



the Skyscraper

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December 2014

AMATEUR ASTRONOMICAL SOCIETY OF RHODE ISLAND * 47 PEEPTOAD ROAD * NORTH SCITUATE, RHODE ISLAND 02857 * WWW.THESKYSCRAPERS.ORG

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Saturday, December 13, 5:30pm at North Scituate Community House

5:30pm Put Luck Dinner

What should you bring? We ask you to bring a dish to share: Appetizer, Main Dish, Side, Salad, Pizza, Dessert. You may want to bring a warming tray and serving pieces. There is a microwave and a refrigerator available.

Provided will be: Beverages: water, soda, coffee. Dishes, forks etc, cups, napkins
Please plan to take home all leftovers.
Email Kathy Siok with what you plan to bring. We expect about 45 people.

As a part of the festivities this year, we would like to showcase any astrophotos you have taken, by projecting them during the dinner portion of our meeting. If you wish to share your astrophotos, please send them to Robert_Horton@Brown.edu, no later than Friday.

7:30pm The Milky Way– An Insiders Guide by Dr. William Waller

The Milky Way - An Insider's Guide takes readers on a grand tour of our galactic home - proving intimate views of the many marvels that inhabit this vast swirling realm. Astronomy and educator William Waller describes the full sweep of galactic phenomena - from the supermassive black hole that quietly lurks within the Galaxy's core, to the ponderous dark matter that prefaces its halo, to the stellar pyrotechnics in its disk that have driven the evolution of chemical complexity -- up to and including ourselves! This book serves both as an engaging guide to the inner workings of our Galaxy and as a springboard for imagining our possible future as galactic "citizens."

Dr. William Waller is a Research Associate Professor at Tufts University Department of Astronomy and Physics.

Dr. Waller's research and interest is in the dynamics of the interaction of components of the Milky Way Galaxy including stars, molecular clouds, spiral arms and supernova remnants. His interests include the spreading of astronomical knowledge to amateurs and the public.





President's Message

Bob Horton

December skies bring long, cold nights, along with the opportunity to do some early stargazing right after supper.

The early winter sky offers many celestial treasures, and with various holiday gatherings that many of us will be attending, now is a great opportunity to share your love of astronomy with your family and friends. Make it a point sometime this month to set up your telescope, and invite others to view objects such as the Orion Nebula, the Pleiades, the Andromeda Galaxy, and the

double cluster in Perseus. If you are heading to church or a family gathering Christmas Eve, bring along a pair of binoculars. On that night, a thin crescent moon will be seen low in the southwestern sky at dusk, which will provide for beautiful views of Earthshine.

Our December meeting will be a holiday gathering for Skyscrapers, complete with a potluck supper. As a part of the festivities this year, we would like to showcase any astrophotos you have taken, by project-

ing them during the dinner portion of our meeting. If you wish to share your astrophotos, please send them to me at Robert_Horton@Brown.edu, no later than Friday. I will put them into a Power Point presentation. There is no limit - send as many as you like.

I wish all of you the very best this holiday season.

Clear Skies

Friday, December 12

Members' Observing Star Party at Seagrave Observatory

A fun observing event will be happening this Friday night, Dec 12th, starting at 10pm.

Three of Jupiter's moons, Callisto, Europa and Io, will at first be seen pretty much be in a line, but as they move in their orbit around Jupiter, the pattern will change, with Callisto seeming to close in on Europa. By 10:40pm, the three form a neat little triangle, and then around 11pm, Callisto will appear to pair up with Io. If you continue to watch the movement of the moons, Callisto will be getting closer to Jupiter, and nearly forming a straight line with the

other moons it just passed. But just as it reaches this point around 11:50pm, Callisto passes into the shadow cast by Jupiter, and the moon disappears from view.

As luck would have it, Seagrave is open that night (weather permitting) for the last Members' Observing Night of the year. All the more reason to brave the elements and join us for a truly unique event!!

Please notify Bob Horton at Robert_Horton@Brown.edu if you plan to attend.



The Skyscraper is published monthly by Skyscrapers, Inc. Meetings are held monthly, usually on the first or second Friday or Saturday of the month. Seagrave Memorial Observatory is open every Saturday night, weather permitting.

Directions

Directions to Seagrave Memorial Observatory are located on the back page of this newsletter.

Submissions

Submissions to The Skyscraper are always welcome. Please submit items for the newsletter no later than **November 21** to Jim Hendrickson, 1 Sunflower Circle, North Providence, RI 02911 or e-mail to jim@distantgalaxy.com.

E-mail subscriptions

To receive The Skyscraper by e-mail, send e-mail with your name and address to jim@distantgalaxy.com. Note that you will no longer receive the newsletter by postal mail.

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Friday, December 5

Let's Go "Back to the Moon for Good" at the URI Planetarium

University of Rhode Island Planetarium
Upper College Road
Kingston, RI

Friday, December 5th, 2014
6:00 and 7:00 P.M.

Contact: Francine Jackson: 401-527-5558

Black Holes are one of the most amazing objects in our sky. Much has been written about them, but they still remain one of the most questioned topics in astronomy. What are they? Where do they come from? Should we be worried about them coming to Earth? The University of Rhode Island, in cooperation with the Denver Museum

of Nature & Science, will present Black Holes, Friday, December 5th, at 6:00 and 7:00 P.M. In addition, a short program on Light Pollution will be shown, then The Skies of the URI campus, a live introduction to the night sky.

Admission is only \$5.00, to benefit the University of Rhode Island memorial fund.

The University of Rhode Island Planetarium is located on Upper College Road, on the Kingston campus, across from the Art Center.

The University of Rhode Island Planetarium is available for programming for schools and other organizations. For more information, please contact Francine Jackson at 401-527-5558.



