National Aeronautics and Space Administration

Sounding Rockets Program Office Quarterly Newsletter

Rocket Report

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2022

INSIDE

Cover photo:
36.351 GE Halford/LAMP launch
from Poker Flat Research Range, AK.

HERSCHEL–2 recovery operations at White Sands Missile Range, NM. Photos by Judy Hawkins/Visual Information Branch/WSMR.

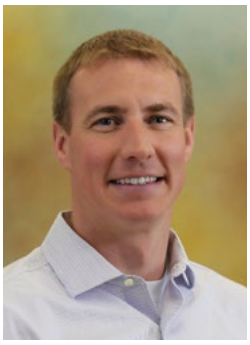
BOundary Layer Turbulence 2 (BOLT–2) on the spin/balance table at Wallops Flight Facility, VA.


STATIC / DYNAMIC
BALANCER

Program News

Two positions in the Sounding Rocket Program Office have been filled; Cathy Hesh is the new Assistant Chief and Scott Bissett has been named the Deputy Chief.

Cathy Hesh/Assistant Chief



Scott Bissett/Deputy Chief

All three payloads for the upcoming Australia campaign have been integrated and tested at Wallops. The first launch, the X–ray Quantum Calorimeter (XQC) mission for Dr. McCammon/University of Wisconsin, is scheduled for June 2022. The Suborbital Imaging Spectrograph for Transition region Irradiance from Nearby Exoplanet host stars (SISTINE) for Dr. France/University of Colorado, and the Dual–channel Extreme Ultraviolet Continuum Spectrograph (DEUCE) for Dr. Fleming/University of Colorado are scheduled for July 2022.

Four missions were launched during the 1st quarter of 2022, and the Ion–Neutral Coupling During Active Aurora (INCAA) team, with PI Dr. Kaeppler/Clemson University, are currently at Poker Flat Research Range, AK conducting operations.

The Sounding Rocket Working Group meeting was held using virtual tools in January 2022.

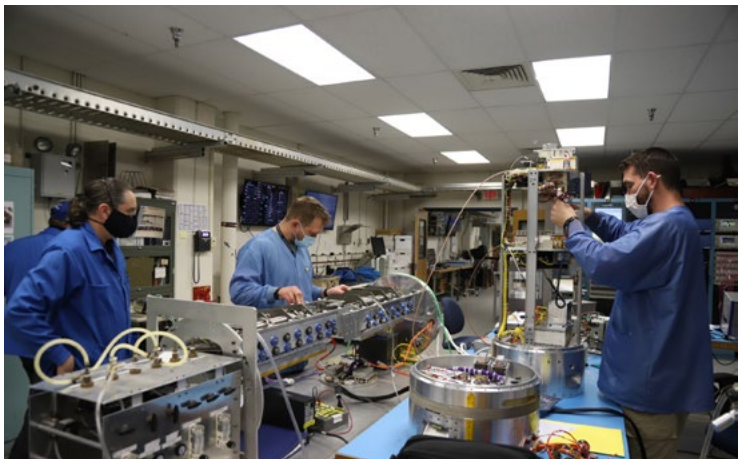
36.363 UH Galeazzi/University of Miami - Diffuse X-Rays from the Local Galaxy (DXL) 4 - launched January 9, 2022

X–rays from space bombard Earth on a daily basis. The sources and characteristics of these X–rays are not clearly understood. The purpose of the DXL mission was to investigate the sources of soft X–rays that speed towards Earth from elsewhere in our galaxy.

DXL team on Wallops Island before launch.
Photo by Allison Stancil/Wallops Imaging Lab.

Soft X–rays can make changes in the Earth's ionosphere which can disturb radio communications and the accuracy of GPS navigation systems. They have lower energy as compared to hard X–rays.

Very low energy diffuse X–rays from space are believed to come from two sources; the first source is located outside our solar system and is generated by remnants of multiple supernovae explosions forming what is now called the Local Hot Bubble region of our galaxy, the second source is within the solar system and is generated by the solar wind charge exchange. DXL seeks to gain a better understanding of the nature and characteristics of these sources.



DXL integration at Wallops.

This was the fourth launch of the DXL instrument. The first flight in 2012 confirmed the Local Hot Bubble as a source of these X–rays. Data from the flight indicated that only about 40 percent of the soft X–ray background originates within the solar system, which means the LHB is the dominant source.

