

# THE YOUNG ASTRONOMERS NEWSLETTER

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## WHAT WE KNOW ABOUT PLANET NINE

No one has yet observed (at least knowingly observed) Planet Nine, the newly proposed addition to the Solar System. This intriguing body was proposed earlier this year by Mike Brown and his associate at Caltech, Konstantin Batygin. Brown gave a summary in the June issue of *Astronomy* magazine about the history and background that led them to claim the existence of Planet Nine. It seems that those who are knowledgeable about the mechanics of the bodies within and beyond the Kuiper Belt suspected that some unseen object was aligning some of their orbits in a peculiar way. For example the extremely elongated orbit of Sedna, a trans-Kuiper object, suggested that something with sufficient mass was shaping the orbits. Other bodies were found to be orbiting the Sun in orbits that are aligned perpendicular to the plane of the Solar System. At least six such renegades were identified.

Brown and Batygin did paper and pencil calculations as well as numerous computer simulations of the planetary motions, and found the right match of the mass and orbit of Planet Nine with the behavior of the other distant objects.

The currently known details are: Planet Nine has about 10 times the mass of Earth; its orbit is inclined by about 30 degrees to the plane of the main Solar System; it has an average distance of around 600 AU (AU = Sun to Earth distance); when it is at its most distant point (aphelion), it is in the constellation Orion; when Planet Nine is at perihelion, it should be at about 18<sup>th</sup> magnitude and near the constellation Ophiuchus; right now, it is near aphelion and is at about 25<sup>th</sup> magnitude.

The path of Planet Nine's orbit is known, but the location of the planet is not yet pinned

down, since at its great distance, it moves so slowly. Brown believes that current, state-of-the-art telescopes, such as Subaru, in Hawaii, should be able to spot it.

## THE BIG GALACTIC PICTURE

Astronomers have now recalibrated the gross anatomy of the cosmos. We used to think of the Milky Way galaxy as being part of the Virgo supercluster. But astronomers R. Brent Tully and colleagues at the University of Hawaii have now determined that Virgo SC, is just a small part of a much larger supercluster called Laniakea. This monster collection of about 100,000 galaxies (each holding some billions to trillions of stars) spans about 500 million light years. Laniakea is the Hawaiian native language for Immeasurable Heaven.

Tully and colleagues have plotted the positions and motions of more than eight thousand galaxies. They concluded that the Milky Way is located on the fringe of the giant Laniakea supercluster. It was found that some galaxies are pulling away from each other, while others are drawing inward. The Milky Way and its neighbor galaxies are drawn inward toward a gravitational focus called the Great Attractor. The neighboring supercluster is called Perseus-Pisces. You can see a neat, four-minute video of this on UTube:

<https://www.youtube.com/watch?v=rENyyRwxpHo>

## SEARCH FOR DARK SKIES

It is gratifying to see in the May 30 *TIME* magazine, an article about the importance of reducing light pollution so that humans can see the full glory of the heavenly bodies. The concept of astrotourism is starting to catch on

so that parks and other regions of the U.S. are being set aside as havens for people to see the maximum number of stars. The International Dark-Sky Association (IDA) has been instrumental in convincing directors of public sites to promote reduced light pollution at their facilities as well as in surrounding communities. The IDA says that it has seen the establishment of 38 of 64 “dark sky” locations since the beginning of 2014.

#### **THE BIGGEST ROCKET: SLS**

NASA is carrying on basic testing of the propulsion components for the Space Launch System (SLS). On June 28, there will be a rocket booster ground test firing at the Promontory, Utah testing site. The media are invited to watch this second round of testing. In the meantime, the RS-25 rocket engines are being test-fired at NASA’s Stennis Space Center near Bay St. Louis, Mississippi. The RS-25 engines are the same ones used to launch the Space Shuttle, and are considered to be very reliable. They are fueled by the combustion of combined liquid hydrogen and liquid oxygen. When fully assembled, the SLS will be the most powerful rocket on Earth. It will be propelled by two five-segment booster rockets plus four RS-25 engines. It is ultimately expected to launch a team of astronauts to Mars. With the Orion crew capsule attached, the SLS will be over 350 feet tall.

The first planned (unmanned) mission is for the September – November 2018 time period. It will reach the moon and release some scientific instruments. The initial SLS configuration will have the capability to haul a payload of 70 metric tons. There will be upgrades so that the payload can reach 130 metric tons. (from various NASA sites).

**Forsyth Astronomical Society Website:**

<http://www.fas37.org>

#### **JUNE BIRTHDAYS**

Giovanni Cassini: b. June 8, 1625. Discovered four moons of Saturn, plus the division in Saturn’s rings.

Fred Hoyle: b. June 24, 1915. Made advancements in nucleosynthesis and stellar evolution.

Charles Messier: b. June 26, 1730. Studied and cataloged cosmic nebulae and galaxies.

George Ellery Hale: b. June 29, 1868. Founded the Yerkes Observatory, plus the Mount Wilson and Palomar Observatory. Hired Edwin Hubble.

#### **JUNE MOON PHASES**

New Moon: June 4; First Quarter: June 12; Full Moon: June 20; Last Quarter: June 27.

#### **PLANET INFORMATION FOR JUNE**

**Jupiter:** In the southwest (mag. -2.1) in Leo. Sets around 2 A.M. Jupiter moon, Calisto does two transits of the planet. From U.S., can see the transit on June 8 (begins at 11:02 P.M. EDT).

**Saturn:** (mag. 0.0) Visible all night. Due south at midnight. Saturn, Mars and Antares dominate the southeastern sky at nightfall. Saturn reaches opposition on night of June 2 – 3.

**Mars:** (mag. -2.0) Look for Mars moving across southern sky. Along with Saturn, Mars roams with Scorpius and Libra. North polar cap should be visible with good telescopes.

**Neptune:** (mag. 7.9) Rises around 2 A.M. (EDT) on June 1. Around 2 hours earlier by month’s end.

**Mercury:** Appears in the east a half hour before sunrise on June 5.

**Venus:** Still out of sight all month.

#### **SUMMER STOSTICE**

The angle of the Sun at noon is at its maximum on June 20, 6:34 EDT (see page 3 on how to measure the vertical angle of the Sun.)

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June 20 is the Summer Stostice. Make an alidade (a type of sextant) to measure the height of the Sun. Make a photocopy of a protactor and glue it on to a thick piece of cardboard. Mark an angle scale so that 90 deg. on the protactor is changed to 0°, 80° is 10°, etc. Tie a one foot length of string to a washer and insert it through the focus hole of the protactor image. Put a weight (washer) on the other end of the string. Using strapping tape, attach a soda straw to the upper edge of the cardboard/angle scale.

Aim the straw at the Sun and look for the bright image on the palm of your hand or piece of white paper (do not look through the straw at the Sun!!). Note the angle of the string on the angle scale.

You can also measure the Sun's altitude by noting the angle the Sun's shadow makes relative to a vertical post.

You can also calculate the Sun's altitude using the equations given in the April Newsletter.

