



June 2022

**Oklahoma Space  
Alliance**

A Chapter of The  
National Space Society

A free email newsletter of the Oklahoma Space Alliance

## FAA delays environmental review of SpaceX's Starship 2 more weeks, to June 13

By [Mike Wall](#) published June 1, 2022



The U.S. Federal Aviation Administration (FAA) has delayed the completion of its environmental review of SpaceX's Starship program by another two weeks, to June

13.

That review, known as a programmatic environmental assessment (PEA), is gauging the environmental impacts of SpaceX's Starbase site in South Texas, where the company builds and tests its giant [Starship](#) vehicle.

<https://www.space.com/faa-spacex-starship-review-delayed-june-13>

Video 8:06 <https://www.youtube.com/watch?v=qoABTxOmtpw>

## **Oklahoma Space Alliance Update**

**June, 2022**

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## **A 'quasi-moon' asteroid companion of Earth that may actually be a moon relic** By Tereza Pultarova published November 11, 2021



An artist impression of Earth quasi-satellite Kamo'oailewa. Astronomers using the Large Binocular Telescope have shown that it might be a lost fragment of the moon. (Image credit: Addy Graham/University of Arizona)

A mysterious object near the Earth is the first known space rock made of what looks like a piece of the moon, a new study reveals. It may, in fact, have split off the moon in an ancient collision with an asteroid.

The space rock, called Kamo'oailewa, was discovered in 2016. It has been the target of study by Vishnu Reddy, an associate professor in cosmochemistry and planetary astronomy at the University of Arizona, and his PhD student Benjamin Sharkey.

Full Story: [A 'quasi-moon' asteroid companion of Earth that may actually be a moon relic | Space](#)

Video 1:34 <https://www.youtube.com/watch?v=6klbS0X9w9s>

## Quote of the Month

“Throughout history, poverty is the normal condition of man. Advances which permit this norm to be exceeded — here and there, now and then — are the work of an extremely small minority, frequently despised, often condemned, and almost always opposed by all right-thinking people. Whenever this tiny minority is kept from creating, or (as sometimes happens) is driven out of a society, the people then slip back into abject poverty.

This is known as “bad luck.” — Robert Heinlein

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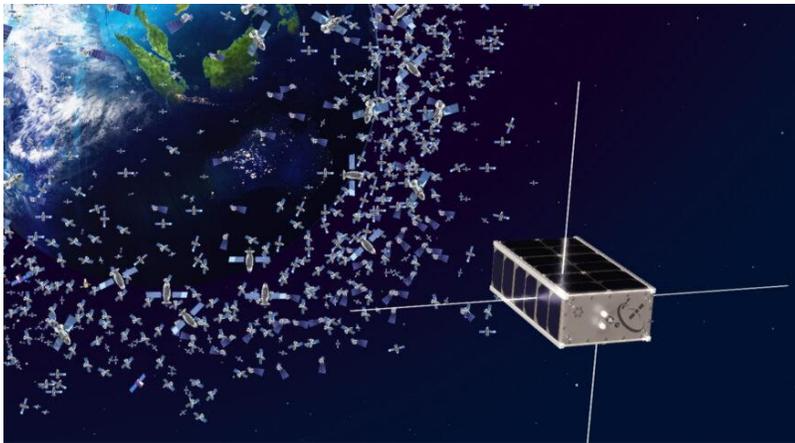
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## Non-Military Space News

### **Startups developing space traffic monitoring system to help manage growing debris problem**

WASHINGTON — Startup Scout Space announced Nov. 16 it has won a U.S. Air Force contract to integrate data from satellites and ground sensors that monitor objects in orbit. The company will seek to demonstrate that data collected in space — combined with data from traditional ground sensors — significantly improves the accuracy of space debris tracking and can help predict collisions.



The two-year old startup based in Alexandria, Virginia, hopes that the \$50,000 Phase 1 Small Business Innovation Research (SBIR) award will lead to bigger contracts for a space-monitoring service it is developing in partnership with [Kayhan Space](#), another startup focused on space traffic management and collision avoidance software.

