Learning how to protect astronauts from space radiation

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A particle accelerator to help make spaceflight safer. Credit: GSI Helmholtzzentrum für Schwerionenforschung GmbH/Jan Michael Hosan 2018

There is little known about the effects of space radiation on the human body. Astronauts cannot see or feel it, yet the high doses they are

exposed to outside Earth's cocoon pose health hazards for trips to the Moon and Mars. To help investigate and find out more, European scientists can now accelerate atoms at close to the speed of light to learn how to protect astronauts.

Space radiation passes through matter and penetrates the human body. Energetic particles impact living tissues, impairing normal function of cells and even killing them. An astronaut on a mission to Mars could receive radiation doses up to 700 times higher than on our planet.

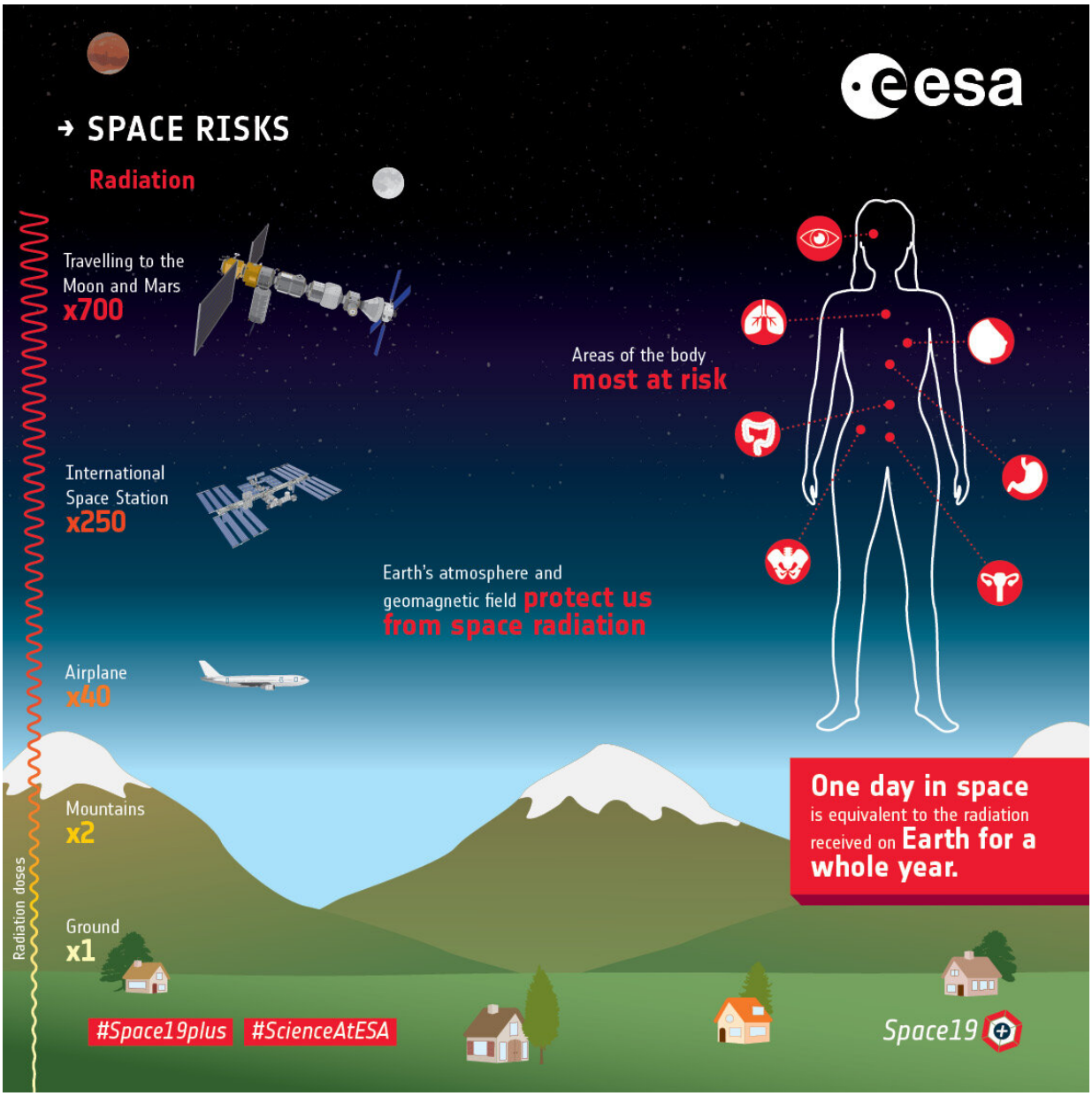
This type of radiation is a major concern for space agencies—the constant shelling of cosmic rays could damage crews and jeopardize a mission.

"The radiation risk is characterized by high uncertainty and lack of countermeasures. We need to know more," says Jennifer Ngo-Anh, ESA's team leader for human research, biology and physical sciences.