M33 Pinwheel Galaxy by Tom Thibault.



In Memory of Walter Dowhyj

It was with great sadness to learn of the recent death of Walter Dowhyj. Although not a presence lately, in past decades Walter had been almost a permanent fixture at Skyscrapers, serving as trustee and being at many public open nights.

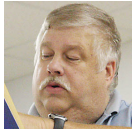
In addition to astronomy, Walter was famous for his cars. Very often he would travel around the state, looking for a car he might love to drive, as long as he believed it was in good condition. At one time, he owned 18. It was always a surprise when he drove in to Peepload

Road, as we never knew what car he would be driving. He even brought his love of cars to his work, as much of his time he was employed at the shipyards, driving the new models out of the ships and into the yards for pickup by carriers. He was often the first to know of any special model car that might soon come on the market.

Walter came to Rhode Island with his parents from Ukraine in the early 1950s. As such, upon the deaths of his parents, Walter leaves no family except the friends he made at Seagrave. We will miss him.

By Francine Jackson
Photos by Steve Hubbard from a
Clark Telescope restoration session in
1976





An Early Holiday Gift: the Geminid Meteor Shower

Dave Huestis

Stargazers are a hearty group of people. During the muggy months of the year we often fight the onslaught of mosquitoes while trying to enjoy the starry sky. Then once the cold of winter sets in, you will still find many dedicated souls bravely bundling up to observe the heavens under often frigid temperatures. These circumstances can be mitigated in one way or another. But the situation that confounds us the most is clouds. Lately it seems Mother Nature is conspiring against us here in Southern New England. Inclement weather clouded out two lunar eclipses this year. Lousy weather has also spoiled several meteor showers.

And to add further insult to injury, many public nights at Ladd Observatory and Seagrave Observatory were cancelled due to poor weather conditions. It can be very frustrating when many of the events I write about cannot be observed, or when after months of planning, a star party for a local school or civic group has to be scrubbed due to cloudy skies. I have to remind myself that this is New England and the weather is often quite fickle. I can only hope that 2015 will be filled with clear skies for everyone to enjoy the wonders of the heavens.

But until the beginning of the new year there are still a few astronomical events to

look forward to during December, provided Mother Nature is kind to us.

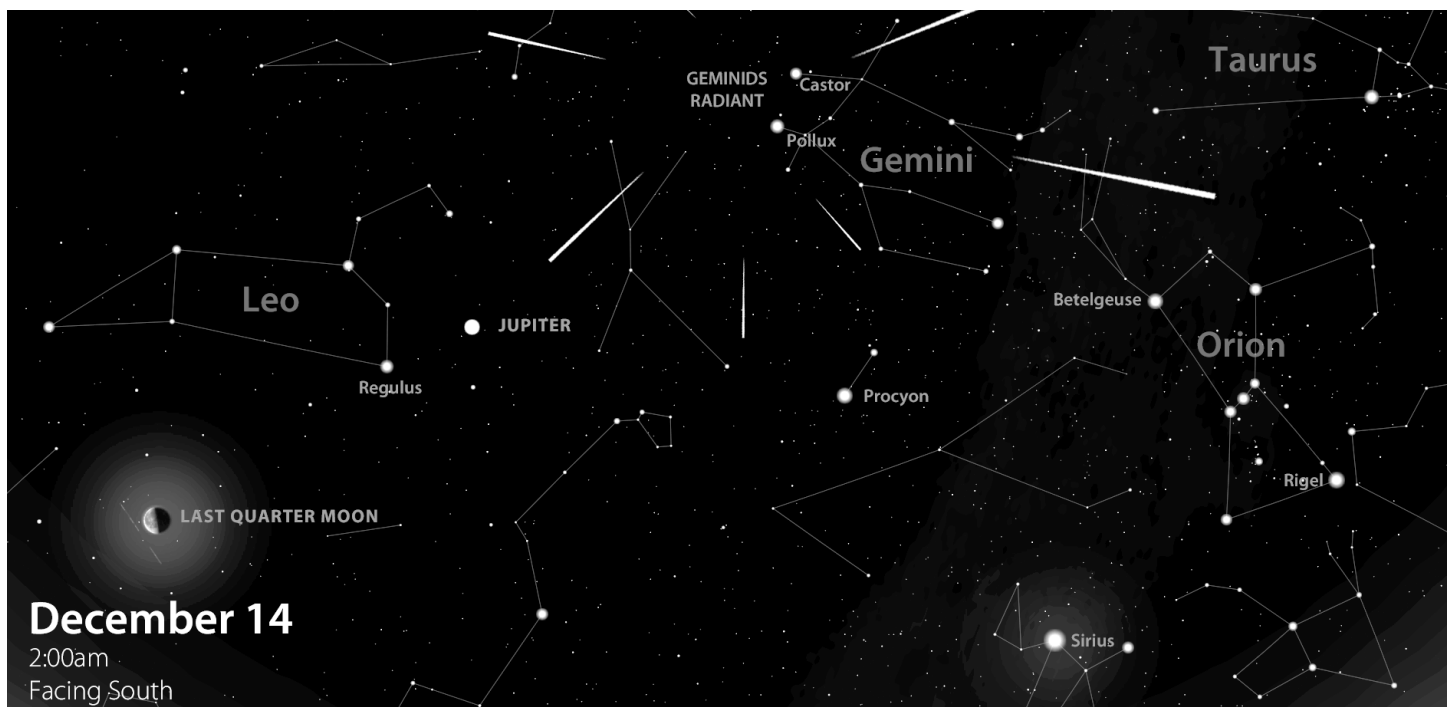
First up, on the evening of December 5-6, the waxing gibbous Moon (almost Full) will pass through the V-shaped Hyades star cluster in the constellation of Taurus. When the Moon rises around 4:00 p.m. locally, it will already be within the cluster. If you have several hours to observe, you will see the Moon slide to the east (right) through this asterism as the night progresses. At around midnight the Moon will be within one degree (two full moon diameters) from Taurus' brightest star, orange Aldebaran, the "eye of the bull." Anytime during this celestial show would be a good opportunity to snap a few images. It will be a very beautiful sight.