36.351 GE HALFORD/NASA GSFC - Loss through Auroral Microburst Pulsations (LAMP) launched- March 6, 2022

LAMP was successfully launched on March 6, 2022 from Poker Flat Research Range in Alaska.

Earth's magnetic bubble — the magnetosphere — protects the planet from high–energy radiation coming from the Sun and interstellar space, but during particularly strong solar events, particles can slip through. Once inside, the particles and the energy they carry are stored on the night side of the magnetosphere, until an event, known as a substorm, releases the energy. The electrons are then sent speeding down into Earth's upper atmosphere where they collide with the other particles and produce the characteristic glow.

Pulsating auroras, however, have a slightly different cause. The magnetosphere is home to a type of plasma wave known as whistler mode chorus. These waves have characteristic rising tones and are able to efficiently disturb the electrons. When these waves make their appearance within the magnetosphere, some of the electrons scattered by the wave careen down into Earth's atmosphere, causing the pulsating auroras.

Chorus waves can launch both low and high–energy electrons, which may explain some puzzling coincidences. Pulsating aurora are caused by fairly low–energy electrons, but they're often observed alongside flashes of X–ray light known as microbursts, which come from higher–energy electrons.

Pulsating aurora and microbursts seem to happen at similar times, even though they're different energy ranges. The big questions that LAMP aims to answer include, are pulsating aurora and microbursts the same events and are they being driven by the same processes in the magnetosphere?

PI Alexa Halford and Electrical Tech Robert Gray during integration at Wallops.

LAMP team at Poker Flat. Credit: NASA Wallops Imaging Lab.

36.307 DS TUN/NAVAL RESEARCH LABORATORY - HElium Resonance Scatter in the Corona and HELiosphere (HERSCHEL) 2 - launched March 9, 2022

HERSCHEL–2 was launched from White Sands Missile Range, NM on March 9, 2022.

Solar flares and coronal mass injections send high–energy particles out into space and the corona constantly releases particles known as the solar wind.

Just as winds on Earth vary, the solar winds departing the Sun travel at different velocities – from a mere 700,000 mph, called slow solar winds, to the fast winds traveling up to 1.7 million mph.

Solar winds interacting with the Earth's atmosphere may interfere with communications, GPS signals, and electrical energy grids.

HERSCHEL–2 studied the origin of the slow solar wind, investigated the variation of helium abundance in the corona, and facilitated future investigation of coronal mass ejections and other solar dynamics.

Pre–launch preparations of HERSCHEL–2 at White Sands Missile Range NM.
Photo by Judy Hawkins/Visual Information Branch/WSMR.

HERSCHEL–2 team at WSMR.
Photo by Judy Hawkins/Visual Information Branch/WSMR.

46.027 DR HOLDEN/AFRL -BOundary Layer Turbulence (BOLT) 2 - launched March 21, 2022

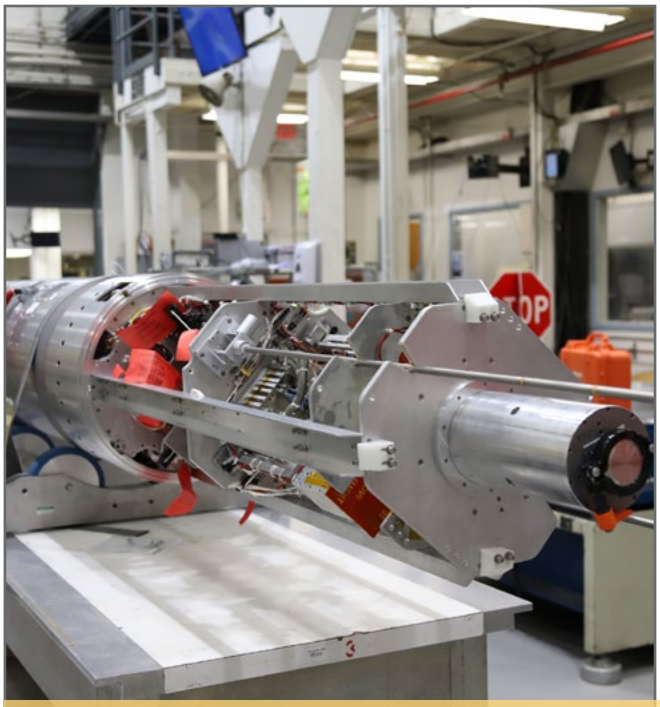
BOLT 2 was launched from Wallops Island, VA on March 21, 2022.

