ABSTRACT ONLY

ASTROPARTICLE TECHNIQUES: SIMULATING COSMIC RAYS INDUCED BACKGROUND RADIATION ON FLYING AIRCRAFTS

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In this work we present results of very detailed simulations which calculate the number of particles incident over an aircraft flying along transoceanic routes. We found that aircrafts traveling along inter-oceanic trajectories are exposed to significant amounts of radiation flux for neutrons, protons and muons and we estimate several possible impacts for frequent flyers and airlines crews.

Aircrafts flying between 10 km to 12 km are exposed to Cosmic Ray radiation levels of two order of magnitud higher than at ground (sea) level, and the dose it receives may affect passengers and plane advanced electronics. Other factors -such as the geomagnetic coordinates of the airplane trajectory and/or different space weather conditions- are also critical to compute the amount of cosmic radiation received by travellers and circuits. In this work we present some preliminary results of precise particle flux calculations and its variations, on five long duration flight trajectories: Bogotá - Buenos Aires, Buenos Aires - Madrid, Johannesburgo - Sidney, New York - Tokyo, São Paolo - Johannesburgo.

We use Magnetocosmics and CORSIKA (COsmic Ray SImulations for KAscade) to calculate the number of particles incident over an aircraft flying along these routes. CORSIKA is a Monte Carlo program extensively used to study the evolution and properties of cosmic ray showers in the atmosphere. Magnetocosmics, on the other hand, is based on Geant4 and is used to calculate charged particles trajectories through different geomagnetic field models and conditions. Using these two codes and considering detailed space weather phenomena, we are able to calculate with high precision the expected flux of particles at any altitude above sea level anywhere in the World.

We also present some results of GEANT4/GATE simulations for the interactions of protons and neutrons with a spherical phantom of 0.1 m^3 during for the above mentioned flight trajectories, where a special effort is done calculating Cĕrenkov photons generated by the cosmic ray crossing this phantom and the energy spectrum deposited on the phantom.

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