A week later, December 13-14, we will be treated to the annual gift of the Geminid meteor shower. The Moon will then be at Last Quarter and will not rise until 11:20 p.m. That's excellent news for the Geminids, as this display can be observed during the early evening hours. This circumstance is contrary to most meteor showers. Why? The Gemini star pattern is well above the east-northeast horizon by 8:00 p.m., allowing us to view members of this display early. An observer with a good horizon may even

see a few earth-grazers skim across the top of our atmosphere.

An additional advantage for many observers this year is the fact that peak night occurs on a Saturday evening to Sunday morning. To see these shooting stars to best advantage you should find a dark-sky location free from any sources of light pollution. Get comfortable and stay warm. You'll know you've seen a Geminid if you can trace the origin of the meteor's trail back to the radiant point near Gemini's brightest stars, Castor and Pollux. The Geminids are fairly bright and moderate in speed, hitting our atmosphere at 21.75 miles per second. They are characterized by their multicolored display (65% being white, 26% yellow, and the remaining 9% blue, red and green). Geminids also have a reputation for producing exploding meteors called fireballs.

Before the Moon rises above the horizon and begins to cast its light across the heavens, an observer could potentially observe 40 meteors per hour. Peak activity occurs between midnight and dawn, with 60+ meteors per hour predicted. However, moonlight will somewhat overshadow the dimmer meteors as the Moon rises higher into the sky. Don't just stare in the direction of Gemini. Scan around the sky as much



as possible without straining your neck. I suggest lying on a lounge chair within a sleeping bag. Gemini will continue moving towards the west, staying away from the Moon. At around 2:30 a.m. Gemini will be on your meridian, just south of zenith.

Keep warm and alert, but don't get too comfy out there. Many moons ago during a Geminid meteor shower watch from Seagrave Observatory, the sky was clear when we started observing. However, sometime during the night we all fell asleep. When we awoke we realized some clouds had paid us a visit, since we were all covered with a dusting of snow. Moral of that story is... stay awake while meteor observing during the winter. Otherwise they may have to pick you up with ice tongs and thaw you out in the morning!!

Another important astronomical event, the Winter Solstice, occurs on December

21 at 6:03 p.m. The Sun reaches its southernmost position in our sky on this date. It will then begin its migration northward and the daylight hours will lengthen as we head towards the Vernal Equinox (Spring) on March 20, 2015, at 6:45 p.m. EDT.

And finally, I briefly mentioned Jupiter last month. In December, Jupiter will still be too low in the sky to be observed from most of the local observatories during their open times. However, if you have your own telescope equipment and a good view to the east, you can start observing Jupiter right away. This huge world can be found in the constellation of Leo, seven to eight degrees to the upper right from Leo's brightest star, blue-white Regulus. Even a small telescope will reveal Jupiter's four Galilean moons and the primary belts and zones in his atmosphere.

When you wish to enjoy the beauty of

the heavens through a telescope, please visit the local Rhode Island observatories.

Seagrave Memorial Observatory (<http://www.theskyscrapers.org>) in North Scituate is open to the public every clear Saturday night, although it will be closed on December 13.

Ladd Observatory (<http://www.brown.edu/Departments/Physics/Ladd/>) in Providence is open every clear Tuesday night.

Frosty Drew Observatory (<http://www.frostydrew.org/>) in Charlestown is open every clear Friday night year-round.

Be sure to check all the websites for the public night schedules and opening times before visiting these wonderful facilities. Wintry conditions can force unexpected closures.

Enjoy the beauty of the heavens.

Happy holidays and clear skies to all.



Star of Bethlehem

Francine Jackson

As December rolls around, our thoughts naturally turn to holidays, the excitement of the upcoming new year, and, of course, the Star of Bethlehem, the enigmatic mention of a guidepost that led the Wise Men to the stable and the Child. This alleged portent is only mentioned once, in the Gospel of Matthew, as an almost aside, and yet, astronomers, philosophers and theologians have been trying for centuries to determine what, or if, this phenomenon could have been.

As astronomers, we try to learn if it could have been a fairly natural celestial occurrence. One reason is the Wise Men themselves, who, as Magi, were classed as Magicians, or, in the words of that time, Astrologers, who continuously checked the sky for "signs" of future events – and the birth of the Child would have been one of the highlights of their work. Because of this, we do have to believe there was something out of the ordinary that they noticed – yet, something not necessarily so fantastic that it would have been seen by everyone.

For instance, a supernova: A brilliant end of a star much larger than the Sun. But, if one had occurred, the possibility of it being seen by many would have been quite high. Also, there are no records of any during this time.

A comet? This is probably the least likely

candidate, as comets were signs of terror, a sky object that brought fear to the masses – not a sign of joy to the Earth.

The best possibility is that of a planetary alignment. As astrologers, this type of celestial happening would have meant a great deal to a sky watcher, but might have gone unnoticed to the average person. And, if so, what? Were there any unique apparitions that might have occurred within the approximate time frame of the Birth?

Of course, the first question is when did the Birth actually take place. One thing we are sure of, is that it did not happen in the year zero. There was no year zero, as the last year listed as B.C. was 1, followed immediately by 1 A.D., which is why, to this day, decades begin on the year ending with one, and end at year ten.