In theory, instead of creating another constellation for space surveillance, the Scout payloads could serve as collision avoidance aids on any satellite delivering broadband or imaging services, Ingram said. “We are making it modular so that anyone can use it to improve space safety. So, it doesn’t necessarily have to be dedicated assets providing the data.”

Ingram said Scout has raised venture funding in a pre-seed round and “we are in the process of raising a seed round. We do anticipate there will be a need for mix of commercial and government funding sources to get this off the ground.”

Full story <https://spacenews.com/startups-developing-space-traffic-monitoring-system-to-help-manage-growing-debris-problem/>

Company news story <https://scout.space/news/scout-and-leocloud-collaborate-to-deliver-the-next-generation-of-space-domain-awareness-services>

Related video: 2:30 <https://www.youtube.com/watch?v=lpsBKYcdXBE&t=17s>

Related story: Feb 1, 2022 memo USD(R&E) Technology Vision for an Era of Competition [https://www.cto.mil/wp-content/uploads/2022/02/usdre\\_strategic\\_vision\\_critical\\_tech\\_areas.pdf](https://www.cto.mil/wp-content/uploads/2022/02/usdre_strategic_vision_critical_tech_areas.pdf)

## **NASA chooses two companies to build spacesuits for its 21st-century Moonwalkers**



**An artist's illustration of two suited crew members working on the lunar surface NASA**

ERIC BERGER - 6/1/2022, 5:19 PM — NASA took another step toward landing humans on the Moon when the agency announced a plan to purchase new and more versatile spacesuits for its astronauts.

After more than a decade of work to develop a new spacesuit in-house, NASA said it would instead buy spacesuit services from two private companies, Axiom Space and Collins Aerospace.

Each of these companies will be able to use technology NASA has worked on but are responsible for the overall development of the spacesuits used on the International Space Station and activities on the lunar surface. Axiom and Collins said they intended to demonstrate their spacesuits for NASA—likely in the form of a spacewalk outside the space station—by 2025.

These will be NASA's first new spacesuits in decades. "The previous suit has been the workhorse for 40 years," said the director of NASA's Johnson Space Center, Vanessa Wyche, during a news conference. "These new capabilities will allow us to continue on the ISS and allows us to do the Artemis program and continue on to Mars."

As part of NASA's ongoing embrace of commercial space and goal of becoming "one of many" spaceflight customers, NASA will provide a limited amount of guaranteed funding to support spacesuit programs at Axiom and Collins. However, the bulk of the funding will be paid out through task orders between now and 2034. Wednesday's announcement means that both companies will be eligible to bid to provide spacesuit services, including ongoing maintenance, for Artemis missions to the Moon and ISS extravehicular activities. The contract for all of the task orders has a ceiling of \$3.5 billion.

Full Story <https://arstechnica.com/science/2022/06/nasa-announces-a-new-plan-to-buy-private-spacesuits-to-make-lunar-landing-date/>

Collins Video 3:16 <https://www.youtube.com/watch?v=rUTIPLkIgg>

## Bezos's Blue Origin makes 5th crewed flight into space

Jeff Bezos's company Blue Origin flew six tourists into space for a 10-minute ride Saturday, successfully carrying out its fifth crewed mission. The white spacecraft called New Shepard lifted off with a roar from a desert spot in west Texas at 8:26 local time (1326 GMT).

The crew hooted with glee as the rocket reached space, a Blue Origin webcast showed. The flight included engineer Katya Echazarreta, who at 26 became the youngest American woman in space. The Guadalajara native also became the first Mexican-born woman to go into space.

Her spot was sponsored by Space for Humanity, a program which seeks to democratize access to space and selected her from among 7,000 candidates. The crew also included the first Brazilian to go into space, Victor Correa Hespanha, as well as businessmen Hamish Harding, Jaison Robinson, Victor Vescovo and Evan Dick. Dick also flew on New Shepard's third crewed flight in December. Ticket prices are a closely guarded secret.

The gumbop-shaped capsule holding the crew detached from the rocket once the latter took them into the heavens. The rocket booster part then eased down vertically, letting off a [sonic boom](#) at one point, and landed to be reused.

The capsule kept going up until it crossed the so-called Karman line at an altitude of about 100 km (60 miles), which by [international convention](#) is considered the boundary between Earth's atmosphere and space.



