



ASTRO

NEWSLETTER

Volume 11, Issue 16

Sep 20, 2018

CONTENTS

- What is BFR? 1
- Elon Musk unveils first tourist for SpaceX 'Moon loop' 1
- Orion's first Service Module integration complete 2
- 5 Hazards of Human Spaceflight ... 2
- Closest Exoplanet Could be Habitable With a Dayside Ocean ... 3
- TESS shares first science image in hunt to find new worlds 3
- Astronomy Picture of the Day 4



What is BFR?

BFR (Big Falcon Rocket) is a fully reusable vehicle designed to service all Earth orbit needs as well as the Moon and Mars. This two-stage vehicle—composed of a Booster and a Ship—will eventually replace Falcon 9, Falcon Heavy and Dragon. By creating a single system that can service a variety of markets, SpaceX can redirect resources from Falcon 9, Falcon Heavy and Dragon to the BFR system—which is fundamental in making BFR affordable.

INTERPLANETARY TRANSPORT
Building Moon bases and Mars cities will require affordable delivery of significant quantities of cargo and people. The fully reusable BFR uses in-space propellant transfer to enable the delivery of over 100 t of useful mass to the surface of the Moon or Mars. BFR is designed to ultimately carry as many as 100 people on long-duration, interplanetary flights.

spacex.com



Elon Musk unveils first tourist for SpaceX 'Moon loop'

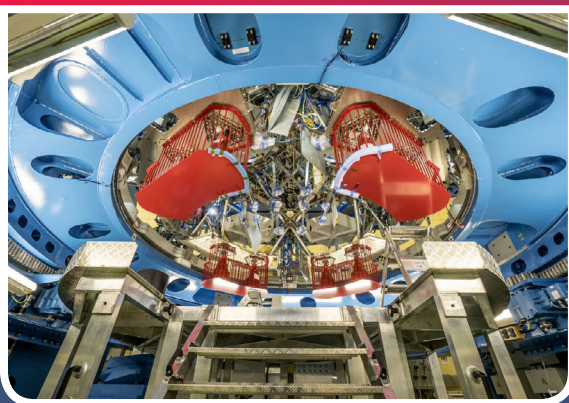
Elon Musk's company SpaceX has unveiled the first private passenger it plans to fly around the Moon. Japanese billionaire and online fashion tycoon Yusaku Maezawa, 42, announced: "I choose to go to the Moon." The mission is planned for 2023, and would be the first lunar journey by humans since 1972. But it is reliant on a rocket that has not been built yet, and Mr Musk cautioned: "It's not 100% certain we can bring this to flight." The company said the flight on board the Big Falcon Rocket (BFR) - a launch system that was unveiled by Mr Musk in 2016 - represented "an important step toward enabling access for everyday people who dream of travelling to space". Earlier on Twitter, Mr Musk had already hinted that the passenger would be from Japan.

Mr Maezawa made headlines last year after paying \$110.5m (£85.4m) for a painting by the late artist Jean-Michel Basquiat at an auction in New York. The art enthusiast said on Monday he would invite six to eight artists from around the world to join him on the trip.

New rocket for a new mission

Only 24 humans have visited the Moon - all of them Americans; 12 of them landed on the moon. Nasa's Apollo 17 in December 1972 marked the last time humans landed on the moon, or went beyond low Earth orbit. Mr Maezawa will not land on the moon. He will travel on what is called a "free return trajectory", which will bring his BFR ship back to Earth after it has gone around the far side of the satellite.

