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YOUNG ASTRONOMERS NEWSLETTER

NASA TESTS NUCLEAR FISSION POWER SOURCE FOR FUTURE SPACE EXPLORATION

NASA is experimenting with power plants that can support bases on the Moon or distant planets. One experimental design for generating electricity is based on fission of uranium-235.

At a news conference held at the Glenn Research Center in Cleveland on May second, NASA announced the successful trial run of its Kilopower unit. The initial configuration for the power plant will be able to produce one to 10 kilowatts of electrical power. This is enough to run several households continuously for ten years. Several power reactors can be coupled together to produce enough power to support a full-fledged outpost. The reactor's fission heat is converted to electricity using the Stirling principle.

The initial tests were conducted at the DOE Nevada National Security Site. The experimental reactor: Kilopower Reactor Using Stirling Technology (KRUSTY) was subjected to various abnormal stresses in order to simulate accidents in space. KRUSTY came through with flying colors. The use of Kilopower will be limited to remote locations and be shielded to protect astronauts from radiation. It should be able to run with little or no maintenance. [Space.com; nasa.gov, May 2, 2018]

HOW TO AVOID COLLISION WITH AN ASTEROID OR COMET

In 1996, Congress directed NASA to assess the threat of an asteroid or comet colliding with the Earth. The space agency was assigned the task of making, within a decade, a catalog of 90% of the estimated 1000 near-Earth asteroids that are at least 1 km (0.6 mi) in diameter and have a perihelion (closest point to Earth) that is within 195 million kilometers of Earth.

By 2011, the Jet Propulsion Laboratory's Center for Near Earth Objects program completed 95% of the assigned study. The resulting NASA official catalog of near-Earth asteroids (NEA) lists 887 bodies that are 1 km or larger. Fortunately, not a single one is on a collision course with the Earth. Three separate space -body studies came up with roughly the same estimate: no immediate threats of a collision.

Now, we might wonder about how dangerous are bodies which are smaller than 1 km? There are a lot more with smaller size. The asteroid hunting team asked congress for approval for a reduced-size (140 meters) survey. Although the concept was approved, funding was marginal for the task.

The survey of the smaller bodies is painstakingly slow due to their greater number and small size. It is estimated that there are more than 24,000 objects in the 140 m- plus range. Currently, 8,100 objects with diameters of 140 m or larger have been identified. So, we are about one-third of the way to the supposed target population.

Of course there must be thousands of smaller asteroids lurking out there that we don't know about. But we may get help from additional planned efforts. New, wide-field surveys will soon come online. For example, the Large Synoptic Survey Telescope in Chile. Also, NASA will submit a proposal, NEOCam (near-earth objects) for a telescope that would be situated in space and thus not be hampered by earthly disruptions, like day-night cycles, clouds, weather and Moon interferences.

And then, there are comets….Although asteroids far outnumber comets, long-period comets that originate in the Oort Cloud can be huge (a km or more across). And they zoom in at high speed with very short advance notice, of only months duration. Incoming asteroids, on the other hand, can give us decades to calculate trajectories. Fortunately, long-period comets are rare and we hope that future technology will be able to give us adequate warning.

What we know so far, is that the body that struck Earth 65 million years ago, leading to the demise of the dinosaurs, had an estimated size of about 10 km. The Tunguska body that blasted a region in Siberia in 1908, was estimated to be between 60 and 190 meters. The Chelyabinsk meteor that burst over Russia in 2013 is estimated at 20 m diameter. [editor's notes: According to Astronomy magazine, July 2015, asteroids with 50 m (164 ft) diam. can cause local devastation and can occur every 2000 years, on average; a 1 km diameter object can strike the Earth every 500,000 years, on average, producing global destruction. Collisions by objects having 5 km (3mi) diameter happen approximately every 30 million years. These would cause global eradication of life forms.][Sky & Tel., June, 2018].

NASA'S INSIGHT MARS LANDER ON ITS WAY TO THE RED PLANET

On May fifth, an Atlas V rocket lifted off from Vandenberg Air Force Base in California to begin the first interplanetary mission launched from the West Coast. InSight (**In**terior Exploration using **S**eismic **I**nvestigations **G**eodesy and **H**eat **T**ransport) planned Mars touchdown is November 26 at the Elysium Planitia (near Mars' equator) The solar powered lander will study the interior of the planet: its core, crust and mantle and measure "Mars quakes".

