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# YOUNG ASTRONOMERS NEWSLETTER

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## MINOR ADJUSTMENT TO NEW HORIZONS' TRAJECTORY

On February 1, NASA made a minor adjustment to the velocity of the New Horizons spacecraft. NH whizzed by Pluto in July of 2015 and is heading for another target, a Kuiper Belt Object labeled as KBO 2014 MU69. NH is expected to reach MU69 on New Year's Day 2019, a distance of about 4 billion miles from Earth.

The adjustment amounts to less than one mile per hour, but this results in a difference of thousands of miles in its location in 2019. The adjustment was based on more recent information about MU69 from the Hubble Space Telescope as well as the location of New Horizons itself. [New Horizons web site: <http://pluto.jhuapl.edu>].

## BLACK HOLE-GALAXY DYNAMICS PUZZLES ASTRONOMERS

The February issue of Sky & Telescope has an article which discusses the relationship of a black hole and its surrounding galaxy of stars. Astronomers are debating whether a black hole size determines a galaxy size, or vice versa.

Stars and matter are attracted to a black hole and this facilitates new star formation near the galactic nuclear center. However, the process of accumulation of matter by the black hole causes a release of energy that disrupts the consolidation into new stars. So, it seems that there is a balance to the system. Some say that black holes act as thermostats for galaxies. [Editor's note: Our home galaxy, the Milky Way, is believed to contain a black hole that weighs about 4.3 million solar masses and is contained in a spherical space having roughly the diameter

of the orbit of Mercury. Many of the facts regarding our black hole come from using radio telescopes for observing about a dozen stars that orbit the galactic center.]

## GROWING CURIOSITY ABOUT FAST RADIO BURSTS

Since about 2007, astronomers became aware of fast radio bursts that emanate from somewhere outside our Milky Way galaxy. The bursts seem to occur at random times, they are very short in duration – only a few milliseconds and they are very energetic. Recently, the location of a source has been pinned down to a location about 2.5 billion light-years away, near the constellation of Auriga. It is the only burst that has been observed multiple times. It was first detected by the Arecibo Observatory in Puerto Rico in 2012, and this has been confirmed by the Very Large Array in New Mexico. The bursts come from a tiny galaxy but they produce more energy than all the stars located in the neighborhood.

The question is: what is causing this odd behavior? Some suggestions include neutron stars, which spin and send out strong, periodic beacons of energy. Some recent observations suggest that the source is near a supermassive black hole. This could mean that the radio burst comes from energy released when the black hole takes on a quick gulp of surrounding matter. Our detection methods are improving, and so we hope that the mystery of fast radio bursts will soon be solved. [Sci. News, Feb. 4, 2017, p. 10]

### **LOOK FOR IRIDIUM FLARES**

As part of their sky-gazing pastime, astronomers can look for the unusually bright objects called Iridium Flares. Iridium Flares are man-made satellites that were launched by the Motorola Corporation back in the 1990's. There originally was a "constellation" of 66 satellites put into a 485 mile orbit for the purpose of providing world-wide communication.

The wide antennas on the satellites have the ability to reflect sunlight for a few seconds on a narrow area of the Earth. The brightness is quite remarkable, as much as -8 to -9 in magnitude. Interested readers may check the Iridium Flare fly-over schedule on the website: Heavens Above. You better hurry to see this, since the original flares are gradually being replaced; probably with non-reflecting surfaces.

### **PLANETARY FORTY-NINERS OF THE TWENTY-FIRST CENTURY**

The January, 2017 issue of "Mining Engineering" has an interesting article about the prospects of and planning for mining the Moon and asteroids. It turns out that a lot is going on behind the scenes in planning and solving the problems of space-age prospecting and mining.

Various private companies are working on drawing board diagrams for rockets, orbiters and mining machines. Some example corporations are: Moon Express, Planetary Resources, Deep Space Industries, Jet Propulsion Laboratories, and Orbital Technologies, Corp. In addition, engineering schools are working on solving the technical challenges. For example, MIT and Caltech have model machines that are being tested. China is also very actively planning on setting up mining operations on the Moon.

The goal is to secure valuable and rare

minerals and volatiles. Moon mining could yield rare earth metals, platinum and titanium as well as helium-3. The latter is an isotope of helium that will be useful in nuclear fusion reactors, and is virtually nonexistent on Earth.

It has been calculated that a small asteroid could produce \$50 billion in platinum.