bbc.com

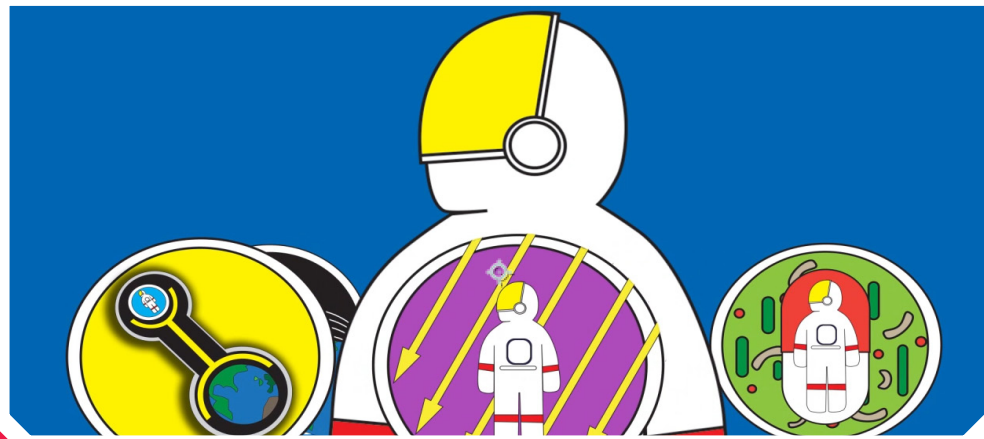


Orion's first Service Module integration complete

Last week at the Airbus integration hall in Bremen, Germany, technicians installed the last radiator on the European Service Module for NASA's Orion spacecraft marking the module's finished integration. ESA's European service module will provide power, water, air and electricity to NASA's Orion exploration spacecraft that will eventually fly beyond the Moon with astronauts. The European Service Module is now complete for Orion's first mission that will do a lunar fly-by without astronauts to demonstrate the spacecraft's capabilities.

Much like closing the bonnet on a car, with the radiators in place technicians can no longer access the internals of the European service module, symbolically ending the assembly and integration of the module that will fly further into our Solar System than any other human-rated spacecraft has ever flown before. Technicians worked 24 hours a day in three shifts to complete the service module's assembly which is now going through the last stages of its extensive testing. Engineers will put the module through its paces with functional tests that include checking the newly installed radiators and testing the propulsion system with its intricate pipelines that deliver fuel and oxidiser to the spacecraft's 33 engines.

Once complete the service module will be packed and flown to NASA's Kennedy Space Center in Florida, USA. Orion's solar wings will be shipped separately, also from Bremen. In the USA the module will be stacked together with NASA's Crew Module Adaptor and Crew Module, the first time the complete spacecraft will be on display.



5 Hazards of Human Spaceflight

A human journey to Mars, at first glance, offers an inexhaustible amount of complexities. To bring a mission to the Red Planet from fiction to fact, NASA's Human Research Program has organized hazards astronauts will encounter on a continual basis into five classifications:

1. Radiation

The first hazard of a human mission to Mars is also the most difficult to visualize because, well, space radiation is invisible to the human eye. Radiation is not only stealthy, but considered one of the most menacing of the five hazards.

Above Earth's natural protection, radiation exposure increases cancer risk, damages the central nervous system, can alter cognitive function, reduce motor function and prompt behavioral changes. To learn what can happen above low-Earth orbit, NASA studies how radiation affects biological samples using a ground-based research laboratory.

2. Isolation and confinement

Behavioral issues among groups of people crammed in a small space over a long period of time, no matter how well trained they are, are inevitable. Crews will be carefully chosen, trained and supported to ensure they can work effectively as a team for months or years in space.

On Earth we have the luxury of picking up our cell phones and instantly being connected with nearly everything and everyone around us. On a trip to Mars, astronauts will be more isolated and confined than we can imagine. Sleep

loss, circadian desynchronization, and work overload compound this issue and may lead to performance decrements, adverse health outcomes, and compromised mission objectives.

