The May general meeting of DPAS will be held at 7 PM on Tuesday, May 1 at the Ray and Ruthie Stonecipher Astronomy Center. The main program will be next in the film series, The Smooth Expanding Universe, as planned for the April meeting which was snowed out. The Learn the Night Sky portion will focus on constellations Draco and Cephus. Both programs will be presented by Steve Ransom-Jones.

Meeting Notes

The Great Debate was put to rest by Edwin Hubble just 3 or 4 years later, again using the cepheid variable relationship to determine that the Andromeda Galaxy was in the order of a million light years distant, certainly outside of the boundaries of our own galaxy.

What are cepheid variables? These are stars that vary in brightness with precise regularity. What Leavitt discovered was a relationship between the actual brightness of a variable star and the period of fluctuation in brightness. So if you measure the apparent brightness of a star and measure the period of variability, you can calculate the distance by knowing how brightness varies with distance.

The program began with the Great Debate of 1920 between Herber D. Curtis and Harlow Shapley. Curtis maintained that there are many galaxies, spirals seen it telescopes are galaxies, and that the sun is near the center of our Milky Way galaxy. Shapley, on the other hand, insisted that there is only one galaxy, spirals are gas clouds, and that the sun is distant from the center of our galaxy. The third contention of Shapley was based on measurements to distant stars made using cepheid variables, a technique developed by Henrietta Swan Leavitt but for which Shapley took credit. (Shapley estimated the diameter of the Milky Way Galaxy to be about 150,000 light years.)

The program then proceeded to some basics: three major types of galaxies, (spiral, elliptical, and irregular), and the familiar fork diagram of the Hubble classification based on how elliptical and elliptical galaxy is, and for spiral galaxies the size of the nuclear bulge and the openness of the spirals, and the presence or absence of a barred nucleus.

An annotated NASA image of the Milky Way Galaxy was projected along with an explanation as to why, continued on page 3
Who We Are

DPAS is a local club and chapter of the Astronomical League. We are also a club member of the International Dark-Sky Association and the Night Sky Network, teaching arm of the Astronomical Society of the Pacific. We meet on the first Tuesday of every month, with rare exception. Meetings are held at the Ray & Ruthie Stonecipher Astronomy Center unless otherwise announced. We operate and maintain the Leif Everson Observatory which houses a 14" Celestron Schmidt-Cassegrain telescope on a sophisticated tracking mount controlled by computer, and a weather station housed in the observatory. Current weather readings are shown on our web site: www.doorastronomy.org

The StarGarden near the observatory is used for viewing the sky with unaided vision, binoculars and members’ telescopes. There are also binocular mounts set in concrete which allow viewers of different heights to view the same object through the same binocular.

The Ray & Ruthie Stonecipher Astronomy Center provides for storage, projects, meetings, warm-up and toilet facilities. It also houses a StarLab, an inflatable planetarium with a sophisticated projection system. The planetarium is used for group presentations.

An Analemmatic Sundial was dedicated on October 20, 2012.

The “astronomy campus” as described here is reached by taking Utah Street east to the stop sign and turning left through the gate onto Stargazer Way. Or you can set your GPS to 2200 Utah.

The Leif Everson Observatory turns 20! repeated from April

By Barb Henkelmann,
Door Peninsula Astronomical Society Archivist

Twenty years ago on May 9, 1998, the Leif Everson Observatory had its dedication ceremony. Located at the Door Peninsula Astronomical Society’s astronomy campus at 2200 Utah St., Sturgeon Bay, the Observatory has been the focus of many stargazing evenings. From the beginning, the building was a co-operative venture between the Sturgeon Bay School District and the Sturgeon Bay Education Foundation. The Sturgeon Bay Education Foundation was a not-for-profit organization founded to raise funds for the school district and consisted of teachers and community-minded members. One of these members, Jim Maki, 8th grade teacher at T.J. Walker Middle School, was the impetus behind the building of the Observatory. He was an avid astronomer and thought that having an observatory for his students to use to study stars and planets was a great idea. He contacted Ray Stonecipher, retired professor from the University of Wisconsin – Whitewater, and together they worked to make the Observatory a reality.

