RISK ASSESSMENT FORM

Use this form to assist you to complete risk assessments for hazardous activities and processes[1]. Any serious or ongoing hazards should be reported via RiskWare to ensure that appropriate corrective actions are tracked and completed.

Faculty/School:	Faculty of Science, School of Physics	**Initial Issue Date: 16/05/2023** **Next Review Date: 16/05/2024**
Risk Assessment Reference Number:	01/23	
Risk Assessment Name:	Kickstart Physics 2023 – General Risk Assessment	
Prepared by:	Gabriel Ha Nguyen, Senior Science Communicator (Chemistry, Physics & Geosciences)	
Responsible supervisor/s:	Kristin Anderson, Head, Partner Engagement & Outreach, Faculty of Science	

Identify the activity and the location	**Identify who may be at risk** This might include fellow workers, students, visitors, contractors, patients, research participants and the public
Activity or process: Kickstart Physics workshops, covering the following modules in the HSC Physics syllabus: Module 5 – Advanced Mechanics (AM) Module 6 – Electromagnetism (EM) Module 7 – Nature of Light (NoL) Module 8 – From the Universe to the Atom (U2A)	**Persons at risk**: Staff – Casual academic demonstrators running workshops; technical staff working in the laboratory; professional staff running/managing workshops External – High school students & teachers attending workshops
Location: Second Year Laboratory, Room 419, School of Physics A28 Physics Lecture Theatre, Room 424, School of Physics A28 - U2A only	**Risk assessment team** (who was consulted?)**:** Gabriel Ha Nguyen, Liam Chalmers-Giddy, Max Mackenzie, Brian Ford, Eugenia O'Brien, Kristin Anderson

List of Legislation, Code of Practice, Australian Standards, Guidance Materials used to determine control measures
Work Health and Safety Act 2011 University of Sydney Cyrogenic Liquids Infosheet University of Sydney Working with Gases Guide Safety Guide: Use of Radiation in Schools, Radiation Protection Series No. 18 National Directory for Radiation Protection – 2nd Edition Radiation Control Act 1990 Radiation Control Regulation 2013 AS/NZS IEC 60825.14 Safety of Laser Products Part 14: A User's Guide School of Physics Risk Assessments and HIRACs

Risk Assessment Methodology
Assessing the risk is a brainstorming exercise, which is most effectively carried out in a team environment with the people required to complete the activity or process. Most activities or processes are broken down into a variety of separate tasks. For each task, consider the hazards, the potential harm or negative outcomes and the conditions required for those negative outcomes to occur. Whenever assessing the health and safety risks associated with a task, always consider the following primary risk factors. • The **physical activities** required to complete the task e.g. repetitive movement, high force, physical exertion, awkward posture • The **work environment** e.g. lighting, layout, traffic flow, ventilation, access to support (isolation)

[1] This tool should also be used to assess the risk associated with clinical activities. Information gathered will be used to guide the classification of clinics in accordance with the University's Health Clinics and Clinical Services Policy and Procedures 2020.

- The **nature of the hazard itself** e.g. working with chemicals, microorganisms, radiation, use of plant and equipment, sharps, working with potentially aggressive clients, patients or research participants
- The **people involved**, e.g. level of training, supervision, experience, health, age, physical capacity.

The information gathered from the **risk assessment** process must be used to develop a **Safe Work Procedure (SWP)** or **clinical protocol** for the activity.

