pyrophorics
* Emits Flammable Gas

## Exploding Bomb

* Explosives
* Self Reactives
* Organic Peroxides

## Flame over Circle

* Oxidizers

## Skull & Crossbones

* Acute Toxicity (fatal or toxic)

## Health Hazard

* Carcinogen
* Respiratory Sensitizer
* Reproductive Toxicity
* Target Organ Toxicity
* Mutagenicity
* Aspiration Toxicity

## Gas Cylinder

* Gases Under Pressure

## Corrosion

* Corrosives

## Exclamation Mark

* Irritant
* Dermal Sensitizer
* Acute Toxicity (harmful)
* Narcotic Effects
* Respiratory Tract Irritant

## Environment

* Acute Aquatic Toxicity

# Flammables are separated into four categories according to their flash points and boiling points

***Category 1*** **(extremely flammable):**

- **Flash point < 73.4ºF (23ºC)**
- **Boiling point ≤ 95ºF (35ºC)**

***Ex: Diethyl ether***

**DANGER**

***Category 2*** **(highly flammable):**

- **Flash point < 73.4ºF (23ºC)**
- **Boiling point > 95ºF (35ºC)**

***Ex: Acetone, isopropanol***

---

***Category 3*** **(Flammable liquid and vapor):**

- **Flash point ≥ 73.4ºF (23ºC) and ≤ 140ºF (60ºC)**

***Ex: Acetic acid, acetylacetone***

**WARNING**

---

***Category 4 (Combustible liquid):***

- **Flash point ≥ 140°F (60°C) and ≤ 199.4 °F (93 °C)**

***Ex. Kerosene, chloroform***

**WARNING**

**(no symbol)**

# Explosion and fire are the two primary hazards associated with flammable and combustible liquids

- **Many organic solvents are *highly flammable***
- **Common organic solvents used at LLE include (but are not limited to):**
  - **Isopropanol**
  - **Methanol**
  - **Methylene chloride**
  - **Methyl ethyl ketone (MEK)**
  - **Toluene**
  - **Acetone**

**Always review safety information and work in a fume hood when using organic solvents**

# No more than 3 gallons of flammable solvent may be stored in any room, outside an approved storage cabinet

***All flammable solvents in excess of the 3-gal. limit must be stored in approved flammable solvent storage cabinets***

***Solvents outside of flammable cabinets should be stored in secondary containment ≥ 110% of the container(s) volume***

**Verify proper storage is available before ordering**

**Both insulated and self-closing, air-tight doors provide high fire resistance**


**Items must NOT be stored on top of a flammables cabinet**

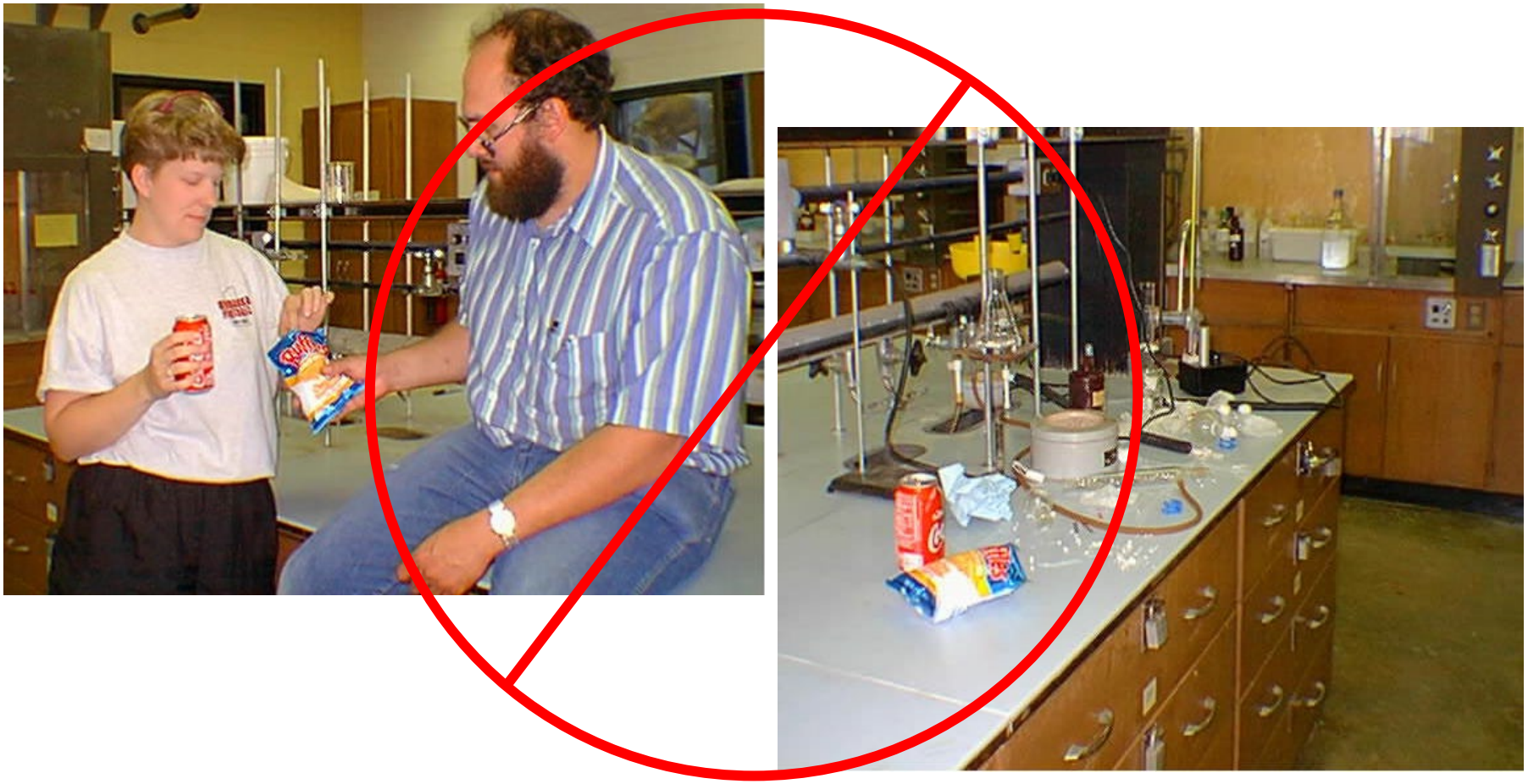
# Eye protection and gloves are mandatory for all chemical operations at LLE

