



Active Space Radiation Shielding for Long Duration Missions

Robert Singleterry



Space vehicle approaching an asteroid

A major challenge for human space travel is radiation protection. Scientists around the world are investigating different approaches to this challenge, including Robert Singleterry at NASA's Langley Research Center.

Singleterry is focusing on the engineering aspects of using magnetic shields to deflect the harmful radiation. When his current research is completed, Singleterry will have a trade study that identifies where active shielding methods are better than using mass-based shielding to protect space travelers. His study will also identify and address engineering concerns associated with the design, deployment, and operation of the shielding technology.

"If we could get this technology to work and keep astronauts safe on a mission, we could extend the mission or keep the astronauts below their radiation limits. That's very important because today we're looking at a half to two-thirds of the mission mass being simply just shielding from the radiation," says Singleterry.

Singleterry has received funding from Langley's Center Innovation Fund for part of the work, but critical to his work is a collaborative approach. Singleterry is working with researchers at the Johnson Space Center, the [Advanced Magnetic Lab](#) in Florida, and the [International Nuclear Physics Institute](#) in Rome. The group pooled various funding resources to ensure that all project aspects were covered.

In addition to researching the state of the art in magnetic technology today and its radiation

protection capability, team members are: monitoring astronauts on space station; looking at how to package spacecraft and support items for missions; and, performing human radiation analysis.

For the study, the team is using a previous NASA design called [TRANSHab](#) as the vehicle concept.



Cutaway of TRANSHab

"Lots of studies have been done, and TRANSHab seems to be the minimum volume that everybody has agreed upon to keep psychological problems down."

The concept is also important because it is inflatable, which would reduce the mass considerably.

"So far, from this investigation are new and innovative magnet and magnetic field configurations that have the potential to shield large habitat volumes.

"This would really be a game-changer if we could show that mission parameters allow this technology to be usable."