

THE FLIGHT PLAN

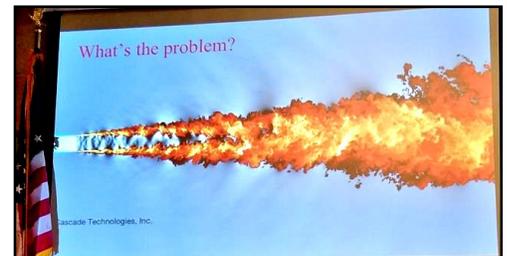
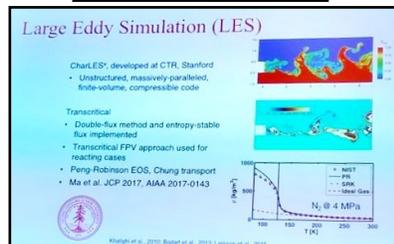
The Newsletter of AIAA Albuquerque Section
 The American Institute of Aeronautics and Astronautics

FEBRUARY 2020 SECTION MEETING: WHY HIGH PRESSURE INJECTION IS DIFFERENT.

Prof. Daniel T. Banuti
 University of New Mexico

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Upcoming Monthly Dinner Lectures:

Mar 19: CANCELLED

Talk is postponed

Apr 16: TBD

May 21: TBD



Professor Banuti began his talk with an introduction to himself. He is new to New Mexico. He was born in Germany and received his degrees at Aachen and Stuttgart, and then worked at the German Aerospace Center (DLR) in Göttingen before moving to California and then Albuquerque. The focus of his talk was to discuss issues with studying and simulating high pressure injection. Such conditions exist when fuel and oxidizer are introduced into liquid propellant rocket engines. These engines as well as gas turbines, and Diesel engines have reached conditions in which we no longer encounter liquids and gases, but in which the working fluids have rather reached a lesser understood supercritical state, with properties somewhere between liquids and gases. He gave an overview of recent findings and future challenges that will help us to understand and design future propulsion and power systems.

CALENDAR

Local Section Events

Thursday 19 March — Section Meeting **CANCELLED**
Roll Out Solar Array (ROSA) Design and Flight Experiment

Presentation is POSTPONED

Copper Canyon Café: 5455 Gibson Blvd, Albuquerque
5:30pm Meet and greet
5:45pm Dinner (order when ready)
6:30pm Presentation and discussion

Upcoming U.S. Launches

Mar 19 Atlas 5 • AEHF 6

Mar 30 Falcon 9 • SAOCOM 1B

Apr 29 Falcon 9 • GPS 3 SV03

TBD Minotaur 4 • NROL-129

TBD LauncherOne • Inaugural Flight

TBD LauncherOne • ELaNa-20

TBD Falcon 9 • Anasis 2

National AIAA Events

[2020 Region IV Student Conference](#)

27 MARCH - 28 MARCH 2020 STILLWATER, OK

February meeting:



AIAA ALBUQUERQUE ELECTION

Robert Malseed, Treasurer

Our Albuquerque section will hold our annual officer election in April. Please consider volunteering to be one of our section officers. We have been without a Vice-Chairman and a Communications officer this year. All help will be greatly appreciated. Contact :

BenUrioste@gmail.com or Robert@malseed.com

After discussions with section officers and the guest speaker, we have decided to cancel our March meeting and postpone the talk until a time when more members will be free to attend.



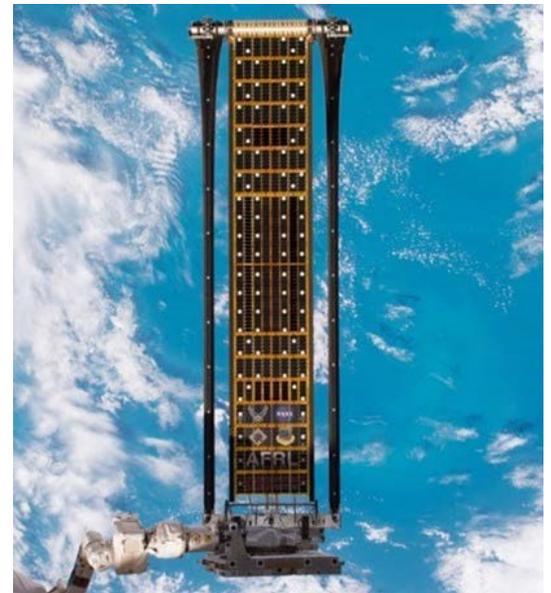
AIAA Lecture



Roll Out Solar Array (ROSA) Design and Flight Experiment .