We also have the king himself to consider. Herod, to whom the Wise Men visited, ordered them to let him know where the Child was, as Herod had been foretold that a King would be born who would depose him, and he wanted to deal with this rival as soon as possible. Fortunately, a dream alerted the Magi to run out of town, sadly forcing the king to murder all male children two years old and under. We do know that Herod died not too long after this declaration, so to choose a point of the birth must take that time into consideration.

The most likely scenario, if we consider a planet explanation, is one of two sets of planetary conjunctions. The first, beginning about 7 B.C., involved a close conjunction of Jupiter and Saturn. This was followed by a second conjunction of them, and finally a third, with the planet Mars then coming very close to the pair. In addition, this last is said to have occurred in Pisces, considered a very sacred constellation at that time.

Also, between 2 and 1 B.C., there was a triple conjunction of Jupiter with Regulus, the heart of Leo, the Lion. The importance of this is the fact that the Lion is the king of the jungle, or the king of beasts, and his heart star is a variation of the word for king. And, then, after the triple conjunction, Jupiter, the fourth brightest celestial object, was joined very closely by Venus, the third brightest celestial object, creating an effect not often witnessed in the sky.

Could one of these planetary alignments have been what the Magi had been waiting to witness? Or, was the Star of Bethlehem just an unexplainable incident, a first and only to mark a once-in-a-lifetime event? Or, was it nothing at all, just a note of fiction written by Matthew to attempt to explain the events of the time? Whatever it was – or wasn't – we at Seagrave Observatory wish you all the best of the holidays, and the happiest New Year.



Double Star Eta (η) Cassiopeiae

Glenn Chaple

The spotlight this month goes to the binary star Struve 60, better known as eta (η) Cassiopeiae (or Achird, if you prefer its Arabic name). Details first.

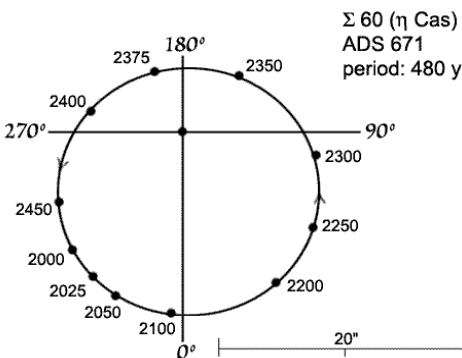
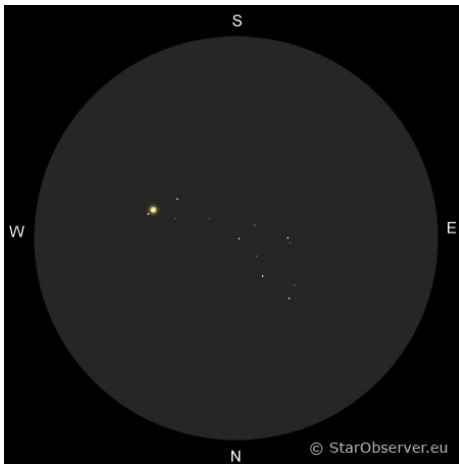
William Herschel discovered the duplicity of eta Cassiopeiae in 1779. At the time, the magnitude 7.4 companion was 11.3 arc-seconds east-northeast (position angle 62°) of the magnitude 3.5 primary. Since then, it has traveled $\frac{3}{4}$ of the way around the main star to its current location $13.2''$ to its northwest (P. A. 323°). A complete orbit takes about 480 years. Eta Cas A is a main sequence G0-type star - a virtual

twin of our sun, similar in mass and size. Eta Cas B is a M0-type star with about $\frac{2}{3}$ the sun's mass and size. The pair lies 19.4 light years away.

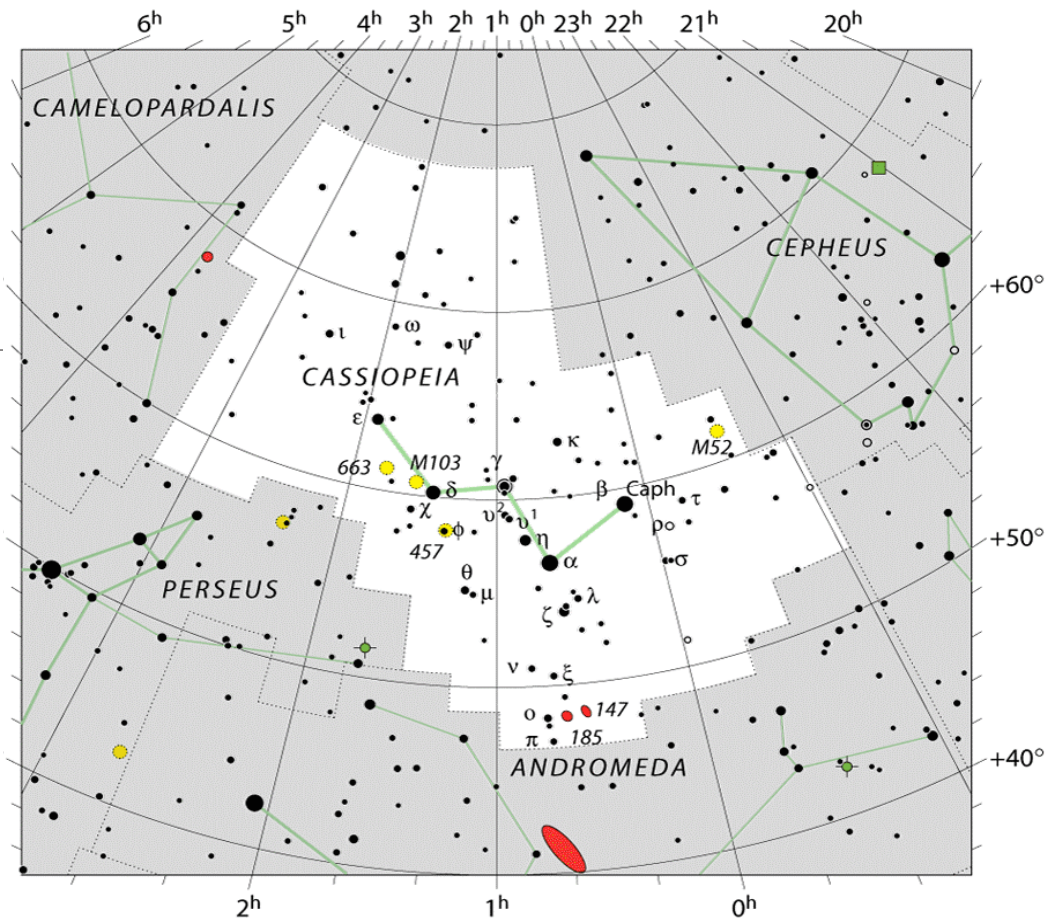
Now for the neat stuff. Eta Cas sports a color contrast so stunning that James Mullaney and Wallace McCall included it in their 1960s *Sky and Telescope* series "The Finest Deep-Sky Objects." I have no reason to argue the selection. After viewing eta Cas with a 90 mm f/11 refractor at 167X, I wrote, "Striking colors! Primary golden yellow; companion pale red." Sissy Haas, in her book *Double Stars for Small Tele-*