At that height the crew experienced weightlessness for a few minutes and could observe Earth's curvature through big windows in New Shepard. The capsule then fell back to Earth, with three giant parachutes and retro engines helping it make a gentle landing that kicked up a big cloud of dust.

This flight had been scheduled for May 20 but was delayed because of a problem with one of the spacecraft's back-up systems. Blue Origin did not give details of the problem.

Blue Origin's competitor for this kind of thing is Virgin Galactic. But since its maiden voyage last July carrying its founder, the business tycoon Richard Branson, the spacecraft has stayed on the ground to undergo modifications.

Full Story <https://phys.org/news/2022-06-bezos-blue-5th-crewed-flight.html>

Bezos Video 1:20 <https://www.youtube.com/watch?v=yKPiggavLuc>

## SpaceX launches 59 small satellites, lands rocket back on Earth



May 25, 2022 SpaceX launched 59 small satellites and landed the returning rocket today (May 25) on a "rideshare" mission called Transporter 5.

A two-stage [Falcon 9](#) rocket lifted off from Cape Canaveral Space Force Station in Florida today at 2:35 p.m. EDT (1835 GMT), on a mission called Transporter 5. The Falcon 9's first stage came back to Earth for a vertical touchdown at Cape Canaveral's Landing Zone 1 about 8.5

minutes after launch.

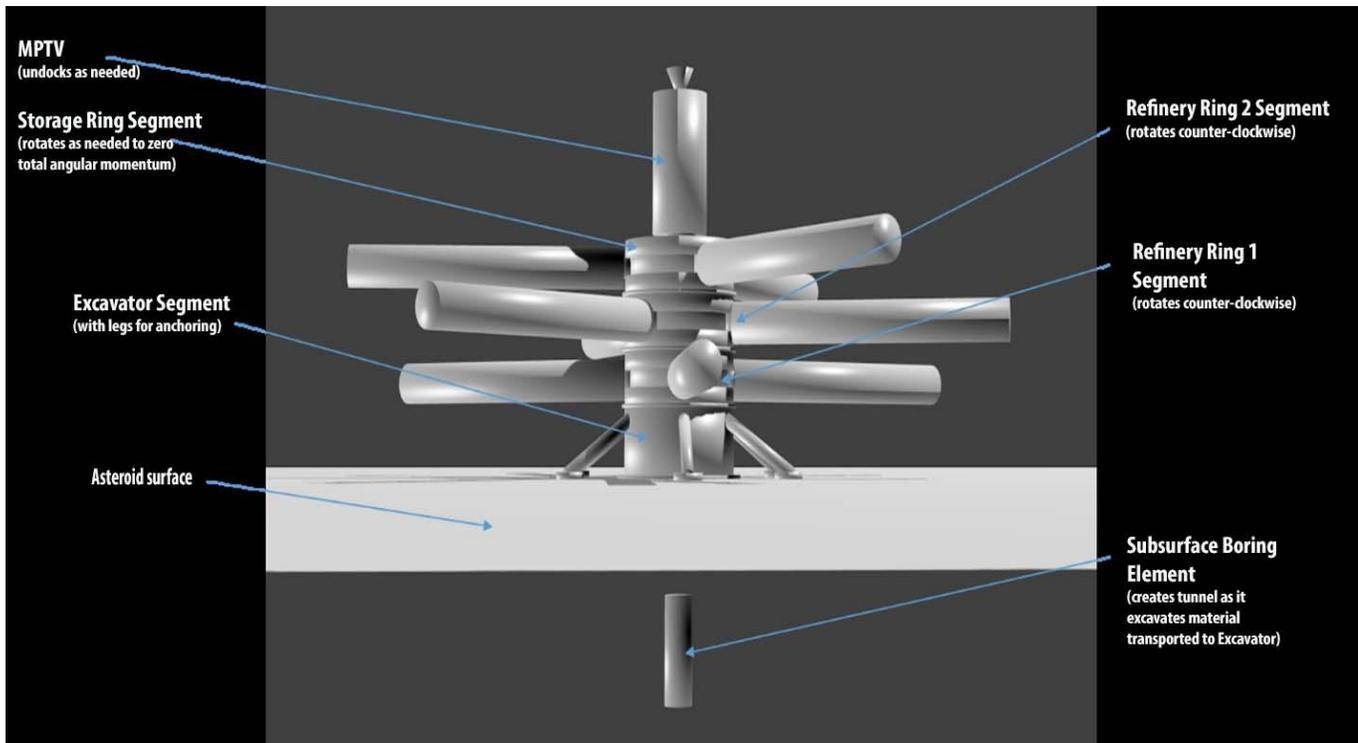
All 59 payloads were deployed into orbit by about 75 minutes after liftoff as planned, SpaceX representatives said.