Capt. Christopher Box, Air Force Research Laboratory

The Roll Out Solar Array (ROSA) is a novel, lightweight, rolled flexible blanket solar array for spacecraft. An external experiment on the International Space Station in June 2017 was conducted to unfurl this new solar array system, then measure the structural dynamics behavior and power production performance in the combined microgravity and extreme thermal environment of space. ROSA is an improvement from heritage rigid panel solar arrays because it shrinks mass by 20 percent and stowed volume by a factor of 4. This experiment was a collaboration between the Air Force Research Laboratory (experiment lead), the Department of Defense Space Test program, NASA, and Deployable Space Systems, Inc. The talk will give an overview of the ROSA design, examine some of the results from on-orbit tests, and discuss ROSA's future.



Speaker Bio:

Captain Christopher Box serves as Deputy Program Manager, Integrated Structural Systems (ISS) Program at the Space Vehicles Directorate of the Air Force Research Laboratory (AFRL) at Kirtland AFB, NM. He also leads the Deployable Structures thrust area within the program to develop novel, highly compactible structures for spacecraft.

In his prior assignment, Captain Box was enrolled at the Air Force Institute of Technology, where in 2017 he graduated with a Master of Science in Astronautical Engineering. His thesis work studied the compressive strength of additively manufactured periodic cellular materials (commonly referred to as lattice structures).

When: TBD

COST: Pay for your own meal

Where: Copper Canyon Café, (505-266-6318)
Albuquerque NM 87108
(at Gibson and San-Pedro)

5:30 - 5:45 Meet and Greet
5:45 - 6:30 Dinner (order when ready)
6:30 ~ 7:30 Presentation & Discussion

SCIENCE FAIR – CANCELLED

By Robert Malseed—Treasurer

This year's Central New Mexico Science and Engineering Research Challenge (Science Fair) has been cancelled. We hope you will consider being one of our Special Awards judges in future years.

KATHERINE JOHNSON PIONEERING NASA MATHEMATICIAN OF 'HIDDEN FIGURES' FAME, DIES AT 101

By Mark Fraser—Public Policy Officer

"NASA Administrator Jim Bridenstine announced her death (Feb. 24)... 'Ms. Johnson helped our nation enlarge the frontiers of space even as she made huge strides that also opened doors for women and people of color in the universal human quest to explore space. Her dedication and skill as a mathematician helped put humans on the moon... The release of 'Hidden Figures' made Johnson one of the most celebrated black women in space science and a hero for those calling for action against sexism and racism in science and engineering.'" (space.com [article](#))

Also, see the NASA [video](#), Wikipedia [article](#), and "Hidden Figures" IMDB [link](#).



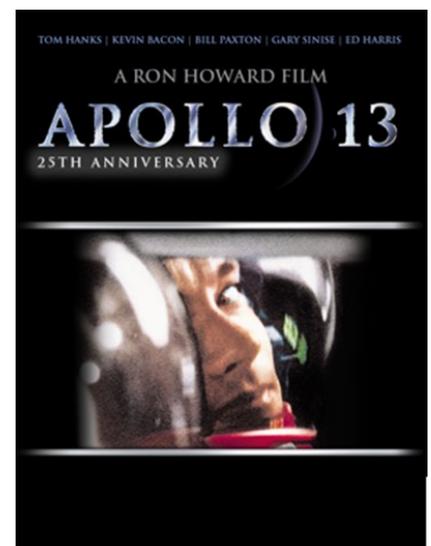
"APOLLO 13" SHOWING IN ALBUQUERQUE IN APRIL

By Mark Fraser—Public Policy Officer

Fathom Events will be showing "Apollo 13" at three theaters on April 5, 6, & 8 ([link](#)).