Task or scenario	**Hazard/s**	**Associated harm,** e.g. what could go wrong?	**Existing Risk Controls**	**Current risk rating** Use the Risk Matrix	**Any additional controls are required?**[2]	**Residual risk rating** Use the Risk Matrix
General						
Moving around the laboratory	Trip hazards from stools, bags, etc.	Physical injury from falling and landing, e.g. bruises and headknocks	Bags are placed in one section of the laboratory and retractable barriers are placed to limit access during workshops. Students are told to use stools appropriately and to place them under benches when not in use to remove them from walkable pathways during workshops.	Low		Low
Using electrical equipment	Faulty equipment	Potential electric shock from faulty equipment Exposure to moving parts	All electrical equipment used in the program are to be tagged and tested as part of the regular yearly checks conducted by the University. Equipment is to be inspected before each use. If inspection identifies a fault, equipment is to be removed from use and replaced with working equipment. Power points are to be checked; power boards will not be overloaded during use.	Medium		Medium
Emergency evacuation	Depends on the nature of the evacuation	Depends on the nature of the evacuation	In the case of an emergency on University grounds, the alarms will sound and the guests will be directed to the appropriate emergency evacuation point. Staff to familiarise themselves with the nearest evacuation meeting point using the map in the laboratories/lecture theatres.	Low	Emergency controls	Low
Multiple items on benches, stools in labs	Items can fall to the ground and break, causing trip hazards	Tripping and sustaining injuries from a fall	All equipment will be placed towards the back of the bench towards the wall. Where this is not possible, equipment will be monitored by a demonstrator or supervisor at all times.	Low	Emergency controls	Low

[2] Always consider whether it is possible to eliminate the hazard or hazardous task altogether. If this is not possible, refer to the hierarchy of risk controls.

		Potential metal/plastic/glass shards may cut those who land on it				
Module 6 – Electromagnetism						
Capacitor	Heavy item falling	Injury from object landing on a person	Capacitor to be placed on the bench towards the back of the wall. Students can only handle the capacitor at that location and are not allowed to move it from that location to minimise risk of falling.	Low		Low
Lenz's Law - Falling Magnets - Jumping Rings - Pendulum	Magnets dropping to the ground Rings launched from apparatus Metal plate swung through strong magnets	Magnets snapping together, breaking apart and leaving shards which can cut Rings hitting people after launch Metal plate swinging into people and hitting them	Magnets to be kept apart from each other by separating experiments with magnets from each other. Students dropping magnets will drop them into a plastic tray with foam base to reduce chance of magnets hitting other metal/magnets. Students to be guided through the use of the jumping rings apparatus by the demonstrator, with the demonstrator supervising the students while the apparatus is being used. Pendulum setup is to be placed away from other experiments to reduce crowding and thus reduce chance of metal plate hitting students	Low		Low
Transformers	Light bulb breaks	Glass shards cutting skin and causing bleeds	Light bulbs are to be inspected before use to ensure their integrity. Bulbs replaced when needed. Appartus to be placed well away from edge of table to reduce falling risk, thus reducing risk of light bulb breaking	Low		Low
Applications of EM	Coke can acting as rotor for induction motor	Sharp edges causing cuts	Edges of aluminium where the can was cut is filed down to reduce sharpness. Edges of aluminium taped over to reduce exposure to shar edges.	Low		Low
Module 7 – Nature of Light						
Hertz's Radio Waves	Rope spinning around to demonstrate standing waves	Collision with other objects causing them to fall down Students tripping over rope while being swung	Rope spinning to take place away from any pieces of equipment to minimise risk of collision with other objects. Students to move away from the location of rope spinning while it is taking place.	Low		Low

