



NASA SBIR 2014 Phase I Solicitation

H11.01 Radiation Shielding Systems

Lead Center: LaRC

Participating Center(s): MSFC

Advances in radiation shielding systems technologies are needed to protect humans from the hazards of space radiation during NASA missions. All space radiation environments in which humans may travel in the foreseeable future are considered, including low Earth orbit (LEO), geosynchronous orbit, Moon, Mars, and the Asteroids. All particulate radiations are considered, including electrons, protons, neutrons, alpha particles, and light to heavy ions up to iron. Mid-TRL (3 to 5) technologies of specific interest include, but are not limited to, the following:

- Innovative lightweight radiation shielding materials are needed to shield humans in aerospace transportation vehicles, large space structures such as space stations, orbiters, landers, rovers, habitats, and spacesuits. The materials emphasis should be on non-parasitic radiation shielding materials, or multifunctional materials, where two of the functions are structural and radiation shielding. Phase I deliverables are materials coupons. Phase II deliverables are materials panels or standard materials test specimens, along with relevant materials test data.
- Non-materials solutions, such as utilizing food, water, and waste already on board as radiation shielding. A challenge of particular interest is to contain and use human waste as radiation shielding. Phase I deliverables are detailed conceptual designs. Phase II deliverables are working prototypes.
- Advanced computer codes are needed to model and predict the transport of radiation through materials and subsystems. Advanced computer codes are needed to model and predict the effects of radiation on the physiological performance, health, and well-being of humans in space radiation environments. Comprehensive radiation shielding design tools are needed to enable designers to incorporate and optimize radiation shielding into space systems during the initial design phases. Phase I deliverables are alpha-tested computer codes. Phase II deliverables are beta-tested computer codes.
- Laboratory and spaceflight data are needed to validate the accuracy of radiation transport codes. Laboratory and spaceflight data are needed to validate the effectiveness of multifunctional radiation shielding materials and subsystems. Comprehensive radiation shielding databases are needed to enable designers to incorporate and optimize radiation shielding into space systems during the initial design phases. Phase I deliverables are draft data compilations or databases. Phase II deliverables are formal, publishable, and archival data compilations or databases.