The goals of the Air Force Research Laboratory/Air Force Office of Scientific Research (AFRL/AFOSR) BOLT flight experiments collected scientific data to better understand Boundary Layer Transition (BOLT) and Turbulence (BOLT 2) during hypersonic flight. Specifically, the desire is to better enable prediction and control of viscous drag and heating on hypersonic vehicles.

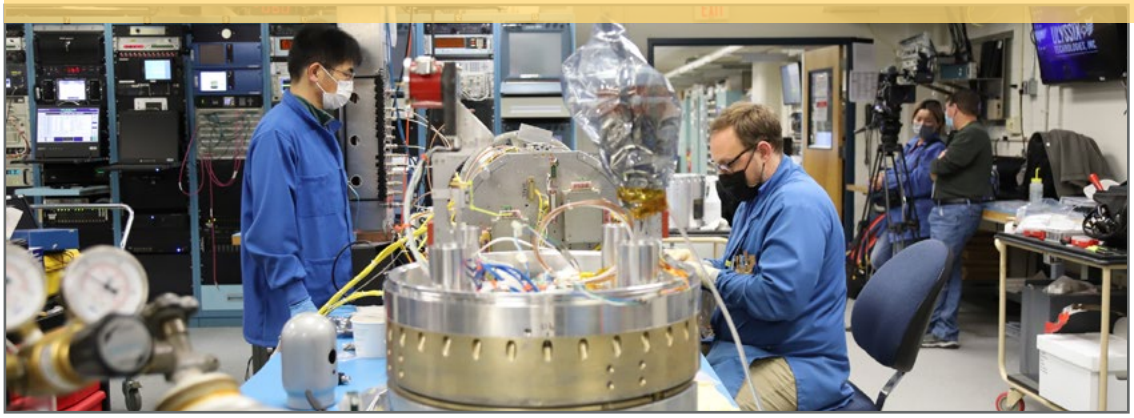
For more information on BOLT, visit: https://www.afrl.af.mil/News/Article/2967247/afrlafosr–to–conduct–rocket–launch–at–nasa–wallops–for–hypersonics–research/

BOLT–2 at Wallops during integration and testing.

BOLT–2 launches on a Terrier–Improved Malemute sounding rocket. Credit: Allison Stancil/Wallops Imaging Lab.



Picture Place



Integration and Testing

Australia payloads finish integration and testing.

Starting in June 2022 three missions are scheduled to be launched from a newly established launch range near Nhulunbuy, Australia. All three payloads for the Australia campaign completed integration and testing at Wallops Flight Facility.

XQC integration at Wallops Flight Facility.
Photo by Berit Bland/NSROC

36.347 UH McCammon/University of Wisconsin - X-ray Quantum Calorimeter (XQC)

The night sky glows with X–ray light coming from all directions. Much of this X–ray light is produced by the interstellar medium, which includes hot gas–es filling the space between the stars. The unique X–ray detectors on this mission, cooled to a frigid one–twentieth of a degree above absolute zero, will measure the arriving X–rays with unprecedented precision to better understand the interstellar medi–um and its influence on the structure and evolution of galaxies and stars.

SISTINE during integration at Wallops
Flight Facility. Photo by Berit Bland/NSROC

36.339 UG France/University of Colorado - Suborbital Imaging Spectrograph for Transition region Irradiance from Nearby Exoplanet host stars (SISTINE)

SISTINE will study how light from stars affects the atmospheres of the planets around them, including the gases thought to be signs of life. For the upcoming flight, SISTINE will measure the ultraviolet light output from α Centauri A and B, two stars of the three–star α Centauri system that are the closest stars to our Sun.