Single & Double Slit Experiment	Laser	Eye damage from staring into the emission point of the laser	Laser designed to emit at power level of Class 3R or lower (<5 milliwatts). Laser designed to be encased in safety box to reduce accidental eye exposure. Laser pointed away from the main laboratory space and directed to a laser viewing screen or wall that reduces scattering. Demonstrator to only keep laser on for as long as necessary to run the experiment to reduce accidental exposure opportunities	Low		Low
Photoelectric Effect	Electroscope demonstration UV light source	Students slapping rubber balloon too hard, potentially bruising or cutting themselves during action UV light source exposure due to misdirected/reflected UV light	Perspex sheet to be placed on table with rounded edges to remove sharp edges. Students to be shown appropriate method to strip electrons from the rubber balloon to the Perspex surface to reduce chance of injury Only demonstrators will have access to the UV light source. Torches will only be directed towards electroscope plate only. Torches will be switched off immediately after use and. Students will be advised not to use the torches. Demonstrators will inform students not to move into the path of the torch light.	Low		Low
Light & Special Relativity	Spinning wheel with whiteboard demonstration	Whiteboard flying off, hitting students or equipment	Students will be directed not to spin the wheel. Demonstrators to remove wheel from student's reach once demonstration ends.	Low		Low
Module 8 – From the Universe to the Atom						
Electron Properties	Oil Drop Analogue – Large water tubes	Water can spill from the tube, causing slip hazards and minor flooding	Experiment is to be conducted in a room without carpet or absorbent material to enable easy cleaning of spills. Water tubes are located in an individual tub to contain water spills from the top of the tube. Tube is to be filled with water only at the start of the workshop. Two people are required to lift the tube to pour the contents of the tube out via the sink in the room.	Low		Low

			Demonstrators to guide students through the experimental process in a way that reduces water spillage during the experiment.			
Spectrum of Hydrogen	Glass gas discharge tubes Discharge tube holder	Glass may break, causing vapours to be released into the atmosphere Discharge tube holder runs at a high voltage and current	Tubes to be inspected before and after use for any signs of damage. Inbetween uses, tubes are to be placed in bubble wrap and original packaging to protect them. Students are isolated from the discharge tube holder, with only the demonstrator allowed to exchange the tubes and turn the device on and off. Device is only allowed to be run for 30 second at a time maximum with a minimum of 30 seconds off between uses to minimise potential damage to the tube.	Low		Low
Mass Defect	Radioactive sources – exposure to ionising radiation	External irradiation of the body Internal radiation of the body	Sources are sealed into a Perspex slide with epoxy resin and are thus considered sealed sources. Sources provided by the Second Year Physics teaching laboratory. Source activity and half-life are as follows: - Cobalt-60: 1μC; 5.26 years - Caesium-137: 5μC 30.05 years Source activity are of levels considered exempt from authorisation or registration requirements if used for teaching the characteristics and properties of radiation or radioactive sources (<200 kBq for both Cobalt-60 and Caesium-137). Sources are checked before and after each use for defects in the slide. If slide is damaged, the source is isolated and no longer used. Sources will be handled with tongs or tweezers via the edge of the slide to minimise direct exposure to the radioactive source. Only one source is to be used at a time. Source is directed towards the Geiger counter used in the experimental demonstration.	Low		Low

			When unused, sources are to be kept in the plastic/lead packaging it was transported within. Sources are never to be pointed directly to the skin/eyes. Sources are to be inspected after each use in the experiment to ensure containment.			
Liquid Nitrogen – Wilson Cloud Chamber (Module 8) and Superconductors (Bonus, Module 6)						
Liquid nitrogen	Decanting and use of liquid nitrogen to cool experiments	Frostbite/burns Asphyxiation Muscle or skeletal injury	All activities are to be done in a well-ventilated area. Before decanting, staff member is to calculate the potential risk of asphyxiation in the case where the entire dewar is spilt (10 L). Rough calculations can be used with 1 L of nitrogen liquid will displace 1 cubic metre of air from the surrounding space, so 10 L will displace 10 cubic metres. Minimum oxygen content in the air is 19.5%, so to ensure safety, liquid (L) to room (m^3) ratio of 1:7 reducing oxygen content by 3% will be used for calculations; 1:10 for 2% and 1:20 for 1%. Staff member to use this rough calculation to determine whether space is well-ventilated enough for use of liquid nitrogen. PPE is to be worn by all staff decanting liquid nitrogen. This includes cryogenic gloves, face shield, long trousers, and enclosed footwear. Students are kept away from all experiments using LN2 while the liquid nitrogen is being decanted. Once decanted, students are reminded of the safety requirements regarding LN2 and an exclusion zone is placed around the dewar containing LN2. Students are not to handle anything containing LN2 directly, and if required to engage with the experiments cooled with LN2, appropriate PPE will be required.			