This 1995 American space docudrama film was directed by Ron Howard and stars Tom Hanks, Kevin Bacon, Bill Paxton, Gary Sinise, and Ed Harris. The film dramatizes the aborted 1970 Apollo 13 lunar mission, and it won two Academy Awards in 1996.

See the Wikipedia [article](#) and the IMDB [link](#).



CORONAVIRUS UPDATES FOR NEW MEXICO

By Mark Fraser—Public Policy Officer

Follow this [link](#) from the New Mexico Department of Health.



Coronavirus Disease 2019
in New Mexico

CONGRESSIONAL SUPPORT FOR NEW MEXICO

By Mark Fraser—Public Policy Officer



Senator Tom Udall



Senator Martin Heinrich

- In December 2019, U.S. Senators [Tom Udall](#) and [Martin Heinrich](#) joined the full Senate in passing government funding bills for fiscal year 2020. Udall and Heinrich secured critical investments in the bills for New Mexico’s economy and communities.

Highlights include: Space and Hypersonics, Inland Launch, Directed Energy and Electronics, Air Force RDT&E Technology Transfer, Defense Nuclear Facilities Safety, Bio-energy Technologies, and various education programs.

The bill provides \$63.7 million for new facilities and construction for Kirtland AFB, Holloman AFB, and White Sands Missile Range. On the national level, the bill includes \$22.63 billion for NASA; and \$8.27 billion for the National Science Foundation (NSF).

- In February, U.S. Senators [Tom Udall](#) and [Martin Heinrich](#) and U.S. Representatives [Ben Ray Luján](#), [Deb Haaland](#), [Xochitl Torres Small](#), along with New Mexico Governor [Michelle Lujan Grisham](#), sent a letter to General [John W. Raymond](#), the first Chief of Space Operations for the U.S. Space Force and Commander of U.S. Space Command.

The letter urged General [Raymond](#) to utilize New Mexico’s existing public and private sector space capabilities as the United States Space Force develops its infrastructure and mission. The letter was also sent to Secretary of Defense [Mark Esper](#), and Secretary of the United States Air Force [Barbara Barrett](#).

“As you work to establish the newly formed United States Space Force, our delegation urges you to fully incorporate and leverage New Mexico’s existing public and private sector space capabilities,” the lawmakers wrote.

Virgin Galactic VSS Unity Moved To Spaceport America For Final Testing

[SPACE](#) (2/14) reported that Virgin Galactic’s SpaceShipTwo vehicle, VSS Unity, arrived February 13 at Spaceport America in New Mexico. Unity made the flight “beneath the wings of VMS Eve, the plane that will carry Unity aloft during operational missions.” Transport, therefore, served as a test. Virgin Galactic said in a statement, “This captive-carry flight provided an opportunity for engineers to evaluate VSS Unity for over three hours at high altitude and cold temperatures, a longer period of time than is experienced during missions to space. These environmental evaluations of system performance are difficult to replicate at ground level, making captive-carry missions a vital component of VSS Unity’s flight-test plan.” Further tests include more captive-carry flights, “unpowered ‘glide flights,’” and “rocket powered test missions, Virgin Galactic representatives wrote in yesterday’s statement.” When tests are completed, Unity “will be ready to begin flying paying customers.”

[Space News](#) (2/14, Subscription Publication) reported that Virgin Galactic CEO George Whitesides said in a statement, “We still have significant work ahead, but we are grateful to all our teammates who have made this day a reality.” VSS Unity’s last powered flight was “nearly a year ago. Since then Virgin Galactic has been making upgrades to the vehicle, including outfitting its cabin for commercial flights.”



STUDENT BRANCH NEWS

By Robert Malseed—Treasurer



The University of New Mexico Lobo Launch team was honored at the New Mexico statehouse in Santa Fe by Gov. Michelle Lujan-Grisham for being the first team to win the 2019 Chile Cup, a new competition within the Spaceport America Cup contest between New Mexico teams.

The University of New Mexico's Lobo Launch rocket team placed No. 5 overall and No. 3 in its height class out of 120 teams from 14 countries in the June 18-22 Spaceport America Cup near Las Cruces. It was the first time the team competed in that contest.

