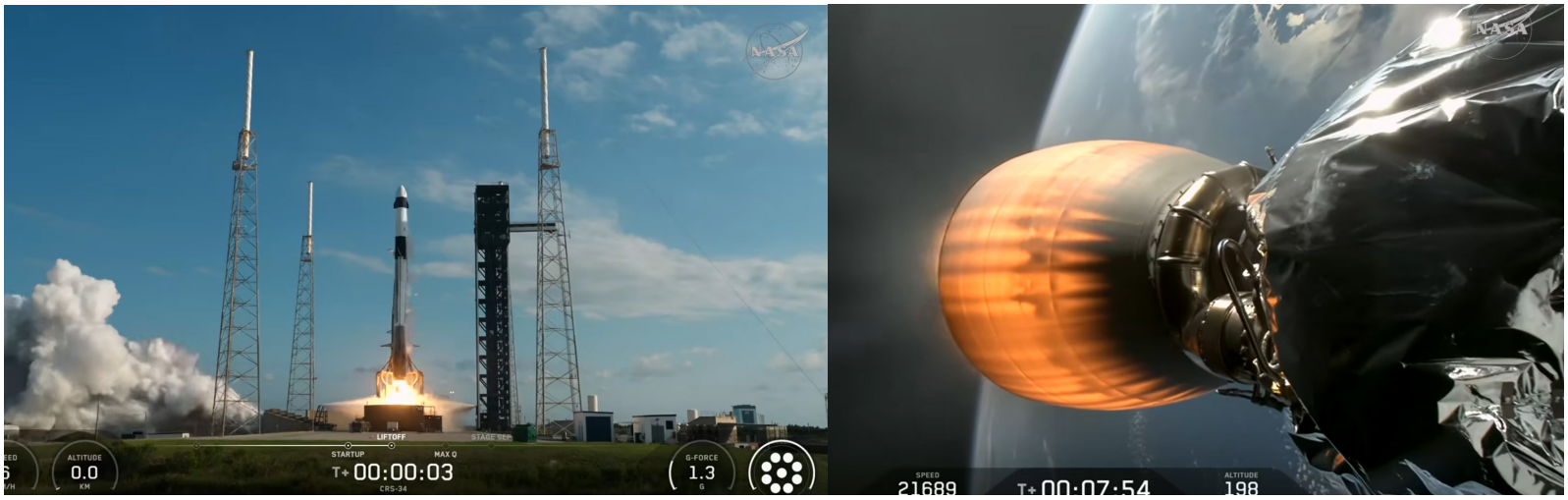


SpaceX's CRS-34 at three seconds after liftoff (left) and approximately eight minutes into flight (right). Image screenshots from NASA's YouTube livestream of the SpaceX launch mission captured on May 15, 2026.

AIMSS Takes Flight to Advance Space Weather Research

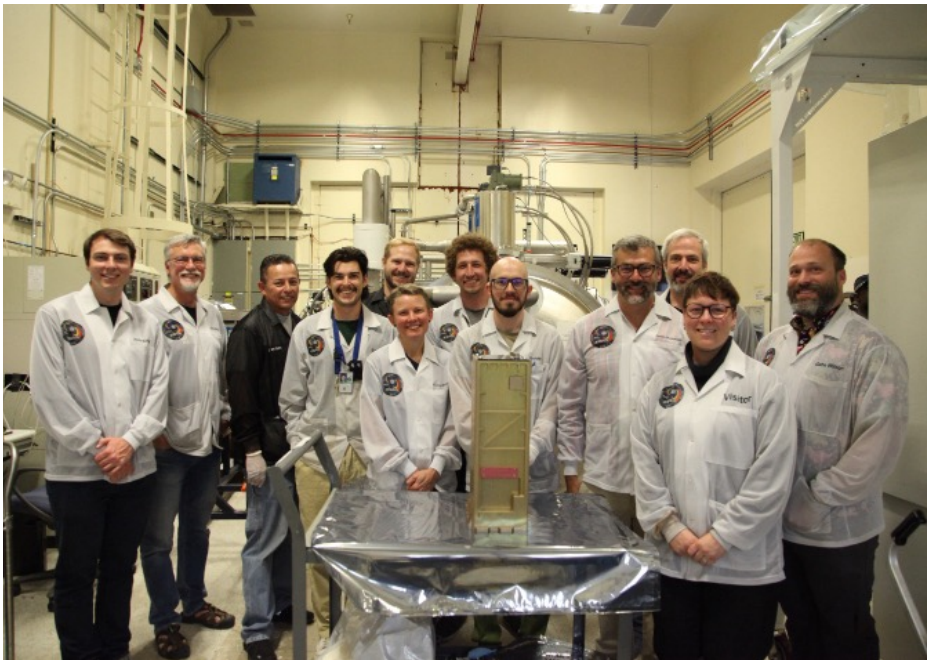
On Friday, May 15, the Los Alamos National Laboratory (LANL)-developed Autonomous Ion Mass Spectrometer Sentry (AIMSS) was successfully launched on board SpaceX's CRS-34 mission as part of the Space Test Program-Houston 11 (STP-H11) payload, beginning its journey to the International Space Station (ISS). The launch of the instrument highlights LANL's growing contributions to space science, national security, and advanced sensing technologies.

