YOUNG ASTRONOMERS NEWSLETTER

HAYABUSA 2 SPACECRAFT HAS REACHED THE ASTEROID RYUGU AND PREPARES TO CARRY OUT ITS SAMPLING MANEUVER

On July 3 the Japanese spacecraft Hayabusa 2 reached its target asteroid, Ryugu (i.d. as 1999 JU3) and is positioned about 12 miles above the surface. It will take some surface photos and measurements before beginning a series of sampling maneuvers in October. The plan is to return asteroid samples in a special capsule in 2020. This is sort of a repeat of the sampling of asteroid Itokawa by Hayabusa 1 in 2010.

However there are some further tricks up its sleeve. The Japanese space agency (JAXA) wants to send down several probes; some to impact with enough energy to kick up dust that may be sampled. There may be an attempt to make a brief landing of the spacecraft into the impact crater.

The Hayabusa probes are also interesting in that they make use of an ion propulsion system. [Space.com, June 15; Extreme Tech, July 2].

MORE MOONS FOUND AROUND JUPITER

The moon count for Jupiter has jumped by a dozen. The total number is now up to 79, and it possibly could go higher.

Teams of astronomers located in Chile, Hawaii and Arizona in 2017, spotted a group of moving objects in Jupiter's backyard. A year of further study ruled out the possibility that the bodies could be passing asteroids, and led to an earlier announcement of two, and then on July 17, of ten more small moons. The announcement came from the Carnegie Institute for Science and the International Astronomical Union's Minor Planet Center.

As expected, the bodies are quite small – only one to three kilometers in size. An outer group of nine orbit Jupiter in a retrograde direction. That is opposite from the innermost, four Galilean moons as well as those discovered in later years. Two of the new ones are in inner, prograde paths, plus one is an oddball which has prograde motion but is located in the same outer region as the retrograde group. This renegade has been named Valetudo, the granddaughter of the Roman god, Jupiter.

By comparison, Saturn's moon count is at 61. [Science Daily, July 17, 2018].

HUBBLE SPOTS THE MOST DISTANT STAR EVER OBSERVED SO FAR

By making use of a unique gravitational lensing maneuver, an international team of researchers has used the Hubble space telescope to image a star that is so far distant, that it gives insight to our early universe. The special technique is called gravitational micro-lensing. It enabled the team to distinguish a single star within the lensing galaxy cluster. The star has been nicknamed Icarus and is a blue supergiant star that is 10 billion light years away. The special microlensing technique can magnify objects by a factor of 5,000. [Astronomy, Aug. 2018].

POSSIBLE DANGERS OF BREATHING MOON DUST

When the Apollo astronauts returned from their Moon missions, moon dust clung to their space suits and boots and made their throats sore and eyes water. Lunar dust is made of tiny abrasive particles that irritate the mucous

membranes as well as degrade moving parts in equipment. Sneezing and congestion continued for several days after the missions.

The fine powder particles are sharp like glass and the low gravity on the Moon allowed them to stay suspended or attached longer to humans and equipment. They also penetrate more deeply into the lungs. "Lunar hay fever" was the way Apollo 17 astronaut Harrison Schmitt described it.

This potential health threat on the Moon is being studied by a team sponsored by the European Space Agency. [earthsky.org; July 20, 2018].

NASA WILL SEND A PROBE TO STUDY THE SUN

Scheduled to be launched on August 4, NASA's Parker Solar Probe is going to take the heat. Developments in the design of heat-resistant materials, such as graphite-epoxy composites has made it possible to create a spacecraft that can fly through the Sun's outer atmosphere, the corona. There, temperatures can soar to several million degrees Celsius.

Parker is scheduled to fly around the Sun two dozen times over the next seven years. It will dip to within about 6 million kilometers of our star's surface. A curious characteristic of the Sun is that the corona, at several million degrees, is hotter than the surface at about 5500^{o}C.

The spacecraft is about the size of a small car and is packed with instruments that will take photographs as well as special measurements such as temperatures, magnetic fields and spectra. It will carry a heat shield that it will keep pointed toward the solar surface. This should protect the sensitive instruments against temperatures approaching 1400^{o} on the shield. At its closest approach, it will be clipping along at around 700,000 kilometers per hour; the fastest human-made object in the solar system.