A site was chosen on Sturgeon Bay School District forest property east of State Highways 42/57 and north of Utah St. The Observatory was the recipient of many monetary donations including a grant from the Peterson Foundation. Francis and Arliss Everson donated a large sum of money to fund the telescope, naming the Observatory “The Leif Everson Observatory” in memory of their teenage son, who died tragically at a football camp.

Groundbreaking took place on July 8, 1997, and was a co-operative effort of many people and businesses, headed by Jim Maki with Ray Stonecipher acting as consultant. Local architect, Henry Isaksen of Isaksen Architects, was hired to design the building. Others were involved in the digging of the foundation, construction of the building using leftover bricks from Sawyer Elementary School and the construction of the fiberglass dome in the school shop class. Sturgeon Bay Utilities donated the underground wires and when Internet service was needed, Charter donated the fiber optic cable. The Observatory houses a 14” Schmidt Cassegrain telescope operated by a tracking mount controlled by computer. When the telescope was installed, it had to be perfectly aligned to the North Star, accomplished by Ray Stonecipher and John W. Beck, computer expert and avid astronomer.

Recent upgrades in software and hardware were installed by DPAS members, Dave Lenius and Steve Ransom-Jones. With the addition of a MallinCam video camera, it allows DPAS to stream images from the telescope live around the world over the Internet web site, www.nightskiesnetwork.ca. During the recent transit of Mercury, DPAS was one of the few sites that had a clear view of the event. In a reverse process on August 21, 2017, on the mostly cloudy day of the total eclipse of the sun, the Observatory’s computer was able to capture the eclipse from a clear sky location on the Night Skies Network and project the images to a projection screen located in the Stonecipher Astronomy Center. Hundreds of people came out to experience this historic event.

Throughout its twenty years of operation, the Leif Everson Observatory has focused on countless night sky objects and been the inspiration to many viewers, young and old alike, through viewing nights facilitated by the Door Peninsula Astronomical Society. DPAS opens the Observatory to Society members and the general public monthly, usually on the Saturday evening closest to the new moon, a yearly Astronomy Day, and on special astronomical occasions.
Satellites from page 1

even with satellites, one can’t take a photo of our galaxy looking down on the spiral so we rely on an artist’s interpretation from the information we have. Another image depicted the inner and outer halos, containing younger and older populations of stars respectively, as well as mention that globular clusters reside in the halo, not on the galactic disc.

Images of our companion galaxies were projected: the Large Magellanic Cloud, the Small Magellanic Cloud, and the Sagittarius Dwarf Elliptical Galaxy, or SagDeg. Drawings and video clips showed how matter from those dwarf galaxies is being spread both ahead of and behind the direction of travel of those dwarfs in relation to the Milky Way Galaxy, explained by the fact that gravity from the entire galaxy affects that matter, not just the dwarf itself.

A very recent report (April 3, 2018) was presented which claims that the Milky Way Galaxy is expanding. Young blue stars are racing toward the periphery at about 1100 mile/hour, and the diameter of the galaxy is increasing at about 500 meters/second. The report was based on studies of similar galaxies from earth based and space based observatories using data obtained at various wavelengths.

Images of familiar galaxies were shown in comparison to the Milky Way Galaxy to show a range of sizes including the Andromeda Galaxy which until recently was thought to be 1.5 to 2 times the size of our galaxy; recent studies of the masses of the two suggests that they may be about the same size. But two elliptical galaxies were shown. Virgo A, also known as M87, has an estimated mass of about 2.7 trillion times the mass of our sun compared to about 400 billion solar masses for our galaxy.

Perhaps the most massive galaxy known is IC1101 in Serpens, with a mass of about 100 trillion solar masses and a diameter of 6 million light years, some 60 times the diameter of our Milky Way Galaxy. It was emphasized that the galaxy could only reach this mass by engulfing other galaxies in the same group. Also, ellipticals tend to appear in clusters unlike spiral galaxies which are not generally part of clusters.

As any program on galaxies calls for pretty pictures, images and a few characteristics of the following were presented: The Andromeda Galaxy M31 and its companions M32 and M100, M33 the Triangulum Galaxy, M101 the Pinwheel Galaxy in Ursa Major, M 51 the Whirlpool Galaxy near the end of the Big Dipper’s handle in Canes Venatici the hunting dogs, M 64 the Black Eye Galaxy in Coma Berenices, and of course M 81 and M 82 which the editor delights in finding with his 4” refractor, both in one eyepiece field.