The AIMSS project is funded by LANL's Laboratory Directed Research and Development (LDRD) program. LDRD supports high-risk, high-reward research that creates innovative technical solutions for some of the nation's most difficult challenges. Over the decades, LDRD funded projects have made foundational contributions to space science technologies, from Mars rover instrumentation technology to the development of systems for small satellites– know as cubesats. These invaluable and realized contributions highlight what is possible through strong and collaborative partnerships. In the case of AIMSS, while LDRD funding enabled the development of the core technology hardware, support from NASA and the Department of War Space Test Program allowed for activities such as command testing, which ensured that the project team would be able to communicate in real-time with the instrument once it arrived at the ISS.

The AIMSS project provides an excellent demonstration of LANL's ability to rapidly develop and deliver advanced space technologies for operational environments. The AIMSS technology moved from concept to flight hardware in less

"During this project, the team demonstrated extraordinary determination, ingenuity, resourcefulness, and technical excellence that exemplifies the core values within the Intelligence and Space Research Division," said Carlos Maldonado, AIMSS principal investigator. "As with all our efforts within Global Security, this would not have been possible without the 'same team same fight' mentality across the directorate."

than two years, an unusually fast timeline for a spaceflight instrument of this complexity. This achievement reflects the strength of a highly collaborative effort led by AIMSS principal investigator Carlos Maldonado and powered by a team of mostly early career scientists whose resourcefulness and innovation were central to the project's success. "During this project, the team demonstrated extraordinary determination, ingenuity, resourcefulness, and technical excellence that exemplifies the core values within the Intelligence and Space Research Division," said Maldonado. "As with all our efforts within Global Security, this would not have been possible without the 'same team same fight' mentality across the directorate."



Pictured are several members of the AIMSS team. Image credit LANL

Building on Maldonado's recognition of the team's dedication, Marc Kippen, Space Systems & Science Program Manager under LANL's Global Security Division, further emphasized the importance of the accelerated and efficient pace the AIMSS team achieved, stating that "Moving fast is critical in the highly dynamic space domain, and clearly AIMSS demonstrates that LANL can move at the needed pace- setting the mark for future LANL programs."

The primary mission of the SpaceX CRS-34 Dragon spacecraft was to deliver over 6,500 pounds of equipment, supplies, and cargo to the crew currently living aboard the ISS. While this mission was considered a commercial resupply mission, the SpaceX CRS-34 payload also included more than 50 new science experiments, one of which was the AIMSS technology.

