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## Radiation Shielding calculations using MCNPX transport code for cost optimization of the shielding material to be used in the new cyclotron vault at iThemba Labs

*Thursday, 14 July 2011 17:00 (2 hours)*

Ion Beam Applications (IBA) commercial cyclotron (IBA Cyclone 70) with capability of accelerating protons up to 70MeV and 350 $\mu$ A of current is to be constructed at iThemba Labs to increase the capacity of the current facility. The two opposite simultaneous extraction of beams using the Carbon foil stripper, enable for the concurrent production of radioactive ion beam (RIB) for nuclear research and isotope production. This high energy beam is expected to have losses of about 10% of particles of concern are neutrons and photons formed during proton beam interaction. Bremsstrahlung x-rays (photons) could be from proton acceleration and neutrons could be produced by (p, n) reactions. Photons and neutrons are not easy to shield. There is a need to simulate the radiation transport using MCNPX transport code so that the levels of doses can be investigated to provide extra safety cautions and adequate selection of materials and correct dimensions for shielding walls to keep the dose rates at acceptable levels. Additionally, water in the cooling system as it consists of Hydrogen isotopes that can react with protons to produce neutrons will also be investigated as it will increase the neutron flux into the vault.

**Level (Hons, MSc, &nbsp; PhD, other)?**

MSc

**Consider for a student &nbsp; award (Yes / No)?**

Yes

**Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?**

Yes

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