Full Story: <https://www.space.com/spacex-transporter-5-rocket-launch-landing>

YouTube Video 2:19 <https://www.youtube.com/watch?v=UWShyrN6Juk>

## Modular Artificial-Gravity Orbital Refinery Spacecraft

The NASA Technology Transfer Program <https://technology.nasa.gov> provides a mechanism for to license NASA invention to commercial business. An example is the patent pending Modular Artificial-Gravity Orbital Refinery Spacecraft



An illustration of the MAGORS system overview deployed on an asteroid surface

## Overview

The Modular Artificial-Gravity Orbital Refinery Spacecraft is a novel, patent-pending technology from NASA Ames Research Center for in-situ refining or recycling of materials in space, including mass from asteroids, Mars moons, orbiting "space junk" debris, and for in-situ creation of products from operations in low or micro-gravity environments. There has been considerable interest in the exploration and mining of asteroids with spacecraft as well as mitigating the growing threat of space debris. Refining operations, such as centrifugal refining processes, introduce challenges for operating in space that are not relevant on Earth, including the need for gravity in order for refining operations to function properly. This technology provides an effective and efficient approach to address these needs and challenges.

## The Technology

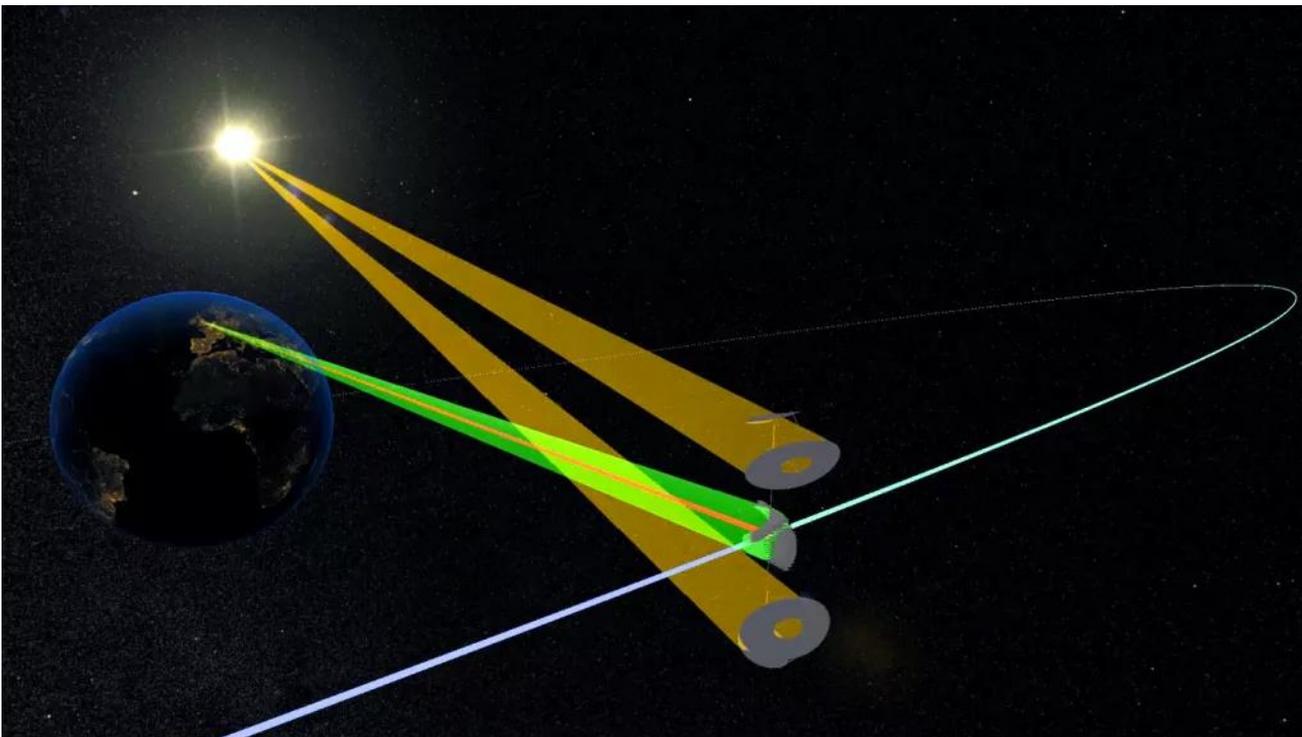
Modular Artificial-Gravity Orbital Refinery Spacecraft is a solution for refining in-situ materials collected in space, such as from asteroids and Mars moons, as well as recycling spacecraft debris, while orbiting in micro-gravity conditions. The spacecraft is coupled with refining modules for refining and recycling different types of materials. It generates artificial gravity for operation in low-gravity environments. The spacecraft is comprised of rotating rings, each generating artificial gravity and angular momentum. When the rotating rings are combined on the spacecraft platform, however, they have a net near-zero angular momentum such that the spacecraft can change its attitude with minimal propellant or rotate at the rate of the object the spacecraft platform is attached to. The spacecraft platform can self-balance to accommodate different sized modules and modules with moving loads. The refined and recycled materials can be used to create products in-situ as well as products too large to launch from Earth, such as construction of orbiting space habitats, large spacecraft, solar-power stations, and observatories.

