

\*\*\*\*\*

# YOUNG ASTRONOMERS NEWSLETTER

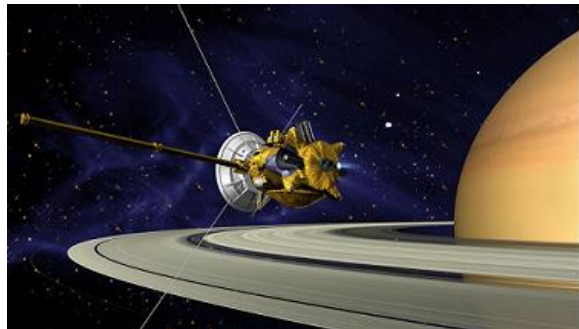
\*\*\*\*\*

## GET READY FOR THE SOLAR ECLIPSE IN AUGUST 2017

On August 21 of this year, there will be a total eclipse of the Sun. The Moon’s shadow will begin on Oregon’s Pacific coast on that morning and then move diagonally across the country and exit from the coast of South Carolina in the afternoon. Only the extreme western parts of North Carolina will be within the path of totality. Check, for example:

[www.eclipse2017.org/2017/path\\_through\\_the\\_US.htm](http://www.eclipse2017.org/2017/path_through_the_US.htm).

You might want to reserve a motel room that is in the region of totality for the day of the eclipse. Of course, you should not look at the Sun without unprotected eyes. You can search the internet for special glasses, or number 12 welder’s goggles will work (according to January Astronomy magazine).



Cassini near Saturn (NASA image)

## SPACECRAFT CASSINI WILL DIVE INTO SATURN IN SEPTEMBER 2017

When it was launched in October 1997, it was called Cassini-Huygens. It was a piggy-backed space probe consisting of Cassini, the home ship and Huygens the lander destined for Saturn’s giant moon, Titan.

During the ensuing seven years, the spacecraft whizzed by several Solar System bodies and finally reached the ringed planet in July, 2004. Then on December 25, 2004, Huygens separated from Cassini and made a soft landing on Titan on January 14, 2005.

Huygens confirmed our suspicions that the moon’s surface was dominated by frozen or liquefied hydrocarbons.

Cassini continued to orbit the Saturnian system, taking high resolution photos, temperature and magnetic field measurements and sampling and analyzing of gases and particles. It spent over ten years studying the moons and rings of Saturn. It discovered two moons: Methone and Pallene, as well as mini-moons located within the rings, and it sampled the geyser plumes emanating from the moon Enceladus.

Starting in the spring of 2015, Cassini initiated a series of engine burns, plus it used a gravitational push from Titan (Cassini was running low on fuel) to change its orbit from an equatorial alignment to polar alignment. This gave the spacecraft a different angle to study the planet and its rings, and it set the stage for the gradual suicidal descent into the planet itself.

In late November, 2016, Cassini began a series of 20 final orbits, concluding with orbits that take it within the inner rings. It should skim to a little more than a thousand miles above the clouds of the gas giant. The death plunge should take place in September. (cont. p. 2)

While Cassini is making its final dive, we hope that it will continue to broadcast information. Over 200 researchers from 17 countries will be anxiously waiting for the new information that will be forthcoming.

The Cassini mission was a joint venture of NASA and the European Space Agency. The ESA had primary responsibility for the Huygens segment. Giovanni Cassini and Christian Huygens were 17<sup>th</sup> century astronomers who made several initial discoveries about Saturn, its rings and its moons. [Astronomy, Jan. 2017; <https://saturn.jpl.nasa.gov/>].

### **A NEW LIGHT-WEIGHT CLASS OF GALAXIES HAS BEEN DISCOVERED**

Early in 2015, astronomers reported the discovery of several galaxies located in the Coma Cluster of galaxies. These galaxies had remained undiscovered until then because they were so weak and diffuse in light output.

It took a special telescope, called the Dragonfly Telescope, to detect these faint star systems. The Dragonfly, located in New Mexico consists of multiple telephoto lenses, kind of like the compound eye of insects. Now, other standard telescopes are re-scanning that area of the sky and confirming the existence of these very faint galaxies. The Dragonfly telescope can compensate for diffraction or other aberrations that cause standard telescopes to overlook the weaker light sources.

These faint galaxies are now being located in other regions of the cosmos, and they have been given a classification name: "ultradiffuse galaxies". They are large in geometric dimensions, but they are low in star population. Their size can be comparable to our Milky Way, but their mass is far less.