A key component in the planning is to target deep Moon craters that are in permanent shadow. Without sunlight, the temperatures of these crater interiors can be as low as 30 to 40 Kelvin. This is cold enough to harbor frozen water and other volatiles. The water could be extracted and electrolyzed (using solar energy) to form hydrogen and oxygen. These gases, in turn, would serve as fuels for mining machinery and rockets. [Editor's note: Thanks to Jean and Rich Ray for sending us the Mining Engineering magazine article. Readers can go to: [www.miningengineeringmagazine.com](http://www.miningengineeringmagazine.com)]

### **ASTRONOMERS DISCOVER EXTRASOLAR PLANETS WITH POSSIBLE EARTH-LIKE PROPERTIES.**

Seven earth-like planets have been discovered orbiting an ultra-cool dwarf star. These extrasolar planets lie close together in orbits that place them closer to their star than planet Mercury is to our Sun. Since the star is so cool, the planets may possess temperatures that allow water to exist. The star is located at a distance of 40 light years in Aquarius.

The system was first detected by the Transiting Planets and Planetesimals Small Telescope located in Chile. The TRAPPIST team spotted three planets and reported their results in the Feb. 22, 2017 issue of the journal "Nature". Very quickly this was confirmed by the Spitzer telescope, which discovered four additional planets in the same system. Other instruments, including the Hubble telescope are following up with close study. [<https://www.sciencedaily.com>].

**MARCH BIRTHDAYS:** **Alfred Einstein (Ger. – Amer.):** b. Mar. 14, 1874; d. Apr. 18, 1955. Theoretical physicist who published “Special Theory of Relativity” and “General Theory of Relativity” which are the modern bases of cosmology. **George Gamow (Ukr. – Amer.):** b. Mar. 4, 1904; d. Aug. 19, 1968. Nuclear physicist – cosmologist. Explained some of the dynamics of the Big Bang. **Walter Baade (Ger. – Amer.):** b. Mar. 24, 1893; d. June 25, 1960. Astronomer. Studied the Cepheid variables which led to a huge increase in our calculated value for the size of the Universe. **Percival Lowell (Amer.):** b. Mar. 13, 1855; d. Nov. 12, 1916. Astronomer who established the Lowell Observatory in Arizona. Proposed, wrongly, that the lines seen on Mars were canals made by intelligent beings. **Eugene Cernan (Amer.):** b. Mar. 14, 1934; d. Jan. 16, 2017. American astronaut. The last man to walk on the Moon (up to now).

**MOON PHASES FOR MARCH:** First Qtr.: Sun. Mar. 5; Full: Sun. Mar. 12; Last Qtr.: Mon. Mar. 20; New: Mon. Mar. 27.

**THE PLANETS IN MARCH:** **Venus:** Venus starts out the month very high and bright in the southwest after sunset, but gradually drops to the horizon as it approaches inferior conjunction ( located between the Earth and the Sun). This occurs on March 25. But a few days before and after the 25<sup>th</sup>, you can see Venus as both an “evening star” and a “morning star” since it rises in the east before sunrise. The planet **Mercury**, on the other hand, is going in the opposite direction. From March 20, it can be seen getting higher in the southwest each day after sunset. **Mars** remains in the southwestern sky all month. Look for it in Pisces. **Jupiter** rises in the east in Virgo, well after sunset (look for the star, Spica in Virgo), but it comes up earlier as the month progresses. This gives very good views of the gas giant by midmonth. **Saturn** is also a morning player. It gives good views after 2:30 A.M. in the constellation Sagittarius. As a reference, you can also look for the nearby star Antares in Scorpius.

**SPRING (VERNAL) EQUINOX:** March 20. On this date, the Sun is directly overhead at the equator and all areas of the Earth have daylight and night of equal duration.

**PLANET MATCH:** Place a letter in the blank which best matches the properties to the planet (see answers below).

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|--|------------------|
| 1. A gas giant, spins on its side: _____                   | <b>A Mercury</b> |
| 2. A gas giant with a great red spot: _____                | <b>B Venus</b>   |
| 3. A rocky planet, the hottest planet: _____               | <b>C Earth</b>   |
| 4. A gas giant with beautiful rings: _____                 | <b>D Mars</b>    |
| 5. Has lots of iron in its rocks and sandy surface: _____  | <b>E Jupiter</b> |
| 6. Blue planet, distance from Sun 2.8 billion miles: _____ | <b>F Saturn</b>  |
| 7. Orbits the Sun in only 88 days: _____                   | <b>G Uranus</b>  |
| 8. Surface is covered 70% by water: _____                  | <b>H Neptune</b> |

**Don't forget: daylight saving time begins on Sunday, March 12.**

**Little known space facts:** The word “galaxy” is derived from the Greek word for milk: gala. That’s because the band of millions of stars that stretches across the sky looks like spilled milk. Did you know that chemists call one of the sugars found in milk galactose?

Planet match: 1-G 2-E 3-B 4-F 5-D 6-H 7-A 8-C

**Forsyth Astronomical Society website:** <http://www.fas37.org> **SciWorks Tel: 336-767-6730; ext. 1000**

**Note that the new name for the combined SciWorks and Childrens’ Museum is KALEIDEUM** The name SciWorks will be gradually phased out. Bob Patsiga, editor