Full Article: <https://technology.nasa.gov/patent/TOP2-299> with Video 10:32 narrated by the inventor, Gregory A Dorais, PhD.

Fact Sheet as a PDF <https://ntts-prod.s3.amazonaws.com/t2p/prod/t2media/tops/pdf/TOP2-299.pdf>

## A solar power plant in space? The UK wants to build one by 2035.

By [Tereza Pultarova](#) published May 11, 2022



The U.K. might have a space-based solar power station in orbit by 2035. (Image credit: Space Energy Initiative)

The United Kingdom is getting serious about beaming solar power from space and thinks it could have a demonstrator in orbit by 2035.

Over 50 British technology organizations, including heavyweights such as aerospace manufacturer Airbus, Cambridge University and satellite maker SSTL, have joined the U.K. Space Energy Initiative, which launched last year in a quest to explore options for developing a [space-based solar power plant](#). The initiative believes that beaming electricity from space using [the sun](#) could help the U.K. meet its target of zero [greenhouse gas](#) emissions by 2050 more cost-effectively than many existing technologies. The requirement to stop carbon emissions entirely by mid-century is part of global efforts to halt progressing [climate change](#) outlined at the [United Nations' COP 26 summit](#) that took place in Glasgow in November 2021.

Speaking at the Toward a Space Enabled Net-Zero Earth conference held in London, the initiative's chairman Martin Soltau said on April 27 that all technology required to develop a space-based solar power plant already exists; the challenge is the scope and size of such a project.

Article: <https://www.space.com/space-based-solar-power-plant-2035>

Related Video Elon Musk 3:19 <https://www.youtube.com/watch?v=S6itoXSVNKY>

## Space investors predict more acquisitions to combat hiring challenges

by [Jason Rainbow](#) — April 4, 2022

COLORADO SPRINGS — Hiring challenges in the space industry will lead to more acquisitions as way for companies to access talent and expand their workforces, investors said during an April 4 space finance session at the 37th Space Symposium here.

Acquiring companies is a “quick shortcut” for filling job openings that risk slowing down projects [across the industry](#), said Jon Luszczakoski, an executive at AE Industrial Partners. “Especially if you’re focused on the classified space or want to get into the classified space,” Luszczakoski said.

The time it takes to get an individual security clearance is “getting longer and longer,” according to Luszczakoski. This makes small companies with classified-level engineers “a hot commodity to a company that’s trying to break into that [market], and can’t afford a two-year timeline to get their team up to that” level.