So, what holds these large, light-weights together? They should have been shredded by the strong gravity of surrounding heavy

galaxies. The answer seems to be dark matter. On the grand scale, dark matter represents about 85% of all matter in the universe. But in the diffuse galaxies, dark matter might be as high as 98%. But how did they get that way? Studying the ultradiffuse galaxies might lead to some new theories of galaxy formation. [Sci. News, Dec. 10, 2016].

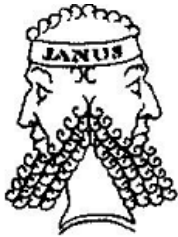
### **BLACK HOLE OCCURRENCE**

Just when in the early developmental stages of our universe did black holes begin to appear? Also, by what mechanism did the early black holes form? These early black holes became huge, millions or billions of times as massive as our Sun and they are believed to be at the centers of old, bright galaxies that we know as quasars.

In regard to the first question, one proposal is that if some of the earliest stars collected into tight clusters, they could merge into black holes. Another idea involves stars that formed right after the Big Bang, called Population III stars. These reached enormous sizes, up to several hundred times the mass of our Sun. These eventually underwent supernova collapse to black holes which merged with neighboring black holes. These grew in galaxies to huge sizes and became quasar energy sources.

However the above description goes against a calculated time-frame that is needed for black hole growth. How did the black holes get so big, so fast?

Not all galaxies contain a central black hole. The Triangulum Galaxy (M33), for example, has no black hole. But probably over half of all galaxies contain black holes. A review of early black hole formation, written by Camille M. Carlisle is found in the January, 2017 Sky and Telescope. This is Part I.



The Roman god, Janus has two faces: one to look to the past and one to look to the future. The month of January is said to be named after Janus.

.....  
**JANUARY BIRTHDAYS:** **Stephen Hawking (Eng.):** b. Jan. 8, 1942; Astrophysicist, specializing in the origins and behavior of the Big Bang, black holes and spacetime. **Robert Woodrow Wilson (Amer.):** b. Jan. 10, 1936; co-discoverer of the cosmic microwave background radiation. Nobel Prize, 1978 (with Arno Penzias).  
.....

**MOON PHASES FOR JANUARY:** First Qtr.: Thurs. Jan. 5; Full: Thurs. Jan. 12; Last Qtr.: Thurs. Jan. 19; New: Sat. Jan. 28.  
.....

**QUADRANTID METEOR SHOWER:** These short-lived meteors should peak on the morning of Jan. 3<sup>rd</sup>. They will radiate out from the end of the handle of the Big Dipper. The Moon phase should be favorable (dark).  
.....

**PLANETS IN JANUARY:** **Mars** and **Venus** are still prominent in the southwestern sky after sunset. They are in the constellation Aquarius, but by the end of the month move into Pisces. **Uranus** (mag. 5.8) and **Neptune** (mag. 7.9) are also in the area, but require binoculars for visualizing. **Jupiter** rises in the east around 1 A.M. at the beginning of the month, but two hours earlier at month's end. It is found in Virgo (find the bright star Spica). **Saturn** rises about 90 minutes before the Sun at the beginning of the month, but this lead time increases to 3 hours before the end of the month. **Mercury** is also in the eastern horizon, a bit lower than Saturn.  
.....

**WORD SEARCH: WINTER CONSTELLATIONS**

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

ARIES  
AURIGA  
CANCER  
CANIS  
CASSIOPEIA  
ERIDANUS  
FORNAX  
GEMINI  
LEPUS  
MONOCEROS  
ORION  
PERSEUS  
PISCES  
TAURUS

L F E G H R K L T S O M \*\*\*\*\*  
E B I F O R N A X C W G \*For up to date information about NASA missions, like Juno, Curiosity,  
P L A H I Z K O U E R F \* Cassini, New Horizons as well as general astronomy topics, go to the  
U M O N O C E R O S V N \* NASA official site: <https://www.nasa.gov>  
S G H I T P E R S E U S \*

.....  
**LITTLE KNOWN FACTS ABOUT SPACE:** Astronauts do not shower in space. On the International Space Station, astronauts take sponge baths and use a dry shampoo to wash their hair.  
.....

**Forsyth Astronomical Society website:** <http://www.fas37.org>      **SciWorks:** 336-767-6730; ext. 1000  
**Have a great start to the year 2017** Bob Patsiga, editor