scopes, considers it a showcase pair. Check it out and see if you agree.

Before putting your telescope away, stand back and take a good naked eye look at eta Cas and its neighbor gamma (γ) Cas. Visually a magnitude brighter than eta Cas, gamma appears to be much closer. It's an illusion. Gamma Cas is actually nearly 30 times farther away. Move this blue-white subgiant next to eta Cas, and it would shine at a dazzling magnitude -5.5. Remember, eta Cas is a twin to the sun. If it (or our sun) were moved to the same distance as gamma Cas, it would be a 12th magnitude speck.

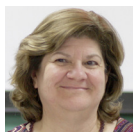


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Secretary

Tina Huestis

Board of Directors Meeting Minutes — 10/20/14

Attendees: Linda Bergemann, Kent Cameron, Conrad Cardano, Jim Crawford, Ian Dell'Antonio, Ed Haskell, Jim Hendrickson, Bob Horton, Dave Huestis, Tina Huestis, Francine Jackson, Pat Landers, Bobby Napier, Kathy Siok, Steve Siok, Tom Thibault, and Matt White.

Bob Horton, President: Bob called the meeting to order at 7:05pm at Seagrave.

Linda Bergemann, Treasurer: Linda reported that there would be three people to introduce at the next meeting.

Steve Siok, 2nd Vice President: Steve provided the speaker update. All the meetings through March are lined up with programming. • Jim Head is a potential speaker for April. Also future months could include member talks relating to mirror/lens grinding and the Browning Spectroscope. • Steve mentioned that a possible AstroAssembly keynote speaker could be Dr. John Johnson, who is participating as one of Brown's colloquium speakers.

Bob Horton next broached the topic of the future of Skyscrapers and began with the observation of "graying" of the membership. In order to look for a different audience demographic, he suggested more collaboration with the local universities. • Bob introduced Ian Dell'Antonio from Brown to provide more context from the University's perspective. Ian noted that Brown's observing projects are hard to accomplish in the city and there is a real need for the students to have a darker sky location, for example using remotely accessed telescopes. Brown sold its Jerimoth Hill property and is weighing the continued viability of its rooftop observatory. Ian said that the Seagrave grounds could be a suitable site for remote access usage by Brown along with funding/grant opportunities. • The University is also reviewing other options but a partnership with Skyscrapers does make sense as a long-term replacement observing site so that students can perform imaging and spectroscopy. • The discussion opened up to the possibilities of partnerships with other universities as well.

Kathy Siok, 1st Vice President: Kathy

told the Board about Roger Williams University's interest in having students help us by creating a series of four seasonal PowerPoint presentations. More details are needed, for instance, which images would be chosen, the logistics of meeting to provide our feedback, etc. These "canned" presentations could be used when clouds or other weather conditions would ordinarily cancel a Skyscraper program or event. • Dave noted that a minimum standard for accuracy would be needed. Kathy agreed and said that Adria Updike, assistant professor of physics at Roger Williams University, would curate the student's work. • Bob Horton told the group that this theme of collaborating with astronomy students would be pursued in an upcoming Board meeting and he encouraged everyone to think more about it and to bring back ideas and other details for that future discussion. • Francine Jackson reminded the Board that partnering with Alton Jones is still a possibility. • She also mentioned that celestial navigation classes could be offered at Ladd Observatory instead of at Mystic, Connecticut. Francine indicated that Reed Navigation may be agreeable to hold a class more central for Skyscrapers members if there was enough interest, perhaps in the March/April timeframe. Francine said that she will follow up.

Matt White: Matt raised the subject of the organization's star party fee structure and whether it should be published. He handed out copies of draft guidelines for offsite star parties, which generated much discussion on how to determine the appropriate fee, whether the event was held onsite or offsite, the size of the group, the number of scopes, etc. • Bob again asked the group to think more about this issue and be prepared to talk more about it at a future Board meeting.

AstroAssembly report: Bob asked the group for their individual reports relating to this year's AstroAssembly. • Linda noted that the event netted \$1,786, which was \$100 more than prior year. • Kathy reported that feedback was positive and that this year's banquet was simplified. • Dave noted that he thanked the Seagrave family guests, who also had a very positive experience. • There was a general discussion on the merits of continuing to offer a banquet, since this year it did not provide additional revenue. Kathy noted that there are other aspects of AstroAssembly that involve time and effort, such as the Grille and the raffle.

