SPACE PROPULSION SYMPOSIUM (C4)
New Missions Enabled by New Propulsion Technology and Systems (6)

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SOLAR SYSTEM ESCAPE ARCHITECTURE FOR REVOLUTIONARY SCIENCE

Abstract

I am PI of a NASA Innovative Advanced Concepts study investigating solar sail architectures to return to the heliopause in a reasonable mission timeframe and explore the region. The concept is a program with 10-12 spacecraft reaching the heliopause in different directions (towards and away from the center of the galaxy, highly inclined above and below the ecliptic, and tangential "forward" and "backward" to the path of sun around the center of the galaxy.) Each direction requires multiple spacecraft because the solar system is inclined from the galaxy itself, and each direction in each inclination must be explored to understand the 3d structure of the heliopause.

We have preliminary trajectory results, and have discussed solar sail capabilities and limitations with a leading solar sail company that will be launching a solar sail technology demonstration mission for NASA Office of the Chief Technologist next year. They say that a 500m x 500m solar sail is within the realm of possibility in the near future. With a sail that size it may be feasible to send 500kg to the heliopause in less than ten years. For comparison, the Voyager spacecraft took 35 years to get there. We are currently investigating sail and boom material properties to narrow the trajectory tradespace and identify a more firm mission concept for HQ review at the end of Phase 1.