

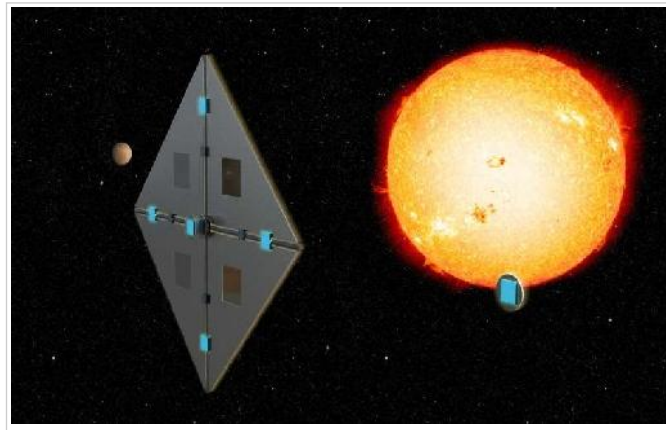
## ORBITER NEWS

News, announcements, and more.

# Aerospace Explores Advancements in Solar Sail Technology

July 28, 2021

Space exploration remains a herculean effort due to the immense challenges imposed by time and distance. While missions to near-Earth objects have been successfully accomplished using traditional means of propulsion, the outermost planets in our solar system are 2 to 3.7 billion miles from the Sun. Reaching them within any reasonable time frame requires propulsion systems that exceed the capabilities of conventional propulsion methods.



Solar sails harness the radiation pressure exerted by light on a reflective material to provide thrust to spacecraft. With few moving parts and the propellant offboard, solar sails provide cost-effective operations and long operating lifetimes. The technology is proven, and was successfully demonstrated by Japan's IKAROS mission's fly-by of Venus in 2010.

The Aerospace Corporation is researching new approaches to solar sail technology that could exponentially increase its already considerable potential, paving the way for a new era of breakthrough science missions.

### Using the Sun for Propulsion

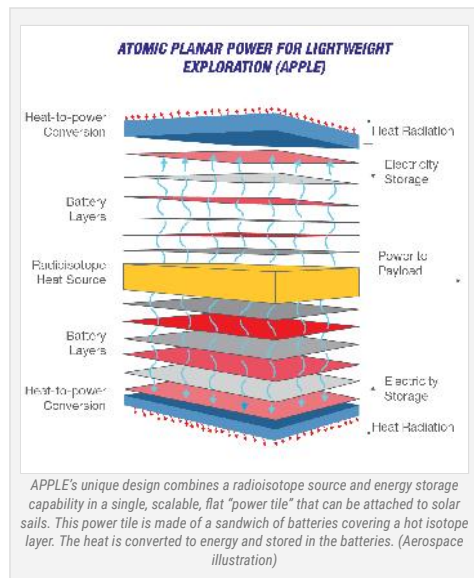
In collaboration with UCLA's Mechanical and Aerospace Engineering Department and NASA's Marshall Space Flight Center, Aerospace is now exploring the use of solar sails as a pathway to faster exploration of the outer solar system and interstellar space. The Extreme Solar Sailing concept offers to employ the Sun as a figurative launchpad, utilizing a "slingshot" maneuver to propel lightweight cubesat-class spacecraft to extremely high velocities.

This technology has the potential to enable missions to distant worlds in far less time, opening up new possibilities for space exploration. "With chemical propulsion, you can attain velocities between two to five astronomical units (AU) per year, with one AU being the distance between the Earth and the Sun," said Dr. Henry Helvajian, Senior Scientist at Aerospace's Physical Sciences Laboratories. "The beauty of extreme solar sailing is that you can gain velocities that surpass pretty much any kind of propulsion that we know of today, by factors of two to 10 to 30 depending on how close you want to get to the sun."

Using this maneuver, solar sails can reach 0.1% of the speed of light (i.e., approx. 300 km/s), reaching the furthest planets of our solar system could take only months, interstellar space could be reached in a few years, and 1000 AU could be attained in less than 20 years.

These capabilities come with some concessions, however. The immense velocity of solar sail-driven spacecraft requires greatly reduced mass, necessitating new spacecraft architectures and materials that can withstand the initial close proximity to the Sun. In addition, solar sails must be resilient and able to provide consistent thrust while also withstanding impacts from dust and debris in their path.

### Advancing Solar Sails for Deeper Space Exploration



The Extreme Solar Sailing proposal received NASA's Innovative Advanced Concepts (NIAC) Phase 1 grant in 2020. While the Phase 1 study demonstrated the conceptual feasibility of extreme solar sailing and the materials it would require, the next phase will require the development of key elements and systems for mission success. The study has received a NIAC Phase 2 grant for the development, fabrication and testing of new, ultra-lightweight metamaterials for solar sails, as well as the design of spacecraft architecture that provides ultra-low mass with the greatest payload functionality, and the conduction of mission studies.

Proceeds from the Phase 2 grant will also explore the application of extreme solar sailing to two breakthrough mission concepts: the Fast Transit Interstellar Probe, which aims to send a probe to 500 AU in 10 years, and Corona-Net, a precursor mission, which aims to send a fleet of solar sails to examine the inner heliosphere at

high inclination. Both mission concepts will also assess spacecraft communications and power requirements, and will explore the design of higher fidelity sail control systems to ensure precise navigation around the Sun and interstellar locations.

In addition to advancements in solar sail velocity, Aerospace is also working to expand other aspects of solar sail functionality such as the Atomic Planar Power for Lightweight Exploration (APPLE) concept, which also recently received a 2021 NIAC Phase 1 grant.