3. Distance from Earth

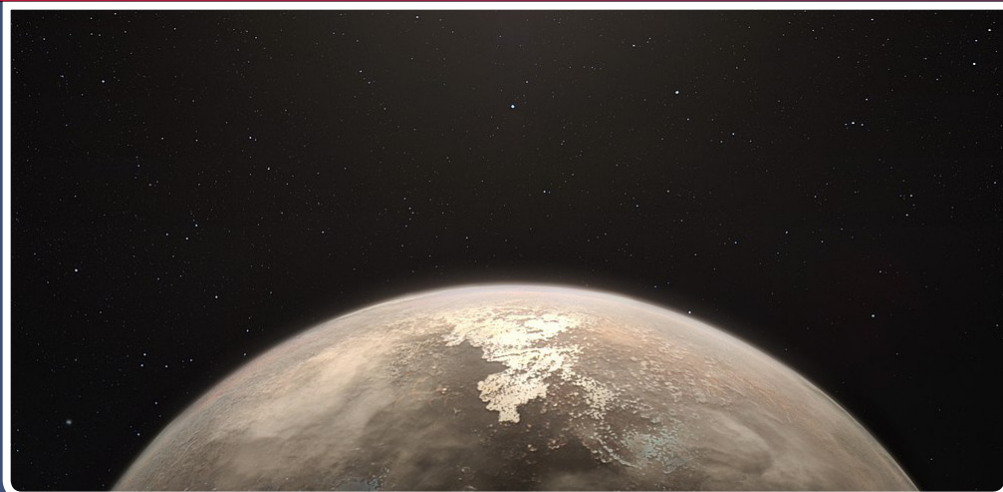
The third and perhaps most apparent hazard is, quite simply, the distance. Mars is, on average, 140 million miles from Earth. Rather than a three-day lunar trip, astronauts would be leaving our planet for roughly three years. If a medical event or emergency happens on the station, the crew can return home within hours. Additionally, cargo vehicles continual resupply the crews with fresh food, medical equipment, and other resources. Once you burn your engines for Mars, there is no turning back and no resupply.

4. Gravity (or lack thereof)

The variance of gravity that astronauts will encounter is the fourth hazard of a human mission. On Mars, astronauts would need to live and work in three-eighths of Earth's gravitational pull for up to two years. Additionally, on the six-month trek between the planets, explorers will experience total weightlessness.

5. Hostile/closed environments

A spacecraft is not only a home, it's also a machine. NASA understands that the ecosystem inside a vehicle plays a big role in everyday astronaut life. Important habitability factors include temperature, pressure, lighting, noise, and quantity of space. It's essential that astronauts are getting the requisite food, sleep and exercise needed to stay healthy and happy.



Closest Exoplanet Could be Habitable With a Dayside Ocean

In August of 2016, astronomers from the European Southern Observatory (ESO) confirmed the existence of an Earth-like planet around Proxima Centauri – the closest star to our Solar System. In addition, they confirmed that this planet (Proxima b) orbited within its star’s habitable zone. Since that time, multiple studies have been conducted to determine if Proxima b could in fact be habitable.

Unfortunately, most of this research has not been very encouraging. For instance, many studies have indicated that Proxima b’s sun experiences too much flare activity for the planet to sustain an atmosphere and liquid water on its surface. However, in a new NASA-led study, a team of scientists has investigated various climate scenarios that indicate that Proxima b could still have enough water to support life.

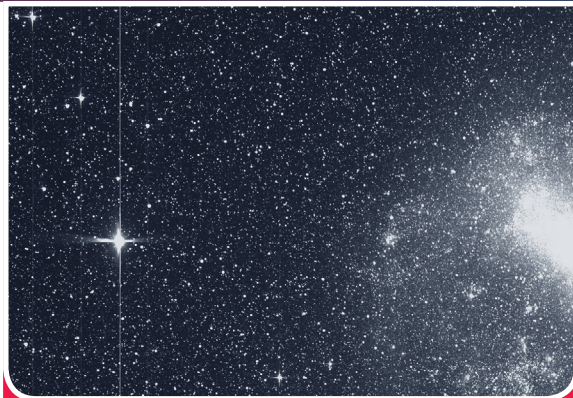
The study, titled “Habitable Climate Scenarios for Proxima Centauri b with a Dynamic Ocean”, recently appeared in the scientific journal *Astrobiology*. The study was led by Anthony D. Del Genio of NASA’s Goddard Institute for Space Studies (GISS) and included members from the NASA Goddard Space Flight Center (GSFC), Columbia University, and Trinnovim LLC – an IT company that provides institutional and mission support for the GSFC.

To break it down, planets like Proxima b – which orbit M-type (red dwarf) stars – face a lot of challenges when it comes to habitability. For one, its close orbit to its star would have likely led to a runaway greenhouse effect early in its history. It would also be subject to intense radiation (X-ray and extreme ultraviolet fluxes) and solar wind – which would lead to catastrophic atmospheric and water loss.

