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Seminar

Institute for Plasma Research

Title : Impact of Cosmic Rays in Real Life

Speaker: Dr. Kajal Garg

Dayalbagh Educational Institute, Agra

Date : 13th May 2022 (Friday)

Time : 03.30 PM

Venue : Online - Join the talk:

https://lobby.ipr.res.in/Dr.KajalGarg_PDFTalk

Abstract :

This talk will discuss the shielding effect of primary cosmic rays on astronauts during space mission. The aim for this simulation was to find a low cost and an effective material for make the shielding for the astronauts to protect them from the primary cosmic rays in the space. Poly materials are found to be the best material for the shielding as it has high hydrogen (H) and low atomic number (Z). High H leads to fragmentation of the heavy GCR particles into small fragments and low Z produces maximum number of secondaries. It is observed that equivalent dose is minimum (107 siver) for Polystyrene as compared to the other material. The application of muon tomography in imaging the dry storage container to detect the high radioactive material inside it have also been studied with the simulation. For this a dry cask container has been designed in Geant4, inside which UO₂ rods have been placed and on varying the number of rods the muon multiple scattering has been observed. This shows that when the dry cask is completely filled with the rods, muon scattered to the maximum angle and if the dry cask is empty, the muon will pass through it straightly without getting scattered. Muon with energy of 3 GeV losses 3.64 MeV/c energy in concrete and the scattering angle was found to be 4.14 mrad whereas the radiation length was 10.91 cm. These calculations have been done for Iron, Lead and Uranium also. For concrete these calculations are further extended to muon of energy ranging from 3 GeV to 10 GeV. The nuclear waste is hard to identify and it's not possible to look for all possible scenarios to identify the nuclear waste. Muon tomography has come out to be the best solution for characterizing the nuclear waste.