Radiation damage to the human body extends to the brain, heart and the central nervous system.

ESA is opening the doors to research into the biological effects of space radiation. Experiments should investigate radiation doses that astronauts could cope with while staying safe from cancer or other degenerative diseases during and after a mission.

Scientists are encouraged to investigate radiation risks and how to stop them with the right countermeasures.



Space risks – Radiation. Credit: European Space Agency

Accelerating knowledge

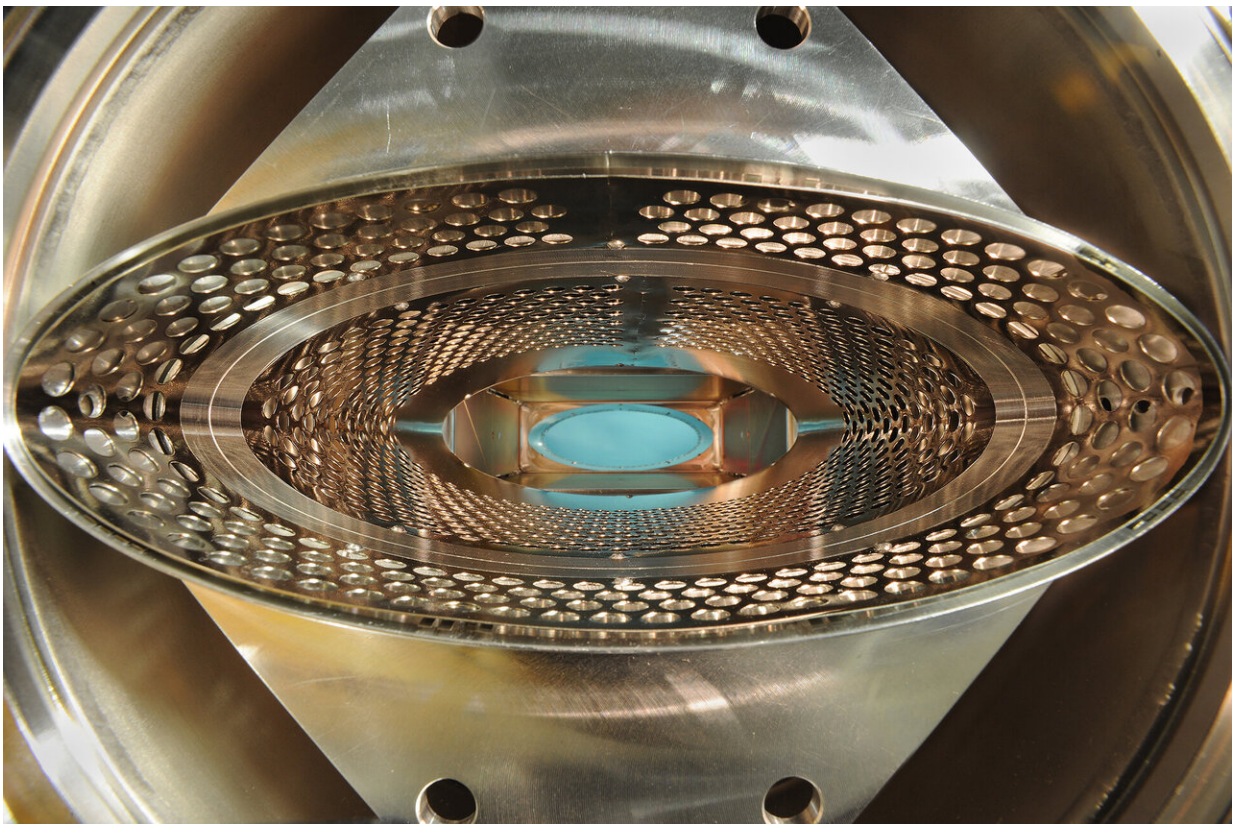
ESA is offering access to a high-energy accelerator to recreate cosmic radiation by "shooting" atomic particles to speeds approaching the speed

of light.

Experiments will take place at the GSI accelerator facility in Darmstadt, Germany, also known for the discovery of six chemical elements and the development of a new type of tumor therapy using ion beams.

This facility has seen 36 experiments bombarding cells and materials with radiation to address the effects of space radiation. The accelerator will host a workshop in September for researchers interested in its potential.

The results from these studies are not solely space bound. "This research could contribute to better assess ionizing radiation risks on Earth and improve charged particle therapy for oncology patients," says Jennifer.



The SIS-18 ring accelerator can shoot ions at targets including biological cells, recreating cosmic radiation. Analysing how the ions interact will help mission designers to develop new ways of minimising the risks of cosmic radiation. The ions are accelerated with magnets to 90% of the speed of light, or 270 000 km/s. This image shows a beam diagnosis element, which allows scientists to analyse the shape of the ion beam as it passes through. Credit: Gabi Otto/GSI Helmholtzzentrum für Schwerionenforschung GmbH

Provided by European Space Agency