May 2017 Volume 25 Number 5 Forsyth Astronomical Society

YOUNG ASTRONOMERS NEWSLETTER

NEW HORIZONS IS FAR OUT

The New Horizons spacecraft launched by NASA to explore the dwarf planet, Pluto and other Kuiper Belt objects is now halfway to its second KB destination: 2014 MU69. The spacecraft is now about 490 million miles beyond Pluto and it has about an equal distance to travel before reaching MU69 on January 1, 2019.

New Horizons went zipping by Pluto in July, 2015 and made scientific measurements of Pluto, its feeble atmosphere and cryo-geology, as well as unique properties of the dwarf planet's five moons. [http://pluto.jhuapl.edu]

DETECTION OF SUPERNOVAE USING NEUTRINOS AND GRAVITY WAVES

Astronomers are trying to get more detailed information about how supernova explosions take place. This highly energetic event gives rise to elements located beyond iron in the periodic table. One way to get a handle on the process is to examine the storm of neutrinos that are emitted. Neutrinos are extremely tiny, fast-moving particles having a mass less than a millionth of an electron. They can pass through our bodies without our knowledge, and so they are hard to detect. They are constantly being emitted by our Sun.

There are several international centers designed to detect and analyze the characters of neutrinos. These centers stay in touch with each other as they monitor the heavens for supernova events. They represent the Super Nova Early Warning System, SNEWS. They are found in diverse locations, like Antarctica, Japan and Canada.

Being able to pass through matter without interacting, means that neutrinos can be emitted from the instant a supernova begins, and then travel through space to reach us before ordinary light from the blast gets here. Thus, to be able to detect neutrinos will give astronomers a jump start in following the course of the supernova blast.

Gravitational waves are another source of energy that should be released. However, they are not expected to provide as much information as would the neutrinos.

It has been estimated that supernovae occur in the Milky Way a few times per century. [Sci. News, Feb. 18, 2017]

WE'RE GETTING BETTER AT FINDING DARK MATTER

A review by Dr. Pauline Gagnon of Indiana University summarize the current tricks that astronomers use to find dark matter. The earliest method was to measure the rotational speed of galaxy clusters. Rotation of objects in space is related to the mass of the central core of the objects. This kind of measurement was accomplished in 1933 by Swiss-American astronomer Fritz Zwicky. He found that in order to keep the rotating cluster of galaxies from flying apart, he had to allow for the presence of unseen mass, that he called dark matter. Zwicky also measured the quantity of light emitted from a galaxy cluster and related that to mass. These results were further refined in the 1970's by American astronomer Vera Rubin (ed. note: Vera Rubin died in December of 2016).

Another indicator for dark matter is its ability to bend light that passes near it. When light (image) from distant objects passes near a blob of dark matter, the light is bent by the blob's

gravitational pull. If the object is uniquely placed, its image can be split as it curves around the mass of dark matter, creating multiple images. This is commonly seen in pictures produced by the Hubble space telescope.

More recent studies on the behavior of colliding (merging) galaxies has shown that as the galaxies pass through each other, ordinary matter slows down, but dark matter does not. This produces a separation of the two forms of matter. Such mergers of galaxies show regions of dark matter (as seen by the lensing affect described above) surging ahead of ordinary matter.

Computer simulations of the interaction of dark matter with ordinary matter in the early universe have produced cosmic structures with lumpiness that corresponds to what we see currently in maps of the cosmic microwave radiation. Thus, it appears that clumps of dark matter acted as nucleating sites for the formation of galaxies and galaxy clusters. [Amer. Scientist, May-June, 2017].

BLACK HOLES THAT TAKE ON A BIG BITE, TAKE LONGER TO GOBBLE THE FOOD

Astronomers have observed that black holes in galaxies typically take about a year to devour a star that happens to be drawn into its gravitational heart. This process can be observed from Earth by monitoring the output of X-rays that are produced. The European Space Agency used the XMM-Newton spacecraft and NASA's Chandra and Swift satellites to observe an X-ray burst from 2005 to 2008 emanating from a region that grew 100 times brighter. The supermassive black hole source is located in a galaxy about 1.8 billion light-years away. Since the outburst has persisted for more than 10 years, it is surmised that the captive star is quite large-perhaps 10 times the mass of our Sun. Astronomers predict that X-ray emission will continue for several more years. [Sci. News, April 1, 2017].

