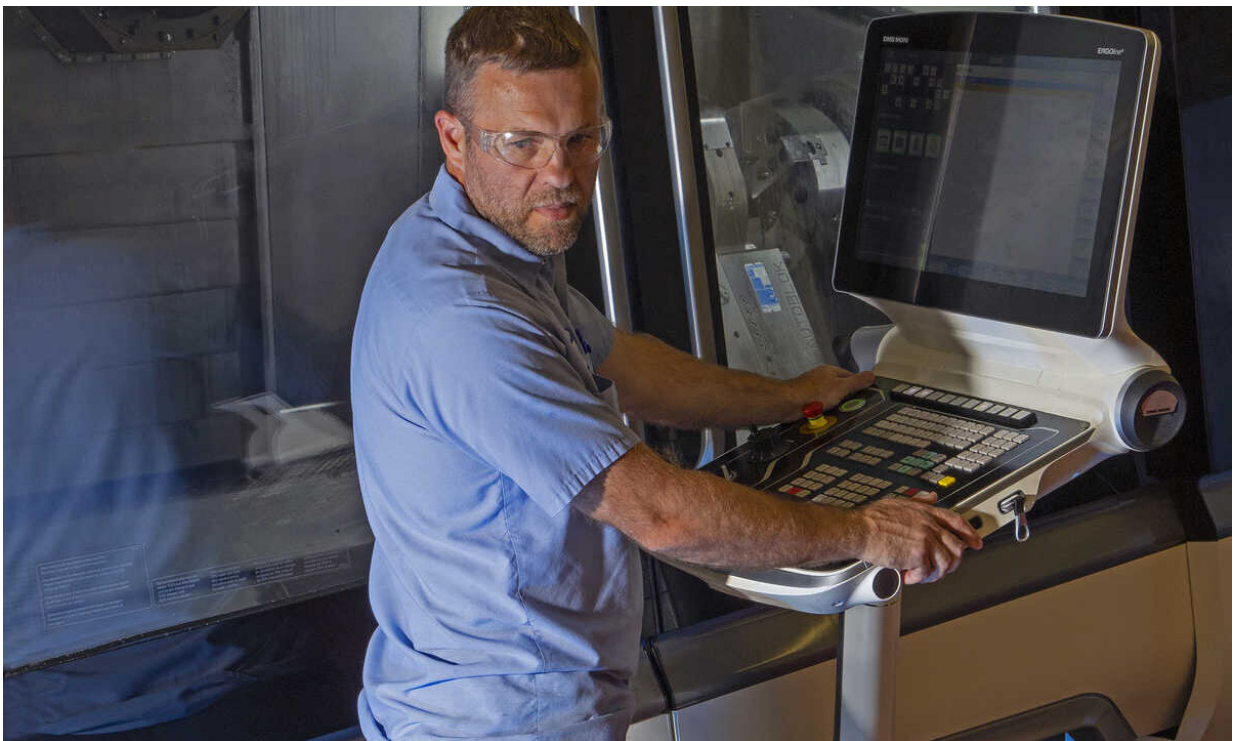


NASA's Interstellar Mapping and Acceleration Probe mission enters design phase

January 28 2020



As the mission enters the design phase, SwRI is building the Compact Dual Ion Composition Experiment (CoDICE) for NASA's Interstellar Mapping and Acceleration Probe mission. CoDICE combines the capabilities of multiple instruments into one patented sensor that weighs about 22 pounds. Credit: Southwest Research Institute

A mission to study the interaction of the solar wind with the ancient cast-off winds of other stars, and the fundamental process of particle acceleration in space, has completed a critical NASA review and is now moving closer toward a scheduled launch in 2024. Southwest Research Institute is playing a major role in the Interstellar Mapping and Acceleration Probe (IMAP) spacecraft, managing the payload office and providing a scientific instrument and other technology for the mission.

The IMAP mission completed its Key Decision Point-B review on Jan. 28, 2020, which now allows the IMAP team to move forward with preliminary design work on the mission, spacecraft, and instruments, referred to as Phase B. Phase B will officially begin on Jan. 28.

"This is a big milestone for the IMAP mission as we move out of the architecting phase into the design phase," said David McComas, IMAP principal investigator and Princeton University Vice President for the Princeton Plasma Physics Laboratory. "IMAP is a critical new mission of exploration and discovery about the heliosphere—our home in [space](#)—and this is a critical step forward in it."

A focus for IMAP is to explore the very boundaries of the heliosphere—the space filled with plasma from the Sun that envelops all the planets of the solar system—to [interstellar space](#). Here the outpouring of solar material collides with the local interstellar medium that fills the space surrounding the heliosphere. This interaction forms a critical barrier for high-energy cosmic rays, at a distance of about 10 billion miles from the Sun.

SwRI is managing the payload and payload systems engineering, providing a [scientific instrument](#) and supporting the development of other IMAP technology for the mission.

"SwRI is providing IMAP's Compact Dual Ion Composition Experiment

(CoDICE), which combines the capabilities of multiple instruments into one patented sensor about the size of a 5-gallon paint bucket and weighing about 22 pounds," said Dr. Mihir Desai, director of the SwRI Space Research Department and an IMAP co-investigator. "Initially developed with internal SwRI funding, CoDICE will measure the distributions and composition of interstellar pickup ions, particles that make it through the 'heliospheric' filter. It also characterizes solar wind ions as well as the mass and composition of highly energized particles from the Sun."

During Phase A of the IMAP mission, scientists and engineers reviewed and finalized plans for the ten scientific instruments, seven of which will directly sample matter from the interstellar medium that reaches Earth's vicinity. These samples include interstellar neutral atoms and ions picked up and accelerated by the solar wind, but also dust particles of interstellar origin.

IMAP will also examine the fundamental processes that accelerates particles throughout the heliosphere and beyond; the resulting energetic particles and cosmic rays can harm astronauts and space-based technologies.

"SwRI is also contributing to the development of the next-generation energetic neutral atom imagers as well as electronics to support IMAP instruments that measure solar wind electrons," said Susan Pope, director of the Space Instrumentation Department and IMAP payload systems engineer.

"IMAP will help us understand how our Sun and the solar wind affect the boundary of our solar system," said SwRI Program Director John Scherrer, IMAP payload manager.

By studying the nature of the interaction of solar and stellar winds,

IMAP will join a fleet of NASA heliophysics missions seeking to understand how the Sun affects the space environment near Earth and across the solar system. Heliophysics spacecraft studying the Sun, near-Earth space, and the boundaries of the heliosphere form a system observatory. Understanding the basic fundamental processes that govern our neighborhood in space continues to build a foundation for prediction of Earth's and the solar system's space weather.

In addition to maturing the design of the mission, IMAP's Phase B will encompass the construction of subassemblies and instrument elements, and the choice of additional hardware and subsystem partners and vendors. IMAP was selected following a competitive peer review of proposals submitted in late 2017. The [mission](#) is cost-capped at \$564 million, excluding cost for the launch vehicle.

More information: For more information, visit <https://www.swri.org/heliophysics>

Provided by Southwest Research Institute

Citation: NASA's Interstellar Mapping and Acceleration Probe mission enters design phase (2020, January 28) retrieved 29 April 2024 from <https://phys.org/news/2020-01-nasa-interstellar-probe-mission-phase.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--