**Don’t spread contaminants. Remove gloves before touching keyboards, telephones or door handles**

**Glove holding sample**

**No Glove on door handle**

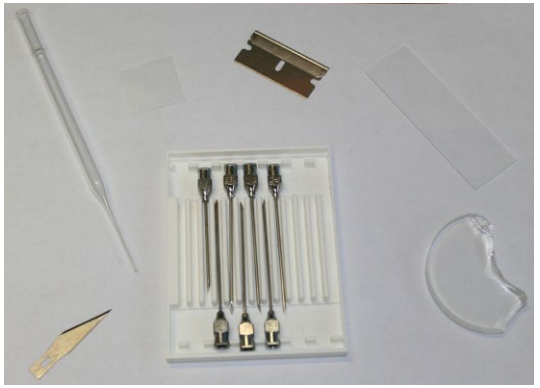
# Food and beverages are prohibited in laboratories



**Strictly prohibited by governmental, UR, and LLE regulations and guidelines!**

# Contact with “sharps” can result in serious injuries

- Razor blades/scalpels
- Broken glass items (including optics)
- Syringe needles (new or used)
- Microscope slides
- Pipettes

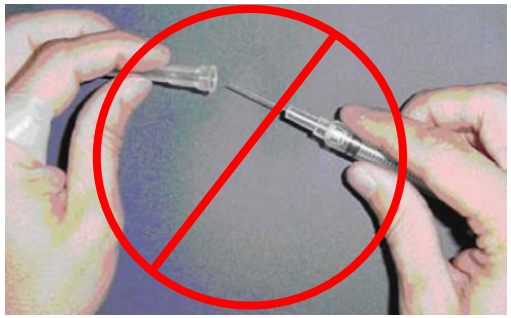


- Use ***non-biohazard*** sharps containers (small items) or glass disposal boxes




**NEVER put sharps or glass items in the regular trash!**

# Syringe needles should *NEVER* be bent, sheared, or re-capped using two hands - either during use or before disposal



- ***Serious or possibly fatal exposure could occur, depending on the material contained in the syringe or needle***
- **Alternative: one-handed "scoop" technique**
  - **place needle cap on table**
  - **hold syringe only, guide needle into cap**
  - **lift syringe so that cap is sitting on needle hub**
  - **secure needle cap in place**
- **Better: use a safety needle**
  - **mechanism to blunt or cover the needle after use**
  - **one-handed operation**

# Many waste materials are designated as “hazardous”

- **Batteries** *(toxic, corrosive, reactive)*
  - **lead-acid, mercury, NiCd, NiMH, Li+, AgO**
  - ***alkaline and carbon batteries may be disposed of in the regular trash***
- **“Sharps”** *(toxic)*
- **“Universal wastes”** *(toxic)*
  - **mercury-containing items (lamps, bulbs, switches, electronics, pressure/vacuum monitors, thermostats)**
- **“E-waste”** *(toxic )*
  - **computers, power supplies, electronics, circuit boards, lasers**
- **Beryllium and other powdered metals** *(toxic, ignitable)*
- **Aerosol cans** *(ignitable, corrosive, toxic)*

**Contact your the Safety Office to assist with disposal of hazardous wastes**

# Know what to do if a chemical exposure occurs

**Touching, breathing or ingesting harmful chemicals can result in varying symptoms with different degrees of danger.**

- **Mild reactions can include tearing of the eyes, burning sensation of the throat, nose, chest, or skin**
- **Severe reactions can include coughing, wheezing, dizziness, and even death**

**For ingestion or other serious exposures, *immediately*:**

- **Alert the LLE Medical Response Team (by calling LLE reception)**
- ***And* call Poison Control *1-800-222-1222***

**For eye or skin exposure:**

- **Flush exposed area for 15 minutes**

**For inhalation exposure:**

- **Move victim to fresh air**

***Report all chemical exposure incidents to a Chemical Safety Officer, and the Chief Safety Officer***

# Summary

- **LLE's Safety Officers and Subject Matter Experts (SME) are available to discuss any questions or concerns you have about safety policies and practices at LLE**
- **Workers who engage in laboratory activities at the Laboratory for Laser Energetics (LLE) need to understand and follow site-specific safety policies**
- **All workers must read and follow instructions on signs when entering a laboratory space**


**Email the Safety Office to report completion of this training**