STUDENT BRANCH ELECTION

By Jeremy Holder—Branch Chairman

On 25 FEB 20 we elected five new officers. As well as placing students in our core vital roles, treasurer and secretary; we created two new positions to ensure effective growth and communication going forward. At the time of election, I was the acting interim chair but have moved into being the permanent AIAA UNM student branch chair going forward. The list of current officers is as follows:

Jeremy Holder - Chair
 Baron Fillpot - Treasurer
 Steven Santillan - Secretary (Subject to his approval)
 Sonny Ji -Website Chair (New Position)
 Arnaud Cammas - Co-Website Chair (New Position, Subject to his approval)
 Nha-Truc Ashley Tran – Outreach Chair (New Position)

For the first time in many months we had a guest speaker talk to the AIAA student section. Erich Brown, a research engineer from Cosmiac, discussed what his experience has been as a former undergraduate and graduate student at UNM now engaged in the engineering workforce. He highlighted not only his research projects but his work trajectory in and out of university. Erich encouraged students to think about the local opportunities in Albuquerque and New Mexico as there are many.

We will continue to have speaker meetings throughout the spring 2020 semester. Our potential speaker for March is Ben Urioste from the local AIAA section and firmly scheduled is Fernando "Doc" Aguilar. "Doc" is the faculty head for the UNM Lobo Launch senior design project. He is scheduled to talk 21 APR 20.

SUPER STEM SATURDAY

By Robert Malseed—Treasurer

A few of our section members represented AIAA for Super STEM Saturday at the Albuquerque Convention Center. We brought out our flight simulators, displays, and AIAA handouts to the event. There was always a long line of children wanting to fly the DreamFlyer. Others flew our table-top flight simulator, watched spacecraft videos, and learned about air-to-air missile guidance.



Linda and Elfego at our table.



Long line for the Dream Flyer.



Elfego helps pilots with the simulator.



Nick helps pilots with the Dream Flyer.



Once again we had visitors from that Galaxy far, far away.



Robert explains 1950s-era Falcon missile guidance. 7

THIS MONTH IN AIR & SPACE HISTORY

105 Years Ago – 1915

March 3: The National Advisory Committee for Aeronautics (NACA), the predecessor agency to NASA was founded “...to supervise and direct the scientific study of problems of flight, with a view to their practical solution...”

60 Years Ago - 1960

March 11: Pioneer 5 launched , 8:00 a.m., EST, on a Thor-Able from Cape Canaveral, Fla.

March 15: Goddard Space Flight Center named by Presidential Executive Order for Dr. Robert H. Goddard, Washington, D.C.

March 23: An Explorer S-46 satellite failed to orbit using a Juno 2 launch vehicle at 8:35 a.m., EST, from Cape Canaveral, Fla.

March 25: First flight of Joseph A. Walker, X-15 pilot, Dryden Flight Research Facility (FRF), CA.

55 Years Ago - 1965

March 9: First launch of eight satellites on a single launch vehicle (Thor Agena-D) from Vandenberg, AFB.

March 18: Voskhod 2 launched. Cosmonauts Pavel I. Belyayev and Aleksei A. Leonov. 0658 UTC, Baikonur. USSR. First two-man crew. Aleksei Leonov performed first spacewalk.

March 21: Ranger 9 launched. 4:37 p.m., EST, Cape Canaveral, Fla. Impacted on the moon 9:08 a.m., EST, March 23, after taking 5,814 close-up photographs of the lunar surface.

March 23: Gemini Titan 3, with astronauts Virgil I. Grissom and John W. Young aboard. Launched 9:24 a.m., EST, Cape Canaveral, Fla. First manned Gemini flight for 3 orbits of the earth lasting 4 hours and 53 minutes. First person to eat a corned beef sandwich in space: Virgil Grissom. First U.S. two-person flight. First manual maneuvers in orbit.

50 Years Ago – 1970

March 5: First NASA flight in a YF-12A with Fitzhugh Fulton as pilot.

March 10: French Dial-Mika and German Dial-Wika satellites launched on a Diamant launch vehicle from Kourou, French Guiana.

