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

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SPACE RADIATION INDUCED BYSTANDER EFFECTS IN ESTIMATING THE CARCINOGENIC RISK : THE HEAVY NUCLEI CASE

Abstract

Space radiobiology is an interdisciplinary science that examines the biological effects of ionizing radiation on humans involved in aerospace missions. The knowledge of the risk assessment of the health hazard related to human space exploration is crucial to reducing damages induced to astronauts from Galactic Cosmic Rays (GCRs) and sun-generated radiation. GCRs have been identified as one of the primary sources of radiation exposure in space. In this context, an accurate characterization of the possible risk of carcinogenesis induced by exposure to GCRs particles is mandatory for safe human space exploration. One of the most crucial open problems is the contribution to carcinogenesis due to the effects on the cells directly and not directly irradiated, indicated as Target Effects (TEs) and Non-Target Effects (NTEs), re-spectively. It is accepted that the detrimental effects of ionizing radiation are not restricted only to the ir-radiated cells but also to non-irradiated distant cells manifesting various biological effects. Tumour Preva-lence (TP) is often used to investigate the impact of NTEs in predictions of chronic GCR exposure risk. This paper reports the status of the research on this topic at the INFN Roma Sapienza Alpha Magnetic Spec-trometer (AMS) research group, where is in progress an extensive study about the risk evaluation of the NTEs that the GCRs radiation will imply when added to the TE. A theoretical framework is presented for TP-induced NTEsmodeling, ready to be used with the data collected from the AMS02 detector. Finally, the last results obtained for the mid and heavy nuclei, with charge ¿5, components of space radiation are presented