

Improvised Explosive Devices and cosmic rays

Friday 16 July 2021 19:18 (12 minutes)

Homemade antipersonnel mines are improvised explosive devices (IED) deployed from unconventional local techniques and materials. IEDs kill thousands of civilians every year, inflicting grievous physical injuries, spreading fear and disruption across affected communities. Colombian mines, made of a combination of ammonium nitrate and fuel oil known as ANFO, may also pack faeces, glass, and plastic scrap for causing infectious diseases on the victims. Therefore, the detection and dismantling of such harmful devices must alleviate the insidious consequences of the internal conflicts that have plagued the country for more than half a century. In this work, we present results that suggest that cosmic rays can be used to detect the type of IED used in Colombia. We implement a GEANT4 simulation of an ANFO sphere of NH_4NO_3 +diesel interacting with cosmic rays flux at the Bucaramanga level (959 m a.s.l.). Simulations considered the IED buried into different soil types: dry soil model, two humid soils, and two fertilized soils. The simulation showed that the studied interaction generates emerging electrons, gammas, neutrons, and protons. Notably, in the IED-soil interaction, protons' energy led to an excess of around 0.58 MeV. This peak is quite pronounced for all soil models, giving a clear indication of the feasibility of using a cosmic ray-based detector for detecting these IEDs in the different types of soils.

Keywords

Collaboration

other Collaboration

Subcategory

Theoretical Results

Primary authors: Ms VÁSQUEZ RAMÍREZ, Adriana (Universidad Industrial de Santander); Mr ARIZA GÓMEZ, Michael (Universidad Industrial de Santander); Mr CARILLO MORENO, Marcos (Universidad Industrial de Santander); Dr BALDOVINO MEDRANO, Victor G (Universidad Industrial de Santander); ASOREY, Hernán (CNEA); Prof. NÚÑEZ, Luis A. (Universidad Industrial de Santander)

Presenter: Ms VÁSQUEZ RAMÍREZ, Adriana (Universidad Industrial de Santander)

Session Classification: Discussion

Track Classification: Scientific Field: CRI | Cosmic Ray Indirect