Two briefcase-sized satellites (MARCO A & B) also hitched a ride on the flight. They carry instruments and communication packages and will orbit the planet. They were released from the main ship shortly after launch and are continuing their trajectory independently. [Space.com, May 5, 2018].

SAGITTARIUS A* HAS A BUNCH OF BUDDIES AT THE CENTER OF THE MILKY WAY

Astrophysicists at Columbia University have crunched the data from the Chandra X-ray space observatory and determined that at least 10,000 small-sized black holes circle the center of our Milky Way galaxy. The center of the Milky Way has in its core a massive black hole having a mass of about 4 million suns. It is designated as Sagittarius A* (pronounced "A-star"). The little fellows orbit close in, within 3 light years of the core, and now that we know they are there, we can study how they interact with their big brother. [Astro-Bob-Astronomy-For-Everyone; April 5 and May 12, 2018]

BIRTHDAYS IN JUNE

George Ellery Hale (Amer.), b. June 29, 1868, d. Feb. 21, 1938. Founded the Yerkes Observatory, Palomar Observatory and Mount Wilson Observatory. Hired Harlow Shapley and Edwin Hubble. **Fred Hoyle** (Brit.) b. June 24, 1915, d. Aug. 20, 2001. Astrophysicist. One of the earliest to explain nucleosynthesis, the synthesis of the elements in the cores of stars. Also did popular science writing and science fiction writing. **Allan R. Sandage** (Amer.): b. June 18, 1926; d. Nov. 13, 2010. Astronomer who worked at the Mount Wilson Observatory (later at Palomar) and collaborated with Edwin Hubble to measure the redshifts of distant stars and galaxies. He revised the Hubble constant downward from 250 to 75. The latter value is more in line with what is accepted today.

(birthdays, continued) Giovanni Cassini (Ital.), b. June 8, 1625, d. Sept. 14, 1712. Studied Saturn and discovered separations in the rings. **Charles Messier** (French), b. June 26, 1730, d. April 12, 1817. Studied the nebulae and created his list of Messier Objects. **Lyman Spitzer** (Amer.) b. June 26, 1914; d. Mar. 31, 1997. Theoretical physicist who did research on star formation. Proposed the idea of telescopes operating in space.

MOON PHASES IN JUNE: Last Qtr.: Wed. the 6th; New: Wed. the 13th; First Qtr.: Wed. the 20th; Full: Thurs. the 28th.

SUMMER SOLSTICE: Thurs. the 21st. The longest period of daylight for the year. The Sun is at its maximum northern angle.

THE PLANETS DURING JUNE: Jupiter comes up in the east as the Sun sets. The gas giant reaches its highest point in the sky around 11pm (look straight up toward the south). It is very bright at a magnitude of about -2.5. **Venus** is our evening "star". It hangs in the west right after sunset. With a mag. of about -4.0, it is even brighter than Jupiter. **Saturn** is best observed after midnight in the east. With a telescope, you can see that it is tilted nicely to give us a good look at its rings. Magnitude around zero. After a couple of months of playing hard to get, **Mercury** is finally showing itself low in the west. It will be near the crescent Moon on the 14th. **Mars** is now the most interesting of the visible planets. It is heading toward opposition (and closest approach) on July 27, and you will see it getting noticeably brighter throughout the month: from mag. -1 to -2. It rises around midnight at the beginning of the month, but by June 30, pops up at 10:30 p.m.

FORSYTH ASTRONNOMICAL SOCIETY ACTIVITIES:

Monthly meeting: Wed. June 13, 7:30 p.m. at the Kaleideum North, 400 W. Hanes Mill Road. (Regular monthly meetings are held on the second Wednesday of the month.) Program for June is a presentation: "Ghosts from a Dying Star" by Samuel Flynn, of NC State U.
Saturday, June second: FAS camper observation at Stone Mountain State Park. (Check the FAS website for specific location in the park.)
Saturday, June 16: FAS observation at Kaleidum North. (Club members begin setting up their telescopes in the parking lot just before dusk.)

FAS website: http://www.fas37.org.

Many of the FAS activities or cancellations can be learned by calling the Kaleideum North front desk: 336-767-6730 ext. 1000.

