

# SERC Research Program 1 Review: Remote manoeuvre of space debris using photon pressure for active collision avoidance

**Professor Craig Smith<sup>1</sup>**

<sup>1</sup>*EOS Space Systems, , Australia*

The Cooperative Research Centre for Space Environment Management (SERC) and its participants, is developing a system to demonstrate remote manoeuvre of space debris using photon pressure for active collision avoidance.

Debris on debris collisions in orbital space are now a significant contributor to the growth of the space debris population. Left unchecked there is the possible (probable) runaway cascade (Kessler Syndrome) caused by such collisions in popular orbits, possibly rendering these valuable orbital slots unusable in the future.

SERC plans to demonstrate the ability to avoid collisions by making small orbit changes to one or both objects in a predicted collision so that the intersection in time and space does not occur. The objects remain in orbit but do not crash and generate more collision debris.

Laser ranging systems will be used to provide high accuracy tracking of the intersecting objects and advanced orbit propagation and conjunction models. When a collision prediction is confirmed it is proposed to make small changes to the debris object's orbit using photon pressure from a ground based laser. Over time the small velocity change grows to a significant displacement and essentially de-phases the two orbits so that the two objects do not occupy the same space at the same time even though they remain in similar orbit geometry.

This paper will describe the method of engagement with the debris object and provide an update on progress with the system development and achievements in Research Programs 1 at SERC.