**Risk Assessment Form**

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| Title of Assessment | Risk Assessment for Superconductivity & Magnetism Group Labs | | | Date of assessment | | 01/10/2019 |
|  |  |  | | Date for review | | Continuous |
| Department | Department of Physics | | |  | |  |
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| Descriptions of Activities | General Risk Assessment for the lab equipment to be used in the PhD project of Sam Curley. | | | | | |
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| Name of those working to this assessment | Sam Curley | | Any others who may be affected by this assessment | | Other users of the lab. | |
| Assessment carried out by | Sam Curley | |  | | | |
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| Additional information |  |

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| **Foreseeable Significant Hazard** | **Existing control measures** | **Controlled residual risk** | **Further Action** where risk remains moderate/high | **By whom & when** | **Controlled Risk Level** |
| **Cryogens – Filling Nitrogen Dewar - Cold burns** | Will receive training. Use appropriate PPE. Avoid contact with gas/liquid/cold surface. | High | Training received. | User | Low |
| **Cryogens - Filling Nitrogen Dewar – Asphyxiation** | Will receive training. Fill in well ventilated space and if filling via the inside Nitrogen filling station it is important to regularly check the Oxygen meter on the wall of the filling station. | Very High | Training received.  No unauthorised out of hours work & vent the space safely (if possible) should Oxygen level begin to fall. | User & nearby individuals. | Low |
| **Cryogens – Filling VSM or PPMS - Asphyxiation** | Will receive training. Ensure rooms are well ventilated. | Very High | Training received.  No unauthorised out of hours work & vent the space safely (if possible). | User & nearby individuals | Low |
| **High Magnetic Fields – Individuals with pacemakers/metal implants** | Warning signs put up at entrance to high magnetic field area. | Very High | Notify individuals of the presence of strong magnetic field and its inherent dangers. | User & nearby individuals. | Low |
| **High Magnetic Fields - Struck by magnetisable object** | No magnetisable objects near the high magnetic fields. | Moderate | Check in the vicinity of the magnet for magnetisable objects prior to sweeping the magnetic field. | User & nearby individuals. | Low |
| **Electrical Equipment – Electrocution/Burns** | Don’t tamper with equipment. Equipment should be PAT tested. | Moderate | Check for PAT test sticker and obvious signs of damage to equipment before use. | User | Low |
| **Handling Samples – poisoning or irritation.** | Use appropriate PPE when working with samples. Don’t ingest and minimise contact time. Wash hands after handling. No food or drink near samples. | Minor | Samples handled on surface that can be safely disposed off after handling; i.e. samples laid out on paper/kimchi wipe. | User & nearby individuals. | Low |
| **Chemicals within Labs - poisoning, irritation and burns.** | Use appropriate PPE when handling chemicals. Don’t ingest and minimise contact time. Wash hands after handling. No food or drink near samples. Check required COSHH form when using chemicals. | Minor | Chemicals well labelled, easily seen and stored away from surface edges to avoid spillages. Chemicals returned to storage area once task is complete. | User & nearby individuals. | Low |
| **Soldering – Burns** | Use soldering iron at appropriate station and re-holster when not directly soldering. Don’t get too close to fresh hot solder. Avoid contact with the hot end of the soldering iron. | Moderate | Ensure the working space is cleared of clutter and there is adequate room to perform the solder. Avoids getting into awkward positions where accidental burns may occur. | User | Low |
| **Soldering – Inhalation of poison vapour** | Solder in a well-ventilated area. Use PPE i.e. face mask, if appropriate. Only solder small components. | Low |  | User | Low |
| **Soldering – Solid solder can get into or on skin and be harmful.** | Wash hands after using the soldering iron. No food or drink near the soldering workspace. | Low |  | User | Low |
| **Soldering – electrical faults – the irons are particularly susceptible to damage due to hear/strain** | Don’t use soldering irons with damaged cables. Keep apart the tip from the cable. | Moderate | Check for obvious damage before use.  Notify appropriate staff members if the soldering iron appears to be damaged. Ensure no other individuals use damaged soldering iron. | User | Low |
| **Heat gun – Burns and risk of fire** | Do not aim at individuals or flammable objects. Use as directed. | High | Check appropriate ‘empty-space’ is left behind object the heat gun is directed at. | User & nearby individuals if fire began. | Low |
| **Evacuable Pellet Die – Components fail at high load, impact from component, inhalation of fine powder and potential poisoning** | Will be trained before use. Don’t tamper with equipment. Use appropriate PPE and close press door upon compression. Minimise exposure to powders and read all relevant sample safety guides. | High | Training received. | User | Low |