Wells Fargo investment banker Paul Croci said smaller companies that win big contracts “often don’t have the people to scale fast enough” to deliver on time. Workforce shortages could push the small companies to partner with a larger contractor or be acquired by a bigger company with more resources.

Full Article : <https://spacenews.com/space-investors-predict-more-acquisitions-to-combat-hiring-challenges/>

Note: Four years ago I asked Jeff Greason if he has any labor shortages. Mr. Greason stated he all the engineers he needs and plenty applying. Obviously, labor conditions have changed. Especially the demand for technical talent with a security clearance – David Sheely

## **Military Space News**

### **Global Space Force University Launches Courses and Certification**

Global Space University announced the rollout of its Space Professional Certification Program, which aims to raise and normalize global standards for space professionals and validate knowledge, skills, and experience for practitioners in the space domain.

To learn more or to register, go to <https://globalspaceuniversity.org/>

Certification for Space Force Professional I SP100 cost \$2,600.00

Course Delivery:

This is an 8-week online course hosted on the Canvas Learning Management System (LMS) using asynchronous and synchronous elements. Each week consists of:

- 6 hours of student assignment and activities
- 2 hours of live-virtual instruction (Microsoft Teams) with a certified Space professional instructor
- Two 30-minute Q&A sessions with instructors (before and after each synchronous session)

Students complete a challenging Capstone project with a Senior Space Professional designed to test student application of knowledge.

### **Ultra Safe Nuclear Selected to Develop High Delta-V Nuclear Small Spacecraft Prototype**

Analysis Will Inform Development of Fastest Spacecraft Ever Built



Ultra Safe Nuclear has been selected by the Defense Innovation Unit ([DIU](#)) to begin the initial stages of a multi-phased research effort for the Nuclear Advanced Propulsion and Power (NAPP) program. The project will evaluate the challenges and potential solutions associated with the development of a highly maneuverable spacecraft that can operate independently from the sun.

“Nuclear tech has traditionally been government-developed and operated, but we have discovered a thriving ecosystem of commercial companies, including start-ups, innovating in space nuclear,” said U.S. Air Force Maj. Ryan Weed, Program Manager for the NAPP program at DIU.

Ultra Safe Nuclear will develop a concept for radioisotope-powered spacecraft with greater than 10 km/s of delta-V, many times greater than today’s small spacecraft propulsion systems. Advanced nuclear fuels capable of providing over one million kilowatt hours (kWh) of energy in just a few kilograms will be evaluated as part of the project, as will the power conversion and supporting propulsion apparatus essential to development of high delta-V small spacecraft.

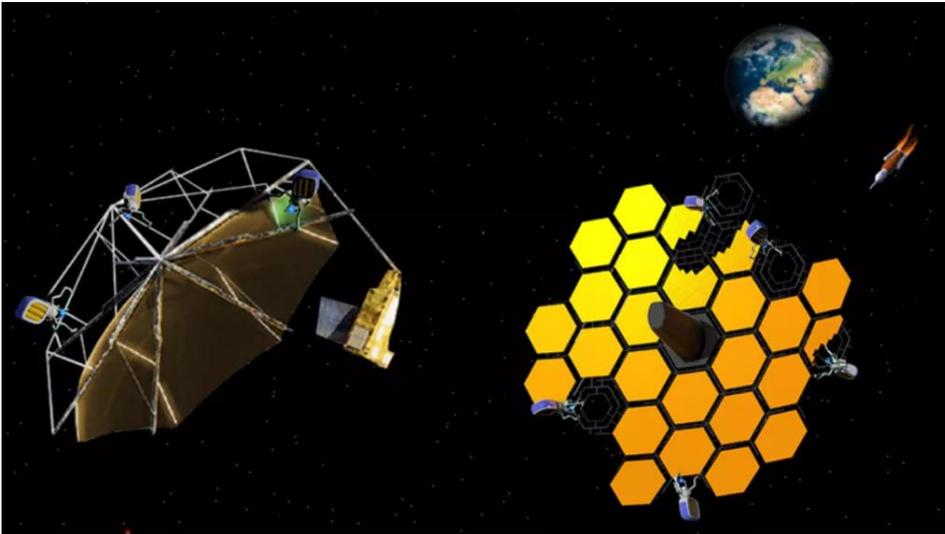
“Radioisotopes have been used for decades in space, but we are scaling them up and incorporating electric propulsion into the system,” stated Adam Schilffarth, Director of Strategy, Advanced Technologies Division. “We believe this combination will yield a spacecraft with unprecedented maneuverability and sun-independence.”

