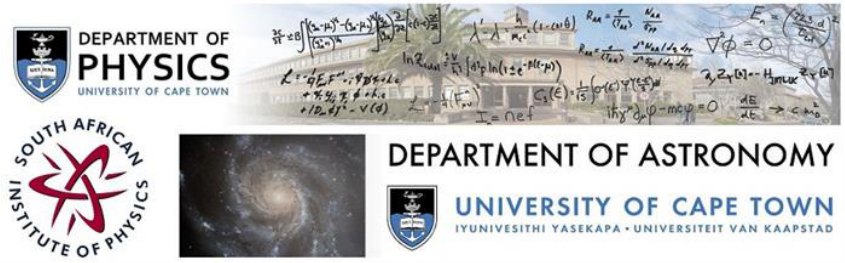

Contribution ID: **508** Type: **Poster Presentation**

MCNPX based Radiation Shielding Analysis for the Mineral-PET Kimberlite Sorting Facility

Wednesday, 6 July 2016 16:10 (1h 50m)

Abstract content
   (Max 300 words)
Formatting &
Special chars

Radiation shielding analysis and optimization calculations have been performed to design a shield for the mineral-PET (Positron Emission Tomography) facility. PET is a nuclear imaging technique currently used in diagnostic medicine. The technique is based on the detection of 511 keV coincident and co-linear photons produced from the annihilation of a positron (produced by a positron emitter) and a nearby electron. The technique is being developed for the run-of-mine detection of diamonds in Kimberlite rock. In the technique, a 40 MeV electron beam irradiates a bremsstrahlung target, producing a photon beam which irradiates the candidate rock to activate the naturally occurring 12C, thus producing a positron emitter 11C isotope via the photo-nuclear (γ,n) reaction. The resultant high intensity and high energy radiation (including both photons and neutrons) field requires appropriate shielding to protect personnel, equipment and the environment around the facility. Calculations to simulate the radiation field and to optimize the required shielding materials and their geometry were done using a Monte Carlo based radiation transport code, MCNPX-2.70. The optimized shield configuration as well as the associated neutron and photon dose rates on the personnel side of the shield are presented.

Apply to be
 considered for a student
   award (Yes / No)?

No

Level for award
 (Hons, MSc,
   PhD, N/A)?

N/A

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

Yes

Please indicate whether
this abstract may be
published online
(Yes / No)

Yes

Primary author: Mr CHINAKA, Eric (UJ & NECSA)

Co-authors: Mr VAN ROOYEN, Johann (Necsa); Prof. CONNELL, Simon (University of Johannesburg)

Presenter: Mr CHINAKA, Eric (UJ & NECSA)

Session Classification: Poster Session (2)

Track Classification: Track F - Applied Physics