Neutrons can contribute a significant fraction to the total dose-equivalent received by astronauts. Current instruments at NASA, and those under development, can provide the total (combined) dose and dose-equivalent for protons, heavy ions, gamma rays, and neutrons. At present, neutrons are included as integral measurements of NASA space flights; however compact active detection systems that can measure neutrons only are needed. Advanced technologies (up to technology readiness level (TRL) level 4) are requested.

Subtopic Requirements/Needs:

Systems are needed specifically to measure the neutron component of the dose and provide the neutron dose-equivalent in real time. Of interest also would be compact active monitoring devices that could measure neutron energy spectra.

The principal energies of interest are neutrons from 0.5 MeV to 150 MeV.

The monitor should be able to measure neutrons at ambient conditions such that proton/ion veto capability should be approaching 100% at solar minimum GCR rates.

During solar particle events, neutrons will be present at increased levels and should also be measured.

The device should be able to measure ambient dose equivalent of 0.02 mSv in a 1 hour measurement period, using ICRP 74 (1997) conversion factors.
The instrument shall be able to perform data reduction internally and provide processed data out to ISS, CEV, and or future lunar outpost data systems. New software needs to be fault tolerant and updated to current operating systems, new hardware and software must be fully documented (schematics, etc.).