A Direct Impact of Astrophysics on Astronauts' Exposure/Humans Presence in Low Earth Orbit

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Secondary particles, such as neutrons generated from galactic cosmic rays (high energy particles which traverse the galaxy) slamming into a spacecraft, increase the radiation doses from neutrons astronauts receive. By analyzing previously collected data in low earth orbit from December 5-12, 2019, the experiment determined the flux, number and energy, of neutrons to quantify the crew's exposure to neutrons and to compare the calculated dose in space with other radiation sources. The data was collected from December 5 to 12, 2019 and measured by NASA's Advanced Neutron Spectrometer. To transform the raw data to a neutron induced dose, raw data files were unpacked, six different criteria were used to select events to include in the analysis, and real neutron data was separated from background data. Using the Standard Formulas, the neutron dose was calculated for a daily average. The results, a daily average of 183 micro-Sieverts, agree well with previously reported trend-lines and support that neutrons from galactic cosmic rays impact an astronauts' dose in outer space. The total ISS average exposure is 76 milli-Sieverts per a 6-month mission: 43 milli-Sieverts for charged particles and 33 milli-Sieverts for neutrons. The calculated exposure is a little higher than the Reported exposure but close enough to verify that both data analysis approaches are reliable. The total crew exposure for six months exceeds most terrestrial exposure limits including a radiation worker.

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