“Rather than using plutonium-238, we are adapting materials from the medical radioisotope industry,” explained Dr. Christopher Morrison, Chief Engineer for Radioisotopes, Advanced Technologies Division. “This approach offers a technically viable, cost-effective path toward sustainable commercialization.”

Article Ultra Safe Nuclear Corp. Seattle, WA 1 June 2022 : <https://usnc.com/ultra-safe-nuclear-selected-by-diu-for-high-delta-v-nuclear-small-spacecraft-prototype/>

## **DARPA is exploring ways to build big things in space**

By [Elizabeth Howell](#) published May 12, 2022



The U.S. military has awarded contracts under a new program to address in-space manufacturing needs, as part of a larger effort to reduce the costs of spaceflight.

Space manufacturing could allow humanity to build large structures efficiently, using materials launched from Earth or harvested on another world such as the moon or Mars. Such work could conceivably begin on the moon in the not-too-distant

future, especially with the arrival of private landing missions as part of NASA's Commercial Lunar Payload Services program.

In-space manufacturing is still in its infancy, and the U.S. military wants to help it along. The Defense Advanced Research Projects Agency (DARPA) recently kicked off work with eight teams to show proofs of concept "to enable production of future space structures on orbit without the volume constraints imposed by launch," DARPA officials stated (opens in new tab) a few weeks ago.

Full Article: <https://www.space.com/darpa-us-military-space-manufacturing>

YouTube Video 2:28 [https://www.youtube.com/watch?v=cKxcDWT\\_f9E](https://www.youtube.com/watch?v=cKxcDWT_f9E)

## Manchin introduces bipartisan bill to establish Space National Guard

WASHINGTON — Senator Joe Manchin (D-WV) on May 12 announced he and a group of senators have introduced legislation to create a National Guard for the U.S. Space Force. The bill would allow Army and Air National Guard members currently supporting Space Force operations to join the Space National Guard.

The bill titled [Space National Guard Establishment Act](#) was co-sponsored by Senators Dianne Feinstein (D-Calif.), Marco Rubio (R-Fla.), John Hickenlooper (D-Colo.), Lisa Murkowski (R-Alaska), Michael Bennet (D-Colo.), Marsha Blackburn (R-Tenn.), Rob Portman (R-Ohio), Rick Scott (R-Fla.), Alex Padilla (D-Calif.), Mike Braun (R-Ind.) and John Cornyn (R-Texas).

Similar legislation was [introduced in the House of Representatives](#) last year but did not pass the Senate.

Full Article: <https://spacenews.com/manchin-introduces-bipartisan-bill-to-establish-space-national-guard/>

YouTube Video 2:02 <https://www.youtube.com/watch?v=p6ONTvAghWg>

# Interesting Space videos

## This week at Nasa videos

**June 10, 2022 3:43** <https://www.youtube.com/watch?v=XPeoEapVicw>

**June 3, 2022 2:49** <https://www.youtube.com/watch?v=tVZbrBbZ16g>

**May 27 , 2022 3:57** <https://www.youtube.com/watch?v=qUjZL6W9Bwk>

**May 20 , 2022 3:47** <https://www.youtube.com/watch?v=H2ZK1yhdOoE>

**May 13 , 2022 4:22** <https://www.youtube.com/watch?v=K4QFiuZcxao>

## Jeff Greason videos

**So1E04 Our Future In Space** - featuring Angie Bukley and Jeff Greason

Dr. Angie Bukley, and Orbital Assembly Corporation (OAC) advisor Jeff Greason join us in this week's episode. Both have long careers in space and share their insights on artificial gravity and more