DEUCE on the mass properties measurement table..
Photo by Berit Bland/NSROC

36.350 UG Fleming/University of Colorado - Dual-channel Extreme Ultraviolet Continuum Spectrograph (DEUCE)

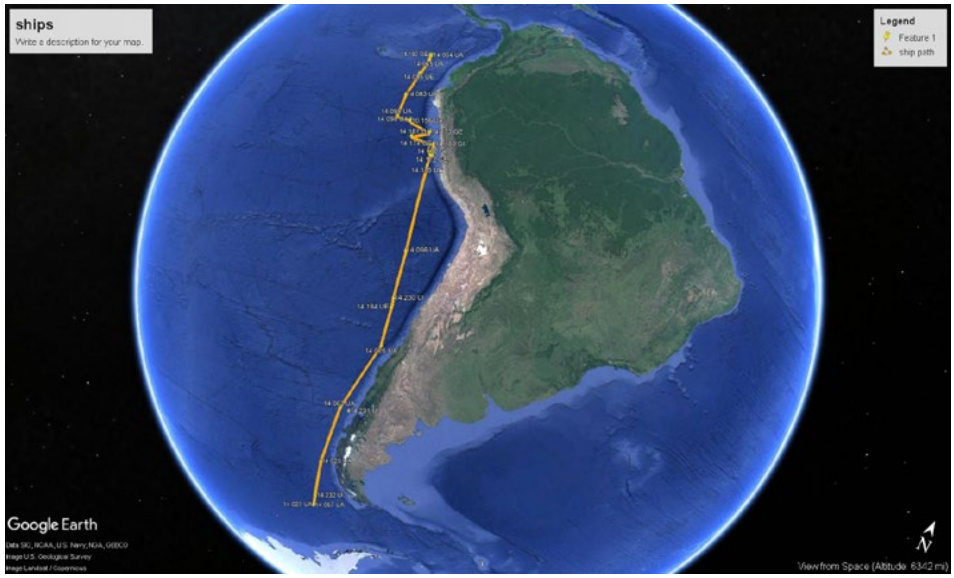
DEUCE will observe α Centauri A and B. DEUCE will measure a so–far unstudied part of their extreme ultraviolet light spectrum. These measurements are needed to model stars similar to and smaller than our Sun, as well as understand their effects on planetary atmospheres.

USNS Croatan 1965

Cruising the coast of South America while launching Sounding Rockets.

NASA equipment onboard the USNS Croatan.

USNS Croatan.



Croatans trajectory during the campaign.

The 1965 shipboard firings were part of NASA's contribution to the International Year of the Quiet Sun (IQSY). A total of 37 Nike–Apaches and 1 Nike–Cajun were launched from the Wallops mobile range facility on the U.S.N.S. Croatan, while it cruised along the west coast of South America between March 8 and April 22, 1965. The experiments were aimed at determining the states of the upper atmosphere and ionosphere during solar sunspot minimum, particularly the equatorial electrojet. The instrumentation was provided by the Universities of Michigan, New Hampshire and Illinois, and Goddard Space Flight Center, and others.

The Croatan, named after a sound on the North Carolina coast, was built during World War 2 as a "jeep carrier". The ship was launched on August 1, and commissioned as USS Croatan, later USNS, on April 28, 1943. After having served in the Pacific during the war, the Croatan was decommissioned May 20, 1946. Croatan was then reactivated in 1958 as an aircraft transport, and ferried military aircraft around the world until 1964 when the ship was assigned a new task for NASA.

The mobile launch platform provided by the ship enabled research in the region of the magnetic equator. The rocket flights provided upper atmosphere and ionosphere measurements that were correlated with worldwide scientific studies.

The first rocket, 14.065, was launched on March 8, 1965 and the last successful launch was 14.025 on April 15, 1965, both for University of Michigan. Only two experiment failures, and no vehicle failures occurred during the campaign.

Ref.
Rocket Ship by Dwayne A. Day
https://www.thespacereview.com/article/854/1

MISSION	DISCIPLINE	EXPERIMENTER	ORGANIZATION	PROJECT	RANGE	DATE
47.001 GE	GEOSPACE SCIENCES	COLLINSON	GSFC	Endurance	SVAL	05/09/22
41.131 UO	STUDENT OUTREACH	KOEHLER	COLORADO SPACE GRANT	ROCKON	WI	06/23/22
36.347 UH	HIGH ENERGY ASTROPHYSICS	MCCAMMON	UNIV. OF WISCONSIN	XQC	AUS*	06/26/22

WI – Wallops Island, VA
SVAL – Svalbard, Norway
AUS – Arnhem Space Center, Australia

NASA Activities for Students

What's Up: Skywatching Tips from NASA: https://solarsystem.nasa.gov/skywatching/home/