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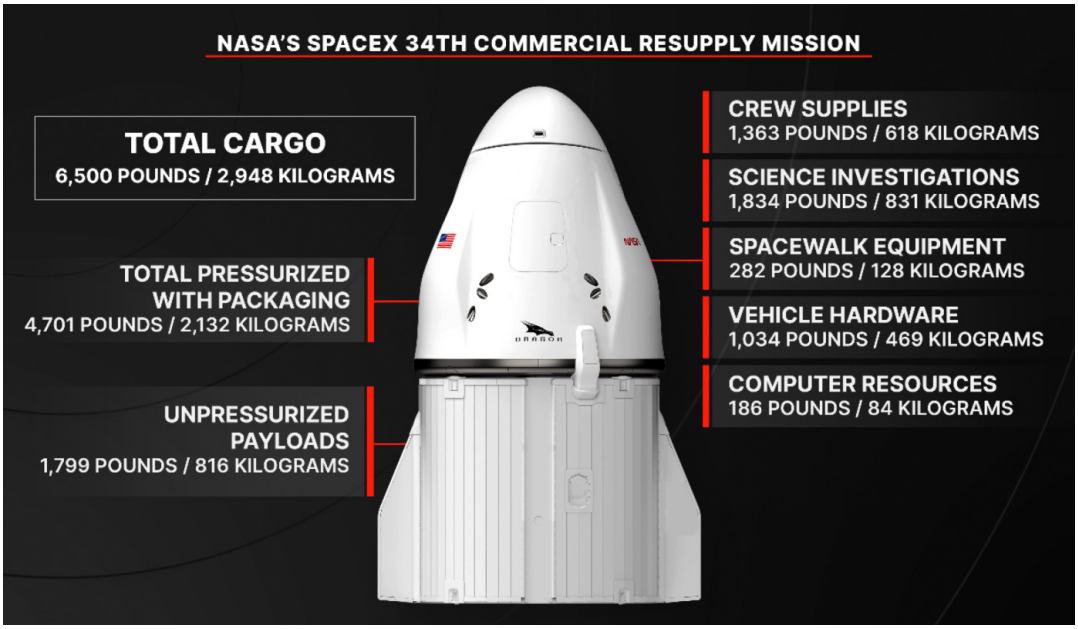
After a 36-hour flight, the SpaceX's CRS-34 Dragon spacecraft docked at the ISS on Sunday, May 17. Once AIMSS is fully operating aboard the ISS, the LANL project team will begin the on-orbit portion of the project. AIMSS' advanced sensor technology allows the instrument to monitor and measure conditions near the space station, such as space weather. The AIMSS payload will advance discovery science related to the near-Earth space weather by providing invaluable ion composition measurements such as the distinction between nitrogen and oxygen ions. This makes it possible to validate modern space weather models.



NASA's SpaceX 34th commercial resupply mission delivered essential supplies to the crew aboard the International Space Station and transported more than 50 scientific experiments. Image credit NASA

In addition to providing data on space weather conditions and measurements, AIMSS will measure contamination caused by space station leaks, venting events, and spacecraft thruster plume impingements, which result in surface contamination, changes in material thermal properties, sputtering, and erosion. These measurements will help address fundamental questions about how material thermal properties might be altered by the contamination. Researchers will better understand how particulates and molecular films form, evolve, and redistribute in low-Earth orbit and how they impact and influence long-term spacecraft degradation.

The AIMSS payload monitoring will also answer questions around spacecraft charging, specifically how electrical charges accumulate, dissipate, and couple with the surrounding plasma environment. This data can be used to determine root cause in the case of spacecraft discharge anomaly by deepening our understanding of charge-plasma-material interactions, delivering new insight into the physical mechanisms that lead to these discharge events.

Through AIMSS technology, LANL researchers are able to advance discovery science and deepen our understanding of both space weather conditions and the complex near-space environment through measurements collected by the AIMSS payload. These measurements will reveal how sensitive instruments and experiments are impacted by human and spacecraft activity as well as by space weather, strengthening our overall space domain awareness.

The AIMMS project highlights how innovative research opportunities made possible through LDRD can rapidly move a promising concept to a deployed technology that enhances the safety, resilience, and scientific understanding of our shared space environment.

You can watch the launch of the SpaceX CRS-34 Dragon spacecraft by viewing NASA's recording of the flight. A description of several of the other scientific experiments carried aboard the resupply mission is provided at eight minutes and nineteen seconds into the video. To watch the launch sequence countdown beginning at one minute before liftoff, skip ahead to twenty minutes and fifty seconds into the video.

Microsoft 365 Copilot was used as supportive tool in the development of this highlight to enhance clarity and refine grammar.

Los Alamos NATIONAL LABORATORY

LDRD