SEASON LENGTH ON OTHER PLANETS

The May issue of Astronomy magazine compares the length of seasons on other Solar System planets. The seasons on our Earth are caused by the tilt of the Earth's axis, which is about 23.5 degrees relative to the vertical. The north end of the axis (an imaginary line that runs through the Earth from pole to pole) always points to the North Star. That means for about three months of the year, we in the northern hemisphere are pointed toward the Sun and we experience our summer season. People in Australia or South Africa will experience their winter season. For three months when our hemisphere leans away from the Sun, we have our winter season and it will be summer in Australia. During the spring and fall seasons we get intermediate radiation from the Sun, since we are not tilted toward or away from the Sun.

So, the season length and thermal intensity depend on the tilt of a planet's axis as well the length of time it takes to make one orbit of the Sun.

To describe a couple of planets: Mercury: its axis has no tilt (close to 0^o), so it has no seasons. Mars: it has a 25.2^o tilt and has four seasons like the Earth. But the length of the seasons will be twice as long as ours, since Mars takes around 688 Earth days to orbit the Sun. Jupiter: axis tilt of 3.1^o and a season length of 3 Earth years (Jupiter takes about 12 Earth years to orbit the Sun.

THE MOUNT WILSON HOOKER TELESCOPE REACHES THE CENTURY MARK

The 100 inch Hooker telescope on Mount Wilson, was constructed in 1917. It was the mainstay instrument for Edwin Hubble and other noteworthy astronomers. (Astronomy, May, 2017).

MAY BIRTHDAYS: Antony Hewish (Brit.): b. May 11, 1924. Radioastronomer, mentor to Jocelyn Bell Burnell, who discovered pulsars. Hewish won the Nobel Prize (with Martin Ryle) in 1974. **Theodore von Kármán (Hung.-Amer.)**. b. May 11, 1881, d. May 6, 1963. Mathematician – aerospace engineer. Specialty was supersonic and hypersonic airflow. He was one of the founders of Jet Propulsion Laboratories.

MOON PHASES FOR MAY: First Qtr.: Tues. May 2; Full: Wed. May 10; Last Qtr.: Thurs. May 18; New: Thurs. May 25.

PLANETS IN MAY: Venus: Rises 2 hours before the Sun. Very bright in the east with magnitude of -4.5. **Jupiter:** Dominates the sky for nearly the whole night. Located in Virgo, near Spica. Magnitude of -2.4. Look for Jupiter moons with binoculars. **Mercury:** In the morning east. Has greatest western elongation (highest position) on May 17. Rises about ½ hour before the Sun. **Saturn:** Rises shortly before 11:30 pm (EDT). In the vicinity of Sagittarius and Ophiuchus. Magnitude 0.3 to 0.1. **Mars:** Located in the southwest in Taurus. Near Aldebaran and Pleiades cluster. You can distinguish Mars and Aldebaran since the red planet sets after Aldebaran.

ETA AQUARID METEOR SHOWER: Occurs over May 5 – 6 in the wee hours of the night. Supposed to produce 60 meteors and hour.

WORD SEARCH: Orbit lingo. (as an educational exercise, look up the meaning of the listed terms)

R T E C L I P S E B D E
S T A T I O N A R Y C L
P E R I H E L I O N O O
N B R A P H E L I O N N
O L T U E D C P A S J G
C R E F R G K S P T U A
C P E R I O D M O L N T
U F A N G V I W G P C I
L U D K E R O M E I T O
T R E G E V A T E R I N
L M O P P O S I T I O N
S U L T R A N S I T N S

APHELION
APOGEE
CONJUNCTION
ECLIPSE
ELONGATION
OCCULT
OPPOSITION
PERIGEE
PERIHELION
PERIOD
STATIONARY
TRANSIT

Don't forget about the solar eclipse on August 21, 2017. A pretty good view of the eclipse can be seen in extreme western North Carolina. But 100 percent totality will be seen just across the border in South Carolina. You can buy solar-viewing glasses from the Kaleideum (SciWorks) gift shop or from the Forsyth Astronomical Society (monthly meeting at Kaleideum the fourth Tuesday of the month at 7:30pm)

Forsyth Astronomical Society website: http://www.fas.org **Kaleideum (SciWorks) ph.: 336-767-6730 Ext. 1000**

I love the way the Earth rotates. It makes my day. Have a great month. Bob Patsiga, editor