In addition to studying the corona and surface, the craft will take measurements of solar winds in order to ascertain their origins. These bursts of energy influence our weather and radio communications.

Parker will make its first dive into the corona in three months. Data will begin to be sent back to Earth in early December. The probe is scheduled to end its mission in 2025. [Sci. News; July 21, 2018].

SOPHISTICATED INSTRUMENTS AND TECHNIQUES IS GREATLY ADDING TO OUR CATALOG OF EXOPLANETS

Beginning in the 1990's with first tentative claims of exoplanets, astronomers have developed a sophisticated array of instruments and techniques used to ferret out planets that orbit their parent stars. This is kind of like trying to spot a moth flying around a street light located ten miles away.

Over the ensuing decades ground-based observatories, such as HARPS (High Accuracy Radial Velocity Planet Searcher located at La Silla Observatory in Chile) produced dozens of candidates which were characterized as hot Jupiters, super Earths, or mini Neptunes.

The early detection method was to look for a Doppler shift in the spectrum of a star that was nudged by the gravitational tug of a planet. Eventually, a few planets were detected as they crossed in front of their star (transits), as viewed from our position on Earth. It then became possible to analyze the spectra of the atmospheres of these planets.

The Kepler Space Telescope, launched in 2009 was programmed to look for transits. This produced a huge catalog of candidates that now has ballooned to nearly 4,000.

We wait for the deployment of the James Webb Space Telescope in anticipation of finding earth-like bodies. [Astronomy, August, 2018]

BIRTHDAYS IN AUGUST

Roger Penrose (Eng.) b. Aug. 8, 1931, Astrophysicist - mathematician. Made many contributions in development of theory of geometry of space-time; description of event horizons around black holes; quantum mechanics and physics of consciousness, artificial intelligence, etc.

Eleanor Burbidge (Brit.-Amer.) b. Aug. 12,1919; Astrophysicist, who studied masses of galaxies, chemical make-up of stars. Co-authored historic paper on nucleosynthesis in stars.

MOON PHASES IN AUGUST: Last Qtr.: Sat. the 4th; New: Sat. the 11th; First Qtr.: Sat. the 18th; Full: Sun. the 26th.

THE PLANETS IN AUGUST: Venus, Jupiter, Saturn and Mars are very prominent in the night sky this month. **Mars**, especially, is just a few days passed its perihelic opposition that took place on July 2**7.** It will be a short distance to the east of vertical, and a bit southward. You can't miss the big red dot (magnitude of -2.5). But you will need a telescope to see any surface details on the planet. Move a bit to the west, and you will see **Saturn** (mag. 0.3) just about straight up and a somewhat toward the south in the constellation Sagittarius. Further to the west, you can see **Jupiter**, at mag. -2.0, not quite as bright as Mars. Viewers with telescopes can see the shadows of Jupiter's two inner moons, Io and Europa on August 23. Then to the west, about a half hour after sunset, you can't miss **Venus**, which has been shining in the early evening for many weeks. It is very bright at magnitude -4.4. For early risers, **Mercury** is visible in the east in the morning, about 45 minutes before sunrise. At magnitude -0.5, it is giving us the best view we've had in several months.

PERSEID METEOR SHOWER: We are optimistic that there will be a great meteor show this year. The Perseids are expected to peak around the 12th. Meteor watchers tell us that this year's display will be the best in three years. We are told that we could see as many as 110 "shooting stars" per hour. We have New Moon on the 11th, so the skies should be nice and dark.

WORD SCRAMBLE: Unscramble the following six names for constellations (answers below)

SECUT RATUSU NCAREC RAODC NYCUGS IGMINE

THE FORSYTH ASTRONOMICAL SOCIETY meets on the second Wednesday of the month at 7:30 p.m. at the Kaleideum North (formerly SciWorks); 400 W. Hanes Mill Road. Visitors are welcome. To obtain information about FAS meetings or events, go to the website: http://www.fas37.org You can also try calling the front desk at Kaleideum about FAS meetings or events: 336-767-6730 ext. 1000

Word scramble: Cetus Taurus Cancer Draco Cygnus Gemini

Stay cool. Bob Patsiga, ed.