March 19: First X-24A powered flight, Jerauld R. Gentry pilot, Dryden Flight Research Facility (DFRF), CA.

March 20: NATO 1 launched, 6:52 p.m., EST, Cape Canaveral, Fla.

March 31: Explorer 1 reentered the earth’s atmosphere, having travelled 2.67 billion kilometers (1.66 billion miles) and made 58,408 revolutions of the earth during its 13-year lifetime.

45 Years Ago – 1975

March 16: Mariner 10 made its last and closest flyby of Mercury, discovering that it has an intrinsic magnetic field.

40 Years Ago – 1980

March 7: Research pilot John Manke rested the Gossamer Albatross to collect data on large lightweight craft.

THIS MONTH IN AIR & SPACE HISTORY

35 Years Ago – 1985

March 22: Intelsat VA F-10 launched, 6:55 p.m., EST, Cape Canaveral, Fla..

30 Years Ago – 1990

March 26: GPS 7 also known as Navstar 2-7 (block 2 spacecraft) launched, part of the Global Positioning Satellite System.

25 Years Ago – 1995

March 2: STS-67 (Space Shuttle Endeavour) launched from KSC at 1:38 a.m. EST. Crew: Stephen S. Oswald, William G. Gregory, Tamara E. Jernigan, John M. Grunsfeld, Wendy B. Lawrence, Ronald A. Parise, and Samuel T. Durrance. Ultraviolet Astronomy (ASTRO) 2 Telescope observations taken. Mounted on Instrument Pointing System on Spacelab pallet in cargo bay. Landed at Edwards AFB, CA, March 18 at 4:47 p.m. EST. Mission Duration: 16 days, 15 hours, 8 minutes.

March 14: Norman Thagard became first American astronaut to be launched on a Russian or Soviet rocket as a member of the Soyuz TM-21 crew and the first American to stay aboard the Mir space station. Crew also included Gennady Strekalov and Vladimir Dezhurov. Launched aboard a Soyuz rocket from Baikonur at 06:11:34 UTC.

20 Years Ago – 2000

March 25: IMAGE (Imager for Magnetopause-to-Aurora Global Exploration), an American magnetospheric science spacecraft, launched by a Delta 2 rocket from Vandenberg AFB at 20:35 UTC.

10 Years Ago – 2010

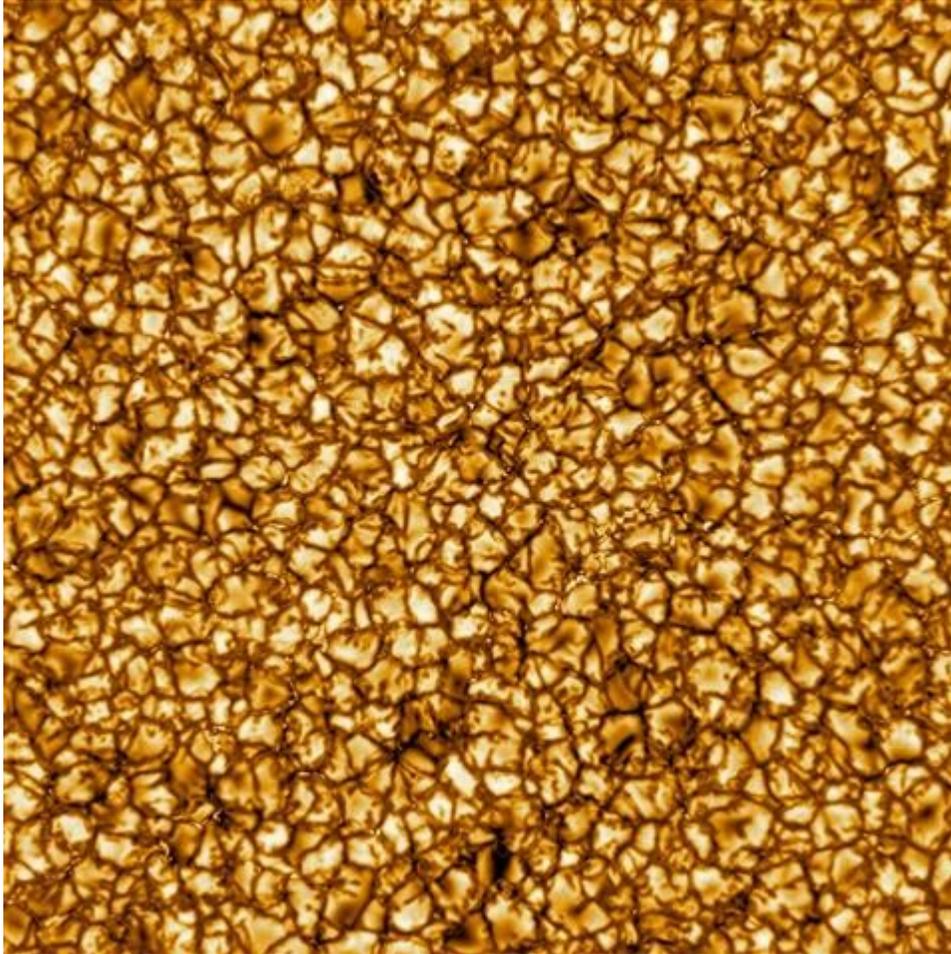
March 18: Soyuz TMA-16 spacecraft landed with Expedition 22 commander Jeff Williams and Russian flight engineer Maxim Suraev to cap off a milestone space station mission (Expedition 22) that supported two shuttle flights and helped install the Tranquility module, cupola viewing port and second Russian docking module.