Video <https://www.youtube.com/watch?v=3eSXCmQuJ2s>

**So1E04 Our Future In Space** - featuring Jeff Greason

A conversation with Jeff Greason from Electric Sky and the Tau Zero Foundation, ranging across electric propulsion to cross-solar system transportation to our imperative to expand beyond the planet. Video 1:08:05 <https://www.youtube.com/watch?v=3eSXCmQuJ2s>

## That's All Folks

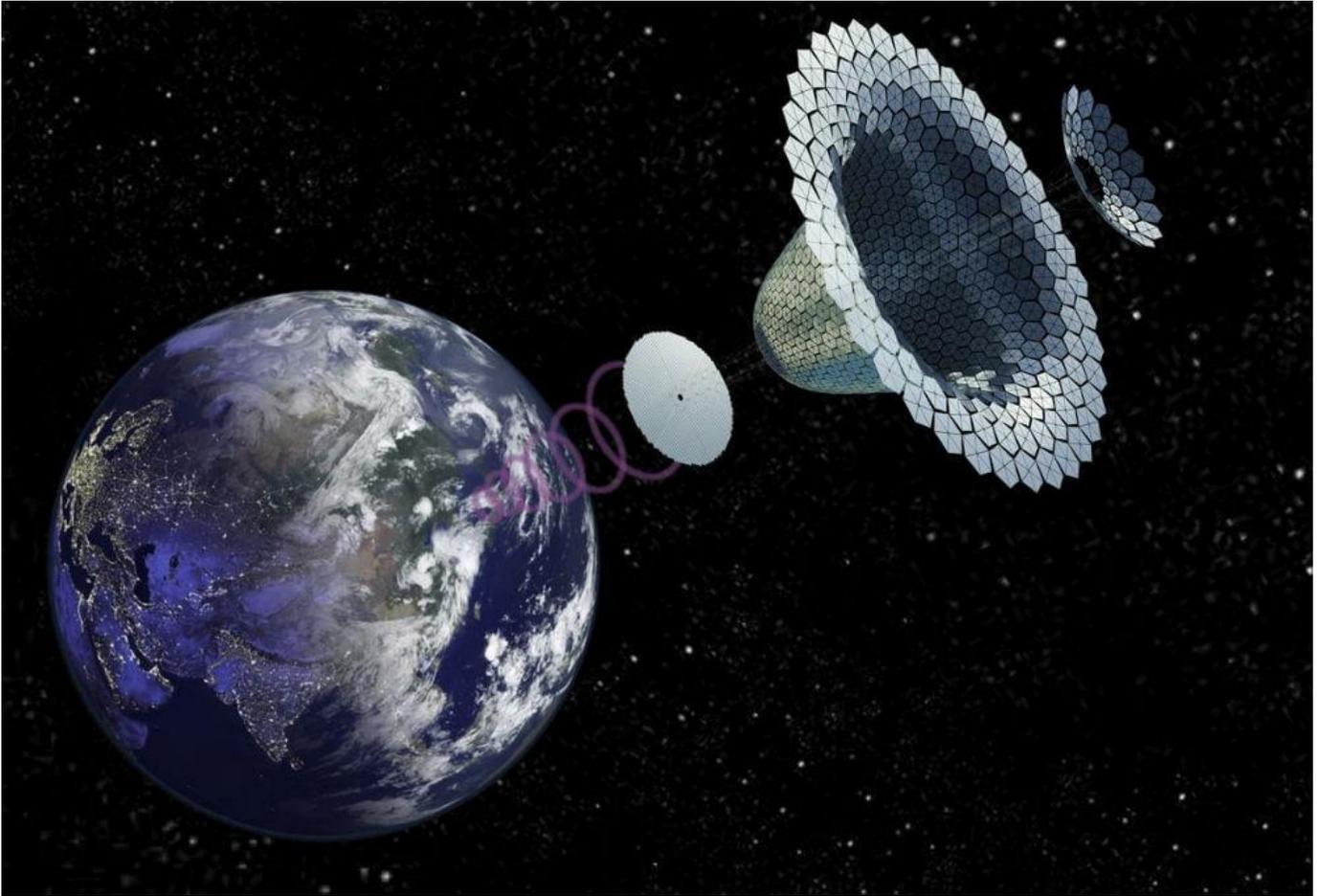


Image Credit: NASA SPS-ALPHA concept by John C. Mankins