

# Wide reach of Solar Energetic Particles in the Heliosphere

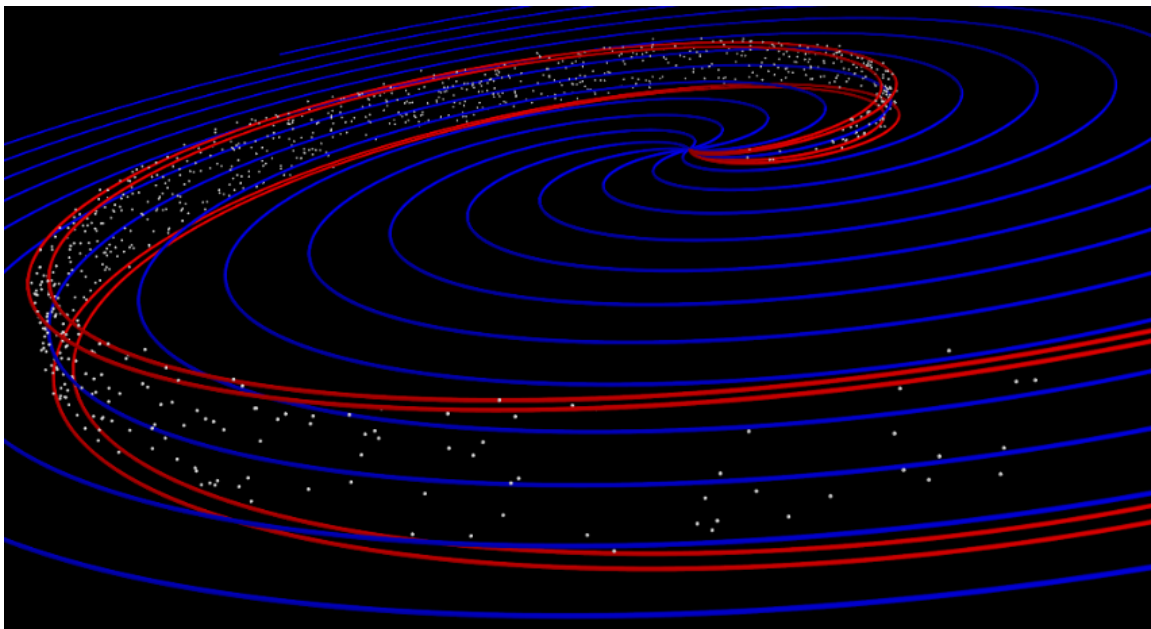
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Solar eruptions release energy in many forms, including in the form of electrons and ions accelerated up to relativistic speeds. These charged particles, the Solar Energetic Particles (SEPs), propagate in the interplanetary space guided by the interplanetary magnetic field which has on average an Archimedean spiral shape, the Parker Spiral. As the SEPs arrive at Earth, they constitute a radiation hazard to humans and technology in space and high-latitude flights. This hazard is included in the [UK National Risk Register](#), as part of the Space Weather risk, and understanding and seeking to forecast the SEP events are part of the effort of trying to reduce the Space Weather risk to humanity.

One of the crucial questions in understanding SEP arrival at Earth is how they propagate along and across the Parker spiral in the highly turbulent solar wind environment. Depending on your preference, you will investigate the SEP propagation either by using and developing state-of-the-art SEP propagation models, or by analysing SEP events by delving into the observations of multitude of spacecraft, including the STEREO spacecraft launched in 2006, and the very recent Parker Solar Probe (PSP, launched in 2018) and Solar Orbiter (SoLO, launched in 2020).

The project will utilise publicly available datasets and/or in-house-built propagation models, and no specialist equipment will be needed. Therefore, this project is well-suited for Distance Learning students either in UK or overseas.

For more details, please contact Timo Laitinen ([tmlaitinen@uclan.ac.uk](mailto:tmlaitinen@uclan.ac.uk)).



**Figure:** SEP (white dots) propagation simulated in the heliospheric Parker Spiral configuration (Image by Mike Marsh).