Bob mentioned that the Alvan Clark

instrument, housed at the Durfee High School, has just undergone a restoration and the Astronomical Society of Southern New England is inviting Skyscraper members to attend a special meeting this Friday from 6:00 – 9:00pm (rain or shine). • An announcement will be sent via email to the membership with those details. • The meeting closed with a final discussion on the topic of advertising Skyscrapers' events and promotion with the University. • Ian noted that the staff population at Brown University has a low awareness level of Skyscrapers.

Submitted by Tina Huestis - Secretary

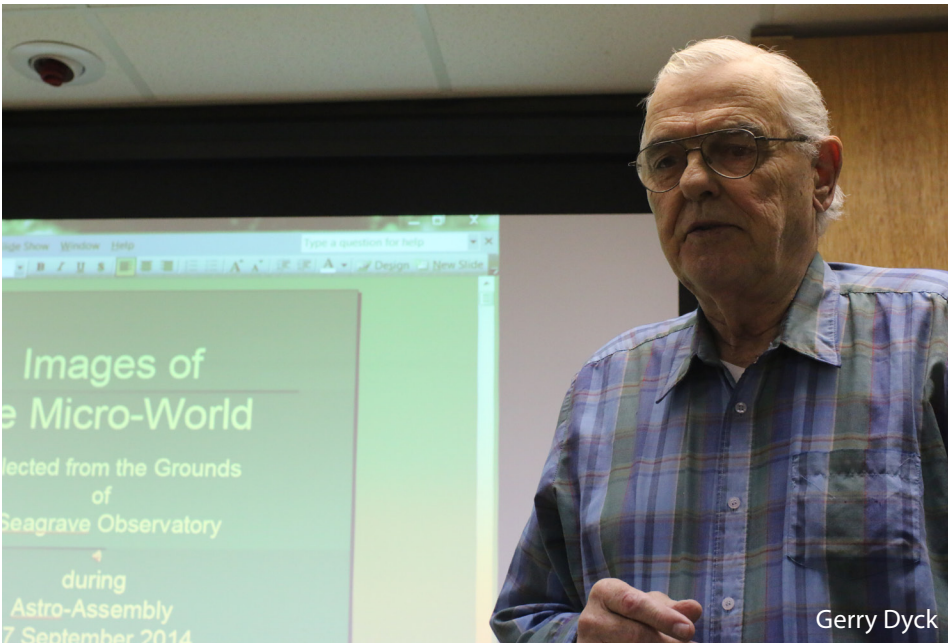
Skyscrapers November Meeting Minutes — 11/7/2014

President Robert Horton called the Skyscrapers' November meeting to order at 7:20 p.m.

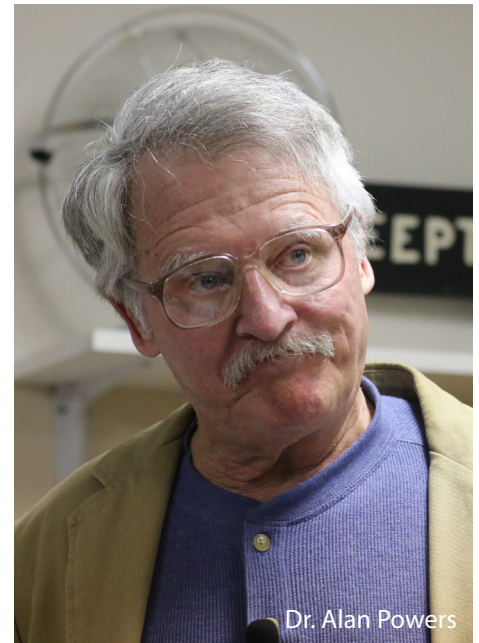
Bob welcomed all present and invited those interested in observing to stay following the evening program, because the Observatory would be open if conditions were clear.

President, Robert Horton: Bob began the business meeting by announcing that the upcoming November 20 Board of Directors meeting would be open to all members. At the September Board meeting discussions included talk of strengthening collaborations with local colleges, including Brown University, that could include grant opportunities as well as fostering more participation by younger generations. The Board is looking for all input on ways to grow the Society and ensure the future of the organization. Bob also informed the membership of the recent passing of Walter Dowhyj, a former Skyscraper member.

Treasurer, Linda Bergemann: Linda introduced new members Michael Davol (of East Providence, RI) and Tracey Prell (of Riverside, RI) that evening. She noted that they will be voted on at the next meeting in which they are in attendance. • Tracey Prell mentioned that she visited the Society's website and was impressed by the President's Letter, which had featured Alex Bergemann's Eagle Scout project and she announced that she was making a \$500 contribution towards Alex's project. • Taking this opportunity, Alex provided an update on the status of his Eagle Project. He noted that post holes were dug and building a base structure was begun. He expects



Gerry Dyck



Dr. Alan Powers

to install the pavilion floor on Tuesday and, if anyone is interested in volunteering, any help would be greatly appreciated. Alex expects to finish by the end of November or early December.

First Vice-President, Kathy Siok: Kathy reminded everyone that this November program will be the last one held at Seagrave during the winter months, when the Society meets instead at the North Smithfield Community. Once April arrives, the organization will return to Peepoad Road for its annual meeting. • The Society's holiday potluck celebration is scheduled for Saturday, December 13, and all are asked to bring a dish to share. The December program features Dr. William Waller, professor at Tufts University, who will speak about the "Milky Way." Dr. Waller will bring copies of his book for anyone interested in purchasing a copy. Everyone is encouraged to bring their own copies as well for Dr. Waller to sign. • Kathy noted that the January meeting will be held on the second Saturday of that month (January 10) and the program topic will be about observing Earth's satellites. • Kathy reminds members to check the website for additional details.

