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Radiation Fields, Effects and Risks in Human Space Missions (5)

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SPACE RADIATION FIELD CHARACTERIZATION USING THE ASTROPARTICLE OPERATING DETECTORS.

Abstract

The actual and next decade will be characterized by an exponential increase of the exploration of the Beyond Low Earth Orbit space (BLEO).

Moreover, the firsts tentative to create structures that will enable a permanent human presence in the BLEO are forecast. In this context a detailed space radiation field characterization will be crucial to optimize radioprotection strategies (eg spaceship and lunar space stations shielding, lunar / Mars village design, ...), to assess the risk of the health hazard related to human space exploration and to reduce the damages potentially induced to astronauts from galactic cosmic radiation. On the other side since the beginning of the century many astroparticle experiments, aimed at investigating the unknow universe components (dark matter, antimatter, dark energy,..) are collecting an enormous amounts of data regarding the cosmic rays (CR) components of the radiation in space.

Collected data cover a large period of time and permit to have not only integrated information of CR fluxes but also their variations on time on a daily basis; Also, the energy range are particularly interesting since the astroparticle detectors operates using instruments that allows to measure CR in a very high energy range starting usually from the MeV scale up to the TeV, that are not covered by other space radiometrics instruments; Last but not least is the possibility to acquire knowledge in the full range of the CR components and theirs radiation quality.

After reviewing the past and still operating astroparticle experiments architectures and instrumentations (PAMELA, AMS02, ...) it will be illustrated how these data can be used to enhance the space radiation field characterization and consequently to improve the radiobiology issues in space with the respect of one of the most the relevant topics of space radiobiology represented by the dose effect models.