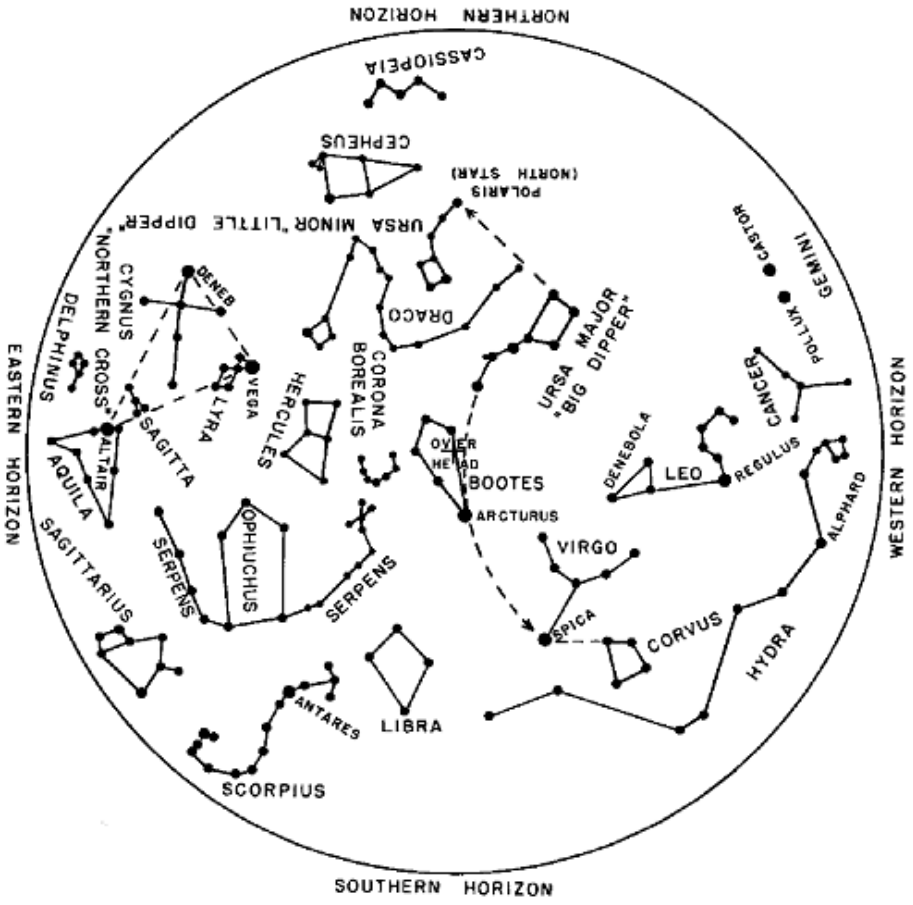
See the summer sky chart on the last page of the newsletter.

Little known astronomy facts: The Moon moves about an inch farther from the Earth every year.
The open cluster, Pleiades, or Seven Sisters (M-45) sit on the back of Taurus, the bull. If conditions are right (or with low-power binoculars), you can see seven jewels: Alcyone, Maia, Taygeta, Sterope, Merope, Celaeno and Electra.

Have a great summer! Bob Patsiga, editor

THE SUMMER SKY

In the summer, if we are in an ideal location, we can see the Milky Way band extend from the southern horizon to the northern horizon. On the southern horizon, we see the fish-hook tail of Scorpius the scorpion and just above the tail, we see Sagitarius The Archer. In the region between Sagitarius and the tail of Scorpius, we are looking toward the center of the Milky Way. A lot of dust and gas blocks out the visible light from the center of our galaxy. The main star in Scorpius is Antares (mag. 1, 600 LY). Antares is a red supergiant star, about 200 times the size of our sun.
High over head, we see the Summer Triangle with the three stars: Deneb (mag 1, 3,000 LY) in the tail of Cygnus the Swan; Vega (mag 0, 25 LY) in Lyra the Harp and Altair (mag 1, 17 LY) in Aquila the Eagle. Sagitarius has the asterism name: The Teapot. Looking north, the Big Dipper (Ursa Major) is lined up vertically (handle up and bowl down) a little off to the west of the North Star. Look for more numerous "shooting stars" (meteorites) in the summer, especially look for the Perseids in mid August.



THE NIGHT SKY IN JUNE