Second Vice President, Steve Siok: Steve updated the group about a Brown University's colloquium he attended recently with Dr. John Johnson speaking about exo-planets. He recommended visiting the International Astronomical Union (IAU) website (http://www.iau.org/public/themes/naming_exoplanets/) to learn more about the naming of exoplanets. • Steve told members that he is looking for help on developing a broad, over-arching theme / topic for next year's AstroAssembly. If you

have any ideas, please reach out to Steve.

Bob introduced member Gerry Dyck who presented the program, "Images of the Micro-World," which featured photos of natural objects collected from the grounds of Seagrave Observatory during September's AstroAssembly.

The meeting adjourned at 7:45. Submitted by Tina Huestis, Secretary.

Kathy Siok introduced Dr. Alan Powers.

Speaker, Dr. Alan Powers presented the talk "NASA Helps Giordano Bruno Find New Worlds," which encompassed a tour of some of the places that Bruno visited during his life, including Italy, France, the United Kingdom, the Netherlands, and Germany (to name a few). Dr. Powers personally was able to retrace many of the steps along Bruno's travels and shared stories, anecdotes, and photos of buildings and statues to help tell the life story of this historical figure who had been burned at the stake for his views.

Board of Directors Meeting Minutes — 11/20/14

Attendees: Linda Bergemann, Conrad Cardano, Jim Crawford, Ed Haskell, Jim Hendrickson, Dave Huestis, Tina Huestis, Bob Horton, Bob Napier, Tracy Prell, Kathy Siok, Steve Siok, Tom Thibault, and Matt White

Bob Horton, President: Meeting called to order at 7:10PM at Seagrave. Bob reminded everyone that at the last Board meeting, the group discussed ways for members to become more involved as well

as fostering future participation in the Society. Bob observed that the organization's core group was getting older, and, to remain viable, we need to explore ways to encourage/reach out to younger demographics to join, bringing in an infusion of new blood, excitement, and fresh perspectives.

Bob suggested that as a starting point, we could identify the different categories of interest of those present in the group and then poll the entire membership. The following interest areas, differentiators, and brainstorming comments were compiled from the evening's session.

Interest Areas (intangibles): Guest speakers — on the plus side, our speakers set us apart from other organizations, conversely some presentations are too technical/inaccessible to segments of the membership • Love of / interest in astronomy • Citizen science (AAVSO, sunspot counts, etc.) • Observational astronomy / star parties • Social aspects / making friends • Intellectually stimulating (speakers) and hands-on opportunities • Education outreach (e.g., star parties, writing columns) • Learn by watching others, asking questions, being exposed to others' telescopes & experiences • Astronomical images / astrophotography • Ambassador / missionary zeal to share astronomy with others / mentoring • Social media (Twitter, Facebook, links on other sites such as IAU, online discussion group)

Interest Areas (tangibles): Clark telescope & 100-year history are major differentiators • Equipment / telescopes / spectroscopy — however failure to keep pace with new technology (e.g., lack of WI/FI) • Seagrave buildings & grounds • Astrophotography

Brainstorming: Improving / maintaining communications was identified as a major improvement area • Retention is more critical than new member acquisition (e.g., constant flow of new members, but they don't stay) • New members may be lacking in skills / they join to learn but their expectations/needs are not being met • Offer entry level programs on telescopes, constellations, observing the Moon, software workshops, etc. • Consider children's topics as well/ be more "kid" oriented • Make our own videos • Meeting Hall is not maximizing its potential / consider offering different visitor experiences: (1) structured: first funnel through an orientation and then lead outside to the domes and (2) allow visitors to self-discover without a formal approach • Develop greater adver-

tising / publicizing / advertising of events and programs • Offer fewer monthly programs (e.g., not every Saturday night) and focus resources on a program & support crew (i.e., along the format of the Astronomy Day "rain or shine" presentation) • Consider school trips (evening observing) to Seagrave where they provide school bus transportation • Seagrave does need modernization (equipment) but not forget our past/history (as our differentiator) • Offer BOFs (birds of a feather) and SIGs (special interest group) formats • Keep in mind that members' needs will vary (i.e., people don't participate the same) and they have to want to meet halfway • "Adopt" a new member (not "neglecting" new members)

Meeting adjointed at 9:10PM

Submitted by Tina Huestis, Secretary



Treasurer Linda Bergemann

Cash Flow YTD as of November 22, 2014
(4/1/14 through 11/22/14)