After a break, the class was treated to images of several other galaxies with comments about some of their features including star-forming regions and dust lanes as well as deformations attributed by some scientists as remnants of interactions with other galaxies. Images of NGC 1512 showing the inner ring and then the nuclear ring give the impression that we’re looking at matter swirling into the event horizon like a drain.

Images comparing the similar appearing Little Sombrero Galaxy, NGC 7814, with the Sombrero Galaxy, NGC 4594 or M 104 were displayed with the point that the former is a spiral but the latter is an elliptical galaxy! Another beautiful edge-on galaxy is NGC 4565, the Needle Galaxy in Coma Berenices. This was followed by M74, the Phantom Galaxy which has been described as a “grand design continued on page 4
Galaxies continued from page 3

galaxy” meaning that the spiral arms are well defined without intervening branches or partial arms. Several other galaxies were presented showing such features as star forming regions, distortions from nearby galaxies, and areas of dust such as the Needle’s Eye Galaxy, NGC 247 in Sculptor. The Virgo cluster of galaxies was projected along with reiterating that elliptical galaxies are found in galaxy clusters unlike spiral galaxies.

A video clip showed M95 with and without Supernova 2012aw. Earlier it was mentioned that 3 supernovas have been documented in M 51 in the past 17 years.

The Hubble Ultra Deep Field and the significance of the image came next with one image pointing out the most distant galaxy ever detected, EQSY8p7, 13.2 billion light years from us. (The universe is thought to be 13.8 billion years old.)

As predicted by but never observed by Albert Einstein, galaxies can be used as gravitational lenses and images explaining this phenomenon were displayed.

NGC 2623 shows what happens when galaxies “collide” and, in this case, the cores have merged and become an active galactic nucleus, a segue into a discussion of various forms of active galactic nuclei, or AGN’s. These include QUASARS, BLAZARS, Seifert I, Seifert II, LINER’s, OVV’s and B Lac objects. A diagram showed how the angle from which the object is view apparently determines which of the types of AGN is detected.

At the conclusion, nobody requested a definition of the word “galaxy”.

Editor

2018 Programs

A tentative schedule of programs for the general meetings has been developed by program director Steve Ransom-Jones and approved by the board. Changes may be made if situations arise. Such a change is reflected below. Since the April meeting was canceled as a result of a violent snow storm, programs have been moved back one month. Here is the revised schedule.

June: Measuring Gravity (Newton to LIGO)
July: Video: Space, Time and Gravity
August: Atmospheric Physics of the Terrestrial Planets
September: Video: Cosmology in Einstein’s Universe
October: Black Holes
November: Video: Galaxies and Clusters
December: Video: Gravitational Lensing

The monthly series of programs, in addition to the feature programs, will be “Learning the Sky and Constellations.”

Viewing Nights

May 19
June 16
July 14*
August 11*
September 8
October 6
November 10
December 8
*The sun sets at 8:33 PM on July 14 and 8:02 on August 11, so viewing will be quite late.

Astronomy Quiz

1. In the study of black body radiation, when Rayleigh and Jeans tried to apply Maxwell’s equations to electromagnetic radiation, their experiments ran into a stumbling block called the “ultraviolet catastrophe”. This was solved by_______ who developed a theory represented by the formula E=hf where h is a constant, h=6.626070040(81)×10−34J⋅s. Who solved the “ultraviolet catastrophe”, what is the constant called, and what theory resulted from this work?

2. When scientists study the sun’s corona, they use an opaque disc just the right size to block the view of the sun but not its corona. That instrument is called_______.

3. Dr. Ray Stonecipher’s favorite vehicle was a ______________.

4. The Stardust Mission returned dust from space gathered from _______. The Hayabusa mission returned dust from_________. The OSIRIS-Rex mission is planned to return dust from ____________.