*Read the [full article on Aerospace.org](#) to learn more about Aerospace's advancements in solar sails.*

# ACE Champion Q&A: Supporting Communities Where Our Teammates Work and Live

July 22, 2021

*Aerospace Committee for Equality (ACE) assesses, recommends and executes the corporation's diversity, equity and inclusion (DEI) actions through the focus areas of Recruitment, Representation, Retention, Education and Training, K-12 STEM Outreach and Community Outreach. Throughout the year, the Orbiter will feature guest Q&As from each focus area executive champion.*



Our guest for this installment is **Sabrina Steele**, executive champion for the **Community Outreach focus area**.



**What makes you passionate about your Aerospace Committee for Equality (ACE) focus area: Community Outreach?**

I have been passionate about community since I worked for a daily newspaper with the time to uncover the daily humanity on my beat. At Aerospace, community is both on our campuses across the country and outside our “walls” – wherever our employees work and live. Community is when we can bring our “whole” selves to work. Last year during the activism following the murder of George Floyd, this element of community became even more important. We needed to come together and support our colleagues who were suffering, and in fact had a different experience. There are actions we can take – the outreach part of Community

Outreach – that help us chart a more inclusive path.

**What initiatives is Community Outreach currently working on?**

This first year was amazing. We started with the premise that each community where we had employees was unique. So rather than requiring a standard approach from corporate headquarters in El Segundo, we established a team of community liaison volunteers at different locations across Aerospace. That team was chartered to work together to expand the Dr. Wanda M. Austin Scholarship for underserved diverse students to those locations. In one year, the team reviewed the Dr. Austin scholarship process and developed a program that was true to the inspiration of the scholarship but tailored to their locations. They named it the Future STEM leaders and did outreach and selected our first round of scholars. I can't say enough about the partnership with the K-12STEM team for this effort.

There was a second area that recently gained traction – the DEI partnership with the city of El Segundo and the Space and Missile Systems Center. Just last week, the city's DEI Committee Chair Shad McFadden moderated a DEI panel with our president and CEO Steve Isakowitz and the SMC Commander Lt. General John “JT” Thompson. Steve and General Thompson talked about their organizations' DEI journeys and shared best practices. While preparing for the panel, we opened a dialogue with the city on growing our trusting relationship that benefits our employees outside the Aerospace campus.

Here are a few actions in building that trusting relationship:

- Steve joined the Board of Governors for the El Segundo Economic Development Council and successfully advocated for DEI as one of the pillars of the group.
- As we come out of COVID-19, the monthly public safety breakfast, which includes Aerospace and base security teams, is set to resume and DEI has been added to the regular agenda.
- We are working with the city to establish an open channel of communication to provide feedback regarding interactions with police officers, as well as build a stronger relationship with the El Segundo Police Department leadership, including the acting chief and the area commander for our part of town.
- We are looking to work with the community liaisons and their leadership to tailor this type of outreach at our other Aerospace locations.

**We often talk about creating a culture of trust, inclusion and sense of belonging. What does this look like to you?**

A culture of trust, inclusion and belonging is one in which everyone feels empowered to bring their best selves to work, where we are helping each other out. This is not a passive culture but a proactive one. That's why I really appreciated the recent allyship discussions on how we can actively support our colleagues.

**How can employees get involved to help Aerospace drive our DEI efforts forward?**

The key word here is involved. I would ask each and every Aerospace employee to volunteer one hour to any one of the DEI initiatives, even better if you volunteer with your friends. Your efforts will make difference and you will feel great!

**What do you believe is Aerospace's most immediate need in the area of DEI?**

For each individual to take an action, like volunteering or participating in the Aerospace Mentoring Initiative. Managers can also actively use the SCARF model (a helpful tool that guides one's behavior in helping people feel included) with their teams – being attuned and kind.

# July 2021 Obituaries

July 01, 2021

*Sincere sympathy is extended to the families of:*

- **Alfred Britting Jr.**, member of technical staff, hired March 7, 1983, retired June 1, 2019, died May 29, 2021
- **Ravi Date**, member of technical staff, hired July 9, 1990, retired Dec. 1, 1999, died May 24, 2021
- **Lowell Howard**, member of technical staff, hired April 6, 1981, retired June 1, 1999, died Jan. 27, 2021
- **William King**, member of technical staff, hired April 17, 1961, retired Jan. 1, 1998, died April 19, 2021
- **Lonnie Lasman**, member of technical staff, hired August 13, 1979, retired Oct. 1, 1988, died April 21, 2021
- **Nancy Reber**, office of technical support, hired Sept. 12, 1960, retired May 1, 2007, died March 15, 2021
- **George Reynolds**, member of administrative staff, hired April 27, 1998, retired March 1, 2007, died April 30, 2021
- **Antonio Salas**, office of technical support, hired June 5, 1972, retired Nov. 1, 1991, died June 2, 2021
- **Ning Wong**, member of technical staff, hired June 21, 1976, retired Nov. 1, 1993, died June 16, 2021

*To notify Aerospace of a death and have it included in the Orbiter, please contact People Operations at (310) 336-5107.*

*These articles are reprinted from The Orbiter, a publication of The Aerospace Corporation 2310 E. El Segundo Blvd., El Segundo, CA 90245-4691 310-336-5000*

*Visit: [Aerospace.org](http://Aerospace.org)*

*Contact Orbiter staff: [Orbiter@aero.org](mailto:Orbiter@aero.org)*

[www.aerospace.org](http://www.aerospace.org)