| **Use of movable steps - Slips and falls** | Brake should be on when platform is in use. Platform should be dry and position in a way to avoid over reaching when it is in use. | Low |  | User | Low |
| **Use of sharp tools – Cuts** | Focus on the activity at hand when using sharp tools. Make sure the work bench is not cluttered. Keep sharps in a safe place, i.e. covered or in a box, when not in use. Dispose of in correct sharps bin. | Low |  | User & individuals with access sharps area. | Low |
| **Ionising Radiation – Exposure to radiation & electrical hazards.** | Will receive training before use. System will have appropriate radiative shielding in place. Radiative areas are clearly marked. All equipment to be made fail-safe with an interlock system and indicate when radiation source is ‘on’. Technicians regularly check the equipment for faults. Don’t tamper with the equipment. | Very High | Ionising radiation safety and training course completed. | User & Individuals near the radiative source | Low |
| **Quantum Design MPMS 1.2 GPa pressure cell** | Appropriate PPE to be worn i.e. pressure safety glasses when working with the cell. When applying pressure to the cell, do not stand in front of the tips of the cell and apply pressure incrementally as advised in the manual. Cell to be kept in a closed metal container when removed from SQUID and under pressure. | Very high | Notify individuals in the area that pressure cell work is underway. When cell in SQUID put a warning label on the SQUID so untrained users don’t remove and harm themselves or damage the cell. | Users & nearby individuals. | Low |
| **Laser exposure – ruby spectrometer**  **(normal use)** | Laser equipment only to be used to used by authorised and trained personnel. Laser enclosure prevents accidental exposure. Enclosure output: 1mW, 532nm. Class 2 laser. Users to review risk assessment for dedicated to this laser set up. Opening enclosure and defeating interlocks makes laser Class 3b which is done during re-aligning. See below. | Very high | Clear signs to inform of users and nearby individuals of laser class and usage. Do not stare directly into beam. | User | V Low |
| **Laser exposure – ruby spectrometer**  **(alignment)** | Laser equipment only to be used to used by authorised and trained personnel.  Requires opening enclosure and defeating interlocks to align internal optical components. | Very high | Clear signs to inform of users and nearby individuals of laser class and usage. Do not stare directly into beam. Safety goggles to be worn during alignment. Lab blinds close to deny beam exit from lab. Sign placed on closed lab door indicating individuals to knock and wait to be granted entry. | Users trained and authorised to operate laser. All other individuals to vacate the area. | V low |
| **Diamond anvil pressure cells – mechanical failure under load** | Safety goggles to be worn upon applying load to the cell to increase the internal sample chamber pressure. Authorised users only. | Low | Only trained users present when loading the cell. | User and personal in lab during loading. | Low |
| **Piston cylinder pressure cells – mechanical failure when under load** | Safety goggles to be worn upon applying load to the cell to increase the internal sample chamber pressure. Authorised users only. Piston (long cylinder) axis not to be pointed at individuals at any time, especially at an individual’s head. | Very high | Only trained users present when loading the cell. Two users present when loading cell. | Users | Low |
| **Manuel hydraulic ram – catching body parts between surfaces under load** | Ram guard plates must be in place when the ram is under load.  Keep hands etc out of enclosure whilst loading.  Specifically trained and authorised users only. | Very high | Only trained users present within the lab when the press is working under load. | Users | Low |

**Work should not be carried out until the assessment is completed to a suitable & sufficient level and all required control measures are in place.**

Is assessment suitable and sufficient Yes

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| Any further actions required to allow work to commence | | * Chemical Handling training (Passed online training) * Fume cupboards training * Gas Cylinder training * Mechanical workshop, load handling and manual handling training * Electrical & Safety training | | |
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| Approved By | Paul Goddard |  | Position | Project supervisor. |
| Date | 03/10/2019 |  |  |  |

Please print a copy, sign it and keep for your records

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|  | **Severity of injury** | | | | |  |  | |
| **Likelihood** | **Superficial** | **Moderate** | **Serious** | **Major** | **Extreme** |
| Unlikely | **Very low** | **Very low** | **Low** | **Low** | **Moderate** |
| Possible | **Very low** | **Low** | **Low** | **Moderate** | **High** |
| Likely | **Low** | **Low** | **Moderate** | **High** | **Very high** |
| Very likely | **Low** | **Moderate** | **High** | **Very high** | **Very high** | **Overall Risk Rating** (highest level found) |  |
| Extremely likely | **Moderate** | **High** | **Very high** | **Very high** | **Very high** |

*See ‘Matrix for risk evaluation’ for further guidance.*