However, there is a lot we don’t know about Proxima b’s evolutionary history, and there are scenarios in which habitability could be a possibility. It could also extend to other rocky planets that orbit M-type (red dwarf) stars, which is even more encouraging. Given that these stars account for over 70% of the stars in the Milky Way Galaxy alone, the likelihood that they support potentially habitable planets increases the odds of finding extra-terrestrial life significantly.

In the coming years, next-generation instruments are expected to play a major role in the detection and characterization of exoplanets. These include the James Webb Space Telescope (JWST), the Wide-Field Infrared Survey Telescope (WFIRST), and ground-based instruments like the Extremely Large Telescope (ELT) and the Giant Magellan Telescope (GMT). And you can bet some of their time will be dedicated to studying the closest exoplanet to Earth!

technology.org



TESS shares first science image in hunt to find new worlds

NASA’s newest planet hunter, the Transiting Exoplanet Survey Satellite (TESS), is now providing valuable data to help scientists discover and study exciting new exoplanets, or planets beyond our solar system. Part of the data from TESS’ initial science orbit includes a detailed picture of the southern sky taken with all four of the spacecraft’s wide-field cameras. This “first light” science image captures a wealth of stars and other objects, including systems previously known to have exoplanets.

TESS acquired the image using all four cameras during a 30-minute period on Tuesday, Aug. 7. The black lines in the image are gaps between the camera detectors. The images include parts of a dozen constellations, from Capricornus to Pictor, and both the Large and Small Magellanic Clouds, the galaxies nearest to our own. The small bright dot above the Small Magellanic Cloud is a globular cluster—a spherical collection of hundreds of thousands of stars—called NGC 104, also known as 47 Tucanae because of its location in the southern constellation Toucana, the Toucan. Two stars, Beta Gruis and R Doradus, are so bright they saturate an entire column of pixels on the detectors of TESS’s second and fourth cameras, creating long spikes of light.

TESS will spend two years monitoring 26 such sectors for 27 days each, covering 85 percent of the sky. During its first year of operations, the satellite will study the 13 sectors making up the southern sky. Then TESS will turn to the 13 sectors of the northern sky to carry out a second year-long survey.

phys.org

— WELCOME —

BACK TO SCHOOL

New School Year is Started

Another school year started and we keep going with more space news! If you did not know, hundreds of articles and photos have been shared with students and teachers via our Astro Newsletter over the last eleven years and this year will be no different. With some new schools joining our educational programs, we look forward to reaching more people. During the 2017-2018 school year, we have conducted 82 videoconferences within our Partner School Science Program (PSSP) and 216 videoconferences within our Future Explorers Program (FEP). This year, we have added a new topic to our curriculum called "Electromagnetic Spectrum". With this educational package we learn the basics of the electromagnetic spectrum and how various types of electromagnetic waves are related in terms of wavelength and energy. We wish all the teachers and students a successful school year. May this be the best school year ever!

Astronomy Picture of the Day

Cocoon Nebula Deep Field

Inside the Cocoon Nebula is a newly developing cluster of stars. The cosmic Cocoon on the upper right also punctuates a long trail of obscuring interstellar dust clouds to its left. Cataloged as IC 5146, the beautiful nebula is nearly 15 light-years wide, located some 3,300 light years away toward the northern constellation of the Swan (Cygnus). Like other star forming regions, it stands out in red, glowing, hydrogen gas excited by young, hot stars and blue, dust-reflected starlight at the edge of a nearly invisible molecular cloud. In fact, the bright star near the center of this nebula is likely only a few hundred thousand years old, powering the nebular glow as it slowly clears out a cavity in the molecular cloud's star forming dust and gas. This exceptionally deep color view of the Cocoon Nebula traces tantalizing features within and surrounding the dusty stellar nursery.



apod.nasa.gov

Space Camp Turkey, Aegean Free Zone 35410 Gaziemir, Izmir / Turkey

Phone : +90 232 252 35 00 Fax : +90 232 252 36 00

Email: info@spacecampturkey.com

© 2018 - SPACE CAMP TURKEY / ALL RIGHTS RESERVED - An ESBAS Enterprise

