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The Case for an Underground Neutrino Facility in South Africa

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Experiments in physics, Astro-particle physics and cosmology that require careful shielding against cosmic rays includes dark matter searches, studies of radioactive decays, and neutrino detection experiments. The need for such shielding has motivated the construction of laboratory caverns in mines and adjacent to tunnels under mountains. There are currently about a dozen such laboratories, in existence or under construction, all in the Northern Hemisphere. A motivation has been made for the establishment of a Southern Hemisphere facility. In this paper a feasibility study of measurements of radon in air (using electret ion chambers and alpha spectroscopy), background gamma ray measurements (inside/outside) the tunnel using scintillator (inorganic) detectors, cosmic ray measurements using organic scintillators and radiometric analyses of representative rock samples for the establishment of such a facility in the South Africa is presented. Keywords: Underground laboratory, Neutrinos, Gamma ray, Radon, Dark matter, Background