Implementation of Additional Risk Controls				
Additional controls needed	**Resources required**	**Responsible person**	**Date of implementation**	**RiskWare Reference**
Write the Safe Work Procedure (SWP) or clinical protocol for the relevant activity	Time (approx 1 hour)	Supervisor		N/A
Education and training for workers to complete process in accordance with SWP	Time – supervisor and workers	Supervisor		N/A

List emergency controls

These might include how to deal with fires, spills, emergency shutdown of equipment, exposure to hazardous materials and adverse reactions or the deteriorating condition of a patients/research participants in our care.

At the University:
Staff will follow evacuation procedures as provided by the School of Physics. In case of an emergency evacuation, ensure that workstations are safe and left such that there is no risk of spillage, move to the evacuation point.

Follow firefighting protocol in case of fire.

In the event of a spill:

1. Isolate the affected area.
2. Stop the transfer of liquid nitrogen.
3. Leave the room immediately.
4. Allow room to ventilate by leaving door/windows open.
5. Prevent entry into the room/area until spill has evaporated.
6. If major, consider exposure to adjoining areas and corridor; clear areas and prevent re-entry if required.

In the event of a spill that leads to contact with a bodily part:

1. For eyes, there is a risk of cold burns: Immediately flush with tepid water or with sterile saline solution. Hold eyelids apart and irrigate.for 15 minutes. Seek medical attention
2. For skin; Remove contaminated clothing and gently flush affected areas with warm water (30°C) for 15 minutes. Apply sterile dressing and treat as for a thermal burn. For large burns, immerse in warm water for 15 minutes. DO NOT apply any form of direct heat. Seek immediate medical attention.
3. Seek medical attention.
4. Notify laboratory staff.

In the event of a medical emergency:
1. Call Triple Zero (000) and ask for an ambulance
2. Contact the closest first aider
3. If the person is unconscious, send for the closest Automated External Defibrillator (AED)
4. Call Campus Security on 9351 33333

REVIEW			
Scheduled review date	**1 year**	**2 years**	**3 years**

Are control measures in place (YES/NO)			
Are controls eliminating or minimizing the risk (YES/NO)			
Are there any new problems with the risk (YES/NO)			
Reviewed by:			
Actual Review date:			

Risk Matrix.

			Potential Consequences				
			Class 3	Class 2	Class 2	Class 1b/1c	Class 1a
			Minor injuries or physical discomfort. Short-term psychological impact (isolated or one-off event).	Injury or illness requiring medical treatment and/or short-term impairment (less than 2 weeks). Psychological impact requiring support.	Injury or illness requiring hospital admission and/or temporary impairment (less than 6 months). Psychological impact requiring medical treatment.	Injury or illness (physical or psychological) resulting in long-term or permanent impairment (more than 6 months). Injury or illness resulting in temporary impairment to multiple people.	One or more fatalities. Injury or illness resulting in long-term or permanent impairment to multiple people.
			Insignificant	**Minor**	**Moderate**	**Major**	**Severe**
Likelihood	Expected to occur regularly under normal circumstances	**Almost Certain**	**Medium**	**High**	**Very High**	**Very High**	**Very High**
	Expected to occur at some time	**Likely**	**Low**	**Medium**	**High**	**Very High**	**Very High**
	May occur at some time	**Possible**	**Low**	**Medium**	**Medium**	**High**	**High**
	Not likely to occur in normal circumstances	**Unlikely**	**Low**	**Low**	**Medium**	**Medium**	**High**
	Could happen, but probably never will	**Rare**	**Low**	**Low**	**Low**	**Medium**	**Medium**