

ELaNa 33 Mission

The sole CubeSat of NASA's 33rd [Educational Launch of Nanosatellites \(ELaNa\)](#) mission was deployed into space on June 29, 2021, from Northrop Grumman's Cygnus spacecraft hours following its departure from the [International Space Station](#).

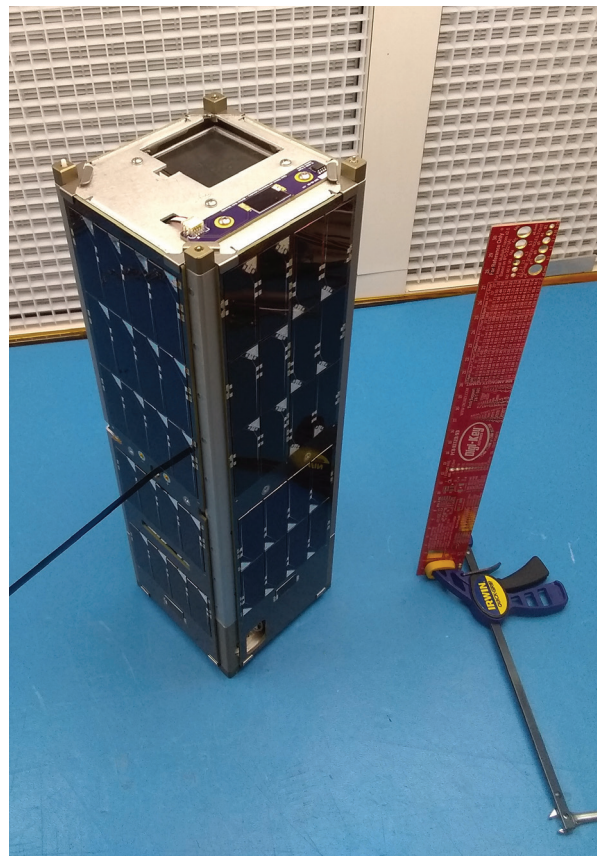
The CubeSat, Ionosphere-Thermosphere Scanning Photometer for Ion-Neutral Studies ([IT-SPINS](#)), carries a sensitive photometric instrument to remotely sense ultraviolet emissions produced when oxygen ions combine with electrons in the ionosphere. The scientific goal is to improve space weather forecasting related to dynamic processes in Earth's ionosphere.

A primary objective of the investigation is to reveal the dynamics of a physical boundary region in Earth's ionosphere where the oxygen-dominated ionosphere becomes proton dominated with increasing altitude, in a layer known as the Topside Transition Region. Understanding how space weather drives the morphology of this layer will allow significant improvements in space weather forecast modeling.

IT-SPINS is the 12th in a series of CubeSats, or small satellites, developed by students and staff at Montana State University's Space Science and Engineering Laboratory to advance CubeSat capabilities and to conduct focused scientific investigations targeting outstanding questions in the geospace sciences.

The university prioritizes combining experiential learning in STEM education with the professional seasoning of early career engineers through mentoring and assumption of leadership roles in developing and operating the investigation. This mission is sponsored by the National Science Foundation, which has supported it during its development and the beginning of operations.

IT-SPINS launched on Feb. 20, 2021, from Wallops Flight Facility in Virginia on Northrop Grumman's 15th NASA contracted cargo mission to the space station. It was stowed within the Nanoracks CubeSat Deployer mounted on the exterior of the S.S. [Katherine Johnson](#) Cygnus spacecraft. Once the Cygnus departed the space station, it remained in orbit to deploy IT-SPINS, which deployed into a free-flying