5. The name of this crater is____.
Poetry Corner

The Night Piece, to Julia

BY ROBERT HERRICK

Her eyes the glow-worm lend thee,
The shooting stars attend thee;
And the elves also,
Whose little eyes glow
Like the sparks of fire, befriend thee.

No Will-o'-th'-Wisp mis-light thee,
Nor snake or slow-worm bite thee;
But on, on thy way,
Not making a stay,
Since ghost there's none to affright thee.

Let not the dark thee cumber;
What though the moon does slumber?
The stars of the night
Will lend thee their light,
Like tapers clear without number.

Then Julia let me woo thee,
Thus, thus to come unto me;
And when I shall meet
Thy silv'ry feet,
My soul I'll pour into thee.

NGC 1512
Nuclear ring

Note streams of dust spiraling in toward the center
Astronomy Quiz Answers

1. The "ultraviolet catastrophe" was solved by Max Planck. The constant is called "Planck's Constant." Thus was born the Quantum Theory.

2. A coronagraph.

3. Posche. He used to race them.

4. Stardust returned dust from Comet Wild-2. Hyabusa returned dust from a small near-Earth asteroid named 25143 Itokawa. The OSIRIS-REx mission will travel to a near-Earth asteroid called Bennu.

5. That's a NASA image of the crater Tycho near the south pole of our moon. 5. There's a NASA image of the called Benenu.

The OIFRS-REx mission will visit asteroid named 25143 Iokawa. Dust from a small near-Earth asteroid named Comet Wild-2, Hyabusa retrieved Comet Wild-2. Hyabusa retrieved asteroid dust from an asteroid.

Viewing Nights 2018

May 19
June 16
July 14*
August 11*
September 8
October 6
November 10
December 8

*May be cancelled because it gets dark so late.

Times will be posted in the Blue Moon Observer and on the website:
www.doorastronomy.org

NCRAL 2018

Newport State Park IDA designation

Saturday 9-10

Beth Bartoli is the Naturalist at Newport State Park in Door County, our Recently designated Dark Sky Site. The designation was awarded after years of work by her, the staff of the park and our Door Peninsula Astronomical Society. She helps conduct astronomy programs at the park and states "We never tire of seeing that 'aha' moment on the upturned faces of our visitors as they gaze toward the heavens." The Wisconsin Department of Natural Resources and Newport State Park are committed to protecting our dark sky through lighting projects, community education and outreach.

One Star at a Time
Saturday 10:30-11:30

Audrey Fischer works through her organization, One Star at a Time, to create star parks in Chicago and around the world. Star parks are designated areas where the light are off or directed downward. As a Chicago native, she knows that it isn’t a perfect place for stargazing, but she is working to return stars back into all cities. Audrey stated during an interview for the Chicago Tribune “Starlight belongs to each and every person in the world. A starry night gives people a reason to look up and to realize that others from around the globe share the same sky. Starlight is the path to closer understanding of our universe, each other and ourselves – and maybe it’s even a path toward peace”.

Near Earth Objects
Saturday 1-2

Tyler Linder is a professional astronomer supported by NSASA’s Near Earth Object Observations (NEOO) research grants to track and study the Near Earth Asteroid (NEA) population. His presentation will focus on the information that can be obtained by asteroid characterization, both through light curve analysis as well as visible and near-infrared spectroscopy. The collaboration between amateur and professional astronomers uses middle and high school students as well as undergraduate students.

Innovators Developing Accessible Tools For Astronomy
Saturday 2:30-3:30

Kate Meredith is the Education Director at the University of Chicago Yerkes Observatory in Williams Bay, Wisconsin. She is currently working on a program for students with low vision and blindness to develop image processing software. The three-year project, Innovators Developing Accessible Tools for Astronomy (IDATA) is funded by the National Science Foundation. She will explore what else we can do with invisible data that will allow everyone access to the same quality and quantity of information.

Light Pollution
Saturday Evening

Kevin Poe is the Green Energy Project Manager at the National Park Service at Bryce Canyon, Utah. He is a second-generation Park Ranger and owner of Dark Ranger Telescope Tours. Kevin calls himself the Dark Ranger to make environmental advocacy cool and heroic, and describes himself as a Planet Hugger. Teaching awareness of light pollution and understanding of the universe to people of all ages through lectures and stories is his goal.