5 Years Ago – 2015

March 6: Dawn spacecraft has become the first mission to achieve orbit around a dwarf planet, It entered orbit around asteroid Ceres at 7:20 a.m. EST (1220 GMT).

March 13: Magnetospheric Multiscale (MMS) mission, launched at 02:44:00 UTC, by an Atlas V, at Cape Canaveral. A Solar Terrestrial Probes Program mission within NASA's Heliophysics Division, the MMS mission, consisting of four identically instrumented spacecraft, uses Earth's magnetosphere as a laboratory to study magnetic reconnection.

March 27: Soyuz TMA-16M spacecraft launched from the Tyuratam (Baikonur Cosmodrome), Kazakhstan by a Soyuz FG launch vehicle at 19:42:00 UTC and docked with the International Space Station (ISS). Crew: Cosmonauts Gennady Padalka and Mikail Kornienko, along with NASA astronaut Scott Kelly. Padalka became the first four-time commander of the ISS. (Expedition 43) Began the Twins Study with NASA astronaut Scott Kelly (in space) and his brother, former astronaut Mark Kelly (on Earth).

IMAGE OF THE MONTH**Highest Resolution Picture of the Sun's Photosphere**

A new solar telescope in Hawaii has taken its first photo and movie of the Sun. The shots are the highest resolution views of our star yet, showing details on the Sun's surface as small as about 18 miles in size. The grainy pattern in the telescope's "first light" image is the mark of plasma cells on the Sun's surface. Hot plasma from within the Sun rises to the surface, cools and sinks back down in a process called convection, like bubbling water in a boiling pot. The hotter parts where new plasma has just risen up from below appear bright in the photo, while the places where cooler plasma sinks back down appear dark. The grains in this first image from the telescope are roughly the size of Texas.

The Daniel K. Inouye Solar Telescope is located on the island of Maui. A primary mirror that's 4 meters (about 13 feet) wide makes this the biggest solar telescope on Earth, and it will be able to resolve smaller details on the Sun than ever before

PARTING THOUGHTS

"The important achievement of Apollo was demonstrating that humanity is not forever chained to this planet and our visions go rather further than that and our opportunities are unlimited."

— Neil Armstrong

**SECTION
INFORMATION**

AIAA ALBUQUERQUE

Chair	Mr. Ben Urioste
Vice-Chair	
Secretary	Dr. Terry Caipen
Treasurer	Mr. Robert Malseed
Publications (Acting)	Mr. Robert Malseed
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Membership	Ms. Erin Pettyjohn
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 online at www.aiaa.org.

AIAA MISSION AND VISION STATEMENT

AIAA's mission is to inspire and advance the future of aerospace for the benefit of humanity. AIAA's vision is to be the voice of the aerospace profession through innovation, technical excellence, and global leadership.