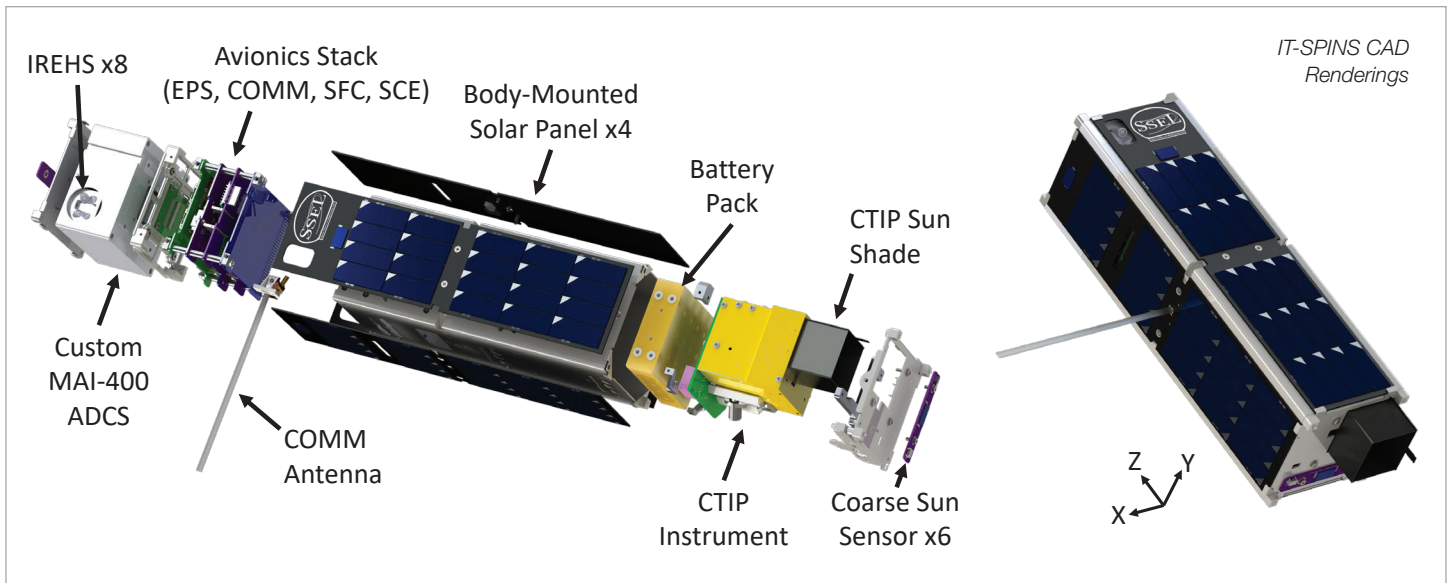
The IT-SPINS 3U CubeSat measuring 33 cm x 10 cm x 10 cm with extended communications antenna. The CTIP instrument aperture is under the folded rectangular pop-out sunshade at the long end of the satellite.

orbit at an altitude between 304 and 210 miles (490 and 500 kilometers) above Earth's surface.

CubeSats are measured in units or U's; one U is defined as a volume of about 3.9 in x 3.9 in x 3.9 in (10 cm x 10 cm x 10 cm). IT-SPINS is a 3U CubeSat measuring approximately 13 in x 3.9 in x 3.9 in (33 cm x 10 cm x 10 cm).

CubeSats are playing an increasingly larger role in exploration, technology demonstrations, scientific research and educational investigations at NASA. These miniature satellites provide a low-cost platform for NASA missions, including planetary space exploration; Earth observation; fundamental Earth and space science; and technology demonstrations

NASAfacts



such as cutting-edge laser communications, energy storage, in-space propulsion and autonomous movement capabilities.

CubeSats also provide educators an affordable means to engage students in all phases of satellite development, operation, and exploitation through real-world, hands-on research and development experience on NASA-funded rideshare launch opportunities.

IT-SPINS was selected by [NASA's CubeSat Launch Initiative \(CSLI\)](#). CSLI enables the launch of CubeSat projects designed, built, and operated by students, teachers and faculty, as well as NASA Centers and nonprofit organizations.

Managed by NASA's [Launch Services Program](#) at the agency's Kennedy Space Center in Florida, ELaNa missions pro-



Solar array balance testing at MSU. Rubin Meuchel (L), Nevin Leh(R).



Characterizing solar array performance. MSU staff and students solar array test team: (L to R) Skylar Tamke, Rubin Meuchel, Nevin Leh, Jackson Novak.

vide a deployment opportunity or ride-share launch to space for CubeSats selected through CSLI. ELaNa mission managers and their teams provide spaceflight education through the preparation (licensing, integration, and testing) of payloads flown in space.

Since its inception in 2010, CSLI has selected 202 CubeSat missions from 42 states, the District of Columbia, and Puerto Rico, and 119 CubeSat projects have launched into space through ELaNa rideshare opportunities.

Follow the ELaNa missions on social media using [@NASA_LSP](#) on Twitter and [@NASALSP](#) on Facebook.

National Aeronautics and Space Administration

John F. Kennedy Space Center
Kennedy Space Center, FL 32899

www.nasa.gov

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