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Risk Assessment for CMS VPT Test Rig area

The CMS 1.8T VPT test rig is situated in building 5.2, in an area shared with the PPD proton test beamline. Access to the outside is by a normal door, or a large folding door. Other doors give access to the main ISIS building and control room and to an emergency exit, so that entry and egress is assured.

The principal task carried out in the area is the testing of Vacuum Phototriode devices (simple photomultiplier tubes) in a 1.8T magnetic field provided by a large water-cooled electromagnet.

The hazards present in the test rig area are as follows:

- Exposure to ionising radiation. The test procedure itself does not involve radiation, but the test rig is located in a controlled area, and only film badge holders are permitted to enter the experimental hall. The fenced area immediately outside the external door is exposed to X-rays.

- Stray magnetic field from the 1.8T magnet, causing a risk to users of heart pacemakers, and making the use of ferromagnetic handtools hazardous.

- The operation of electrical equipment at high voltages up to 1200V, leading to a risk of electric shock and physical injury.

- The magnet power supply, which can provide DC power up to 200V and 500A. The magnet busbars and cooling pipes are shielded by a perspex screen, but a shock hazard is present if hands or tools are inserted behind the screen.

- Normal mains-operated equipment, giving a risk of electric shock.

- Remote operation of the rig. The test rig is computer-controlled, and can begin operating at any time, even if no operator is present in the experimental area, leading to a risk of physical injury or electric shock to anyone working on the rig.

- The metal framework of the test rig leads to a risk of physical injury for those working nearby.

- The use of hand tools, leading to a risk of physical injury.

- Soldering of electrical components, leading to a risk of burns and exposure to fumes from the flux used in soldering.

- Storage and operation of nitrogen gas cylinders. The experimental hall is sufficiently large that there is no risk of asphyxiation, but the cylinders are heavy, leading to a risk of physical injury when they are handled, and high-pressure regulators can fail.

- Cables linking equipment to the data acquisition system, causing a risk of tripping.

- A void under the floor close to the test rig, covered by a trapdoor, causing a falling hazard when the trapdoor is open. When closed the trapdoor could collapse if its load-bearing limit is exceeded by heavy objects or vehicles.

- Pallet trucks and fork-lift trucks. These are occasionally used by other groups in the experimental hall, and their use will increase when work starts for the installation of the MICE experiment.

- A gantry crane is present in the experimental hall, leading to a risk from falling objects.

Good working practices should ensure that the risks associated with these hazards are minimised. Particular points to note are:

1. All relevant regulations governing ionising radiation must be followed at all times. In particular, visitors must not be allowed access to the experimental hall without a film badge; temporary badges may be obtained from the ISIS control room.

2. The test rig area should be kept tidy to reduce the risk of injury through tripping.

3. Access to doorways must be kept clear at all times.

4. Cables should, where possible, be protected and secured.

5. The stray field from the 1.8T magnet poses a risk to users of heart pacemakers. The magnet area is fenced off and clearly signed to prevent inadvertent exposure to the stray field. In addition, ferromagnetic tools should not be used or left near the magnet unless the magnet power supply is off.

6. All high-voltage power supplies used in the test rig area are current-limited to reduce the risk of electric shock. The main risk from these power supplies is of physical injury arising from the uncontrolled recoil of the hands after accidental contact with the HT terminals. The test rig area is clearly signed to indicate that high voltage equipment is in use.

7. The magnet power supplied must be turned off (not just ramped down to nominal zero volts) before working close to the busbars or cooling pipes behind the perspex screen. A notice to this effect must be displayed prominently on the magnet.

8. Hand tools should only be used by persons conversant with their proper use, or by others supervised by such a person. Appropriate protective equipment should be used.

9. Since the rig can be operated remotely, it is essential that the HV system be turned off manually before working on exposed contacts. For the same reason, the stepper motor must be powered down before working close to the motor or drive belts.

10. Any work which involves exposed mains or high-voltage terminals should not be carried out while working alone.

11. The gantry crane must only be operated by qualified persons. When not in use it must be locked and parked at the opposite end of the experimental hall from the test rig.

This concludes the general assessment of the R5.2 CMS Test Rig area. Provided that the above comments are noted and all warning signs obeyed, then no serious risks are associated with working in this area.

Additional Rutherford Appleton Laboratory safety documents whose recommendations must be followed in respect of work in this area are:

RALSC3	Electrical Safety
RALSC8	Use of portable equipment
HSN3	Apparatus left running during silent hours
HSN20	Radiation protection
HSN29	Fire prevention
HSN41	Safety of Visitors
HSN47	Personnel working alone

GENERAL Signs and warnings