

Challenges of Life Support/Medical Support for Human Missions (8)
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CAN HIGH ENERGY PARTICLE DETECTORS BE USED FOR IMPROVING RISK MODELS IN
SPACE RADIOBIOLOGY ?

Abstract

In the last two decades many experiments were built and deployed in space to produce a complete inventory of charged particles and nuclei in Cosmic Ray (CR). The physics goals are the study of CR properties, indirect search of Dark Matter and direct search of primordial antimatter. By now precise measurements of CR components exist in the energy region from few KeV to hundreds of TeV. Such precision measurements can be used also to evaluate the health hazard of astronauts due to the exposure to ionizing radiation in exploratory space missions and are of interest for the space scientist (physicists, biologist, engineers, ...) working on space radiation and health. Many successful space missions take cosmic rays' data in the last decade and the AMS02 experiment. AMS02 (Alpha Magnetic Spectrometer) is installed from May 2011 on the International Space station and will continue to operate throughout the lifetime of the ISS (2028) and in the last years it collected more than 166 billion cosmic rays events and the AMS collaboration produced new measurements of unprecedented precision of charged particle fluxes that compose the Cosmic rays up to high Z nuclei. Ionizing radiation exposures is one of the main concerns for astronaut's health involved in exploratory missions to the Moon and Mars due to the high doses of radiation expected during the flight and on the surface. The radiation health hazard assessments in exploratory space missions requires the evaluation of the dose effects models to quantify the expected damage in the forecast astronaut's exposition scenario. To complete this task the charged particle data taken by the high energy particle experiments can be useful to increase knowledge in many parts of the risk assessment phases. One possible approach to address the space radiobiology open problems is the comparison of possible effects on the health of astronauts from particles and dangerous charged nuclei with the radiobiology experience in the clinical field where the ionizing radiations are used for therapy and diagnosis. In this paper I will represent what has been done and the perspective of such research in the experience of the collaboration of the INFN Roma group and the 2017 between the INFN Roma-Sapienza AMS group and the Medical Physics Department of Policlinico S.Orsola in Bologna (Italy).