INFLOWS

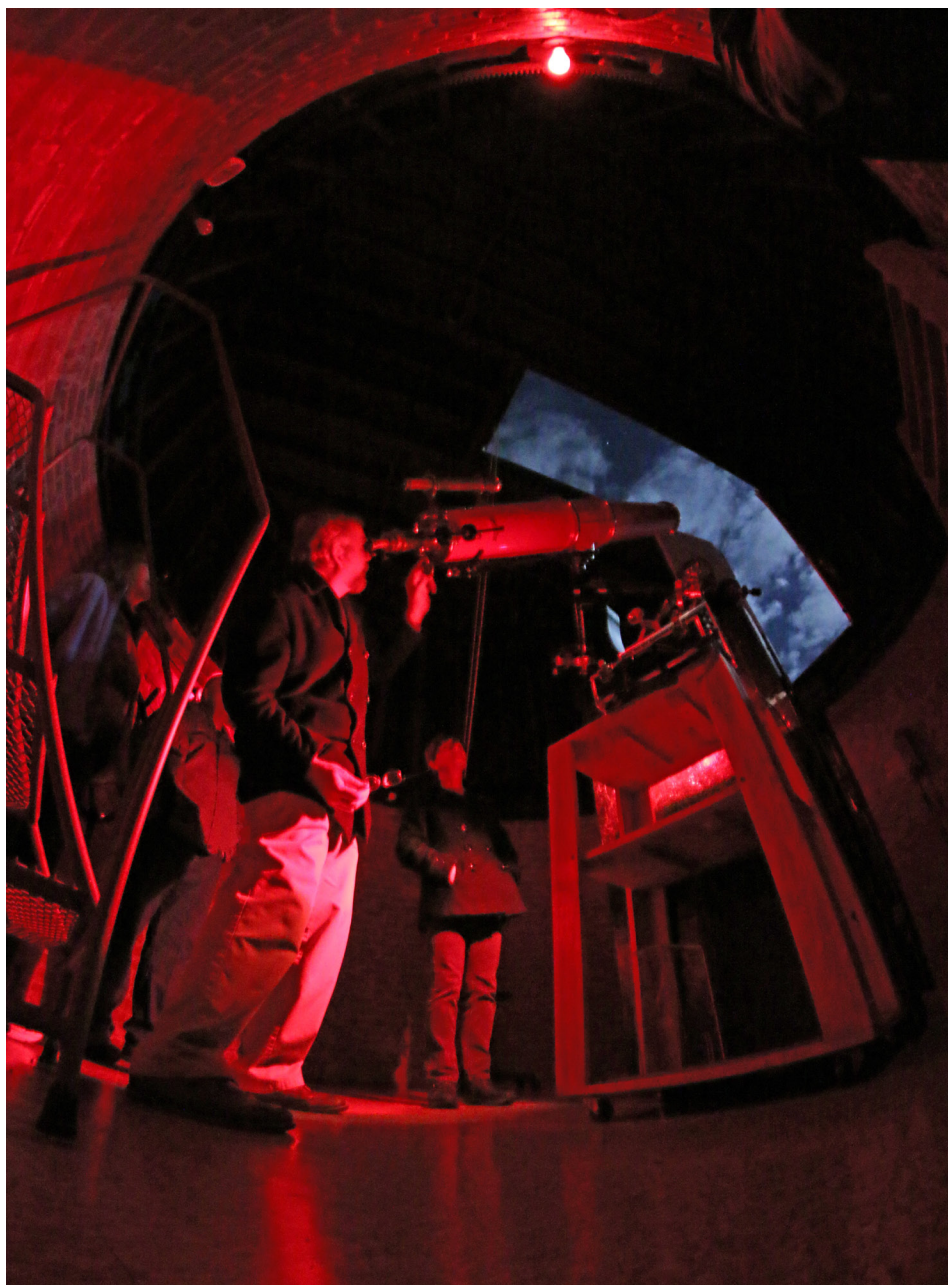
AstroAssembly	
Banquet	\$1,475.00
Centennial Mugs	\$145.00
Grill	\$397.25
Raffle	\$539.00
Registration	\$1,755.00
TOTAL AstroAssembly	\$4,311.25
Donation	
Misc Donation	\$859.00
Refreshment Donation	\$44.00
TOTAL Donation	\$903.00
Dues	
Contributing	\$35.95
Family	\$120.00
Junior	\$15.00
Regular	\$790.55
Senior	\$297.90
TOTAL Dues	\$1,259.40
EAGLE Project In	\$970.00
Misc Income	
Book Income	\$56.00
Interest Inc	\$18.57
Sale of Items	\$529.00
TOTAL Misc Income	\$603.57
Star Party Donations	\$341.00
Subscription Income	
Astronomy	\$68.00
Sky & Telescope	\$65.90
TOTAL Subscription Income	\$133.90
TOTAL INFLOWS	\$8,522.12

OUTFLOWS

Astro Assem Exp	
Banquet	
Caterer	\$1,121.00
Reception	\$108.30
TOTAL Banquet	\$1,229.30
Centennial Postcard	\$85.60
Grill	\$180.37
Refreshments	
Friday PM	\$7.98
Saturday AM	\$2.02
TOTAL Refreshments	\$10.00
Speaker Fee	\$300.00
Tent Rental	\$720.00
TOTAL Astro Assem Exp	\$2,525.27
Contingency	
Speakers Fees	\$200.00
TOTAL Contingency	\$200.00
Corporation, State Fee	\$20.00
EAGLE Project Out	\$970.00
Postage and Delivery	\$24.15
Presidential Fund	\$40.00
Printing and Reproduction	\$10.70
Property Insurance	\$2,386.00
Refreshment Expense	\$111.70
Subscription Payments	
Astronomy	\$68.00
Sky & Telescope	\$65.90
TOTAL Subscription Payments	\$133.90
Trustee Expense	
Capital Equipment	\$222.33
Property Maintenance	\$3,298.65
TOTAL Trustee Expense	\$3,520.98
Utilities	
Electric	\$174.41
Porta-John	\$693.00
Propane	\$80.25
TOTAL Utilities	\$947.66
TOTAL OUTFLOWS	\$10,890.36
OVERALL TOTAL	(\$2368.24)

Cash and Bank Accounts - As of 11/22/14

Capital One Bank	\$12,357.04
Cash	\$72.00
Checking	\$9,788.78
PayPal	\$0.00
TOTAL Bank Accounts	\$22,217.82





Where the Heavenliest of Showers Come From

By Dr. Ethan Siegel

You might think that, so long as Earth can successfully dodge the paths of rogue asteroids and comets that hurtle our way, it's going to be smooth, unimpeded sailing in our annual orbit around the sun. But the meteor showers that illuminate the night sky periodically throughout the year not only put on spectacular shows for us, they're direct evidence that interplanetary

space isn't so empty after all!

When comets (or even asteroids) enter the inner solar system, they heat up, develop tails, and experience much larger tidal forces than they usually experience. Small pieces of the original object—often multiple kilometers in diameter—break off with each pass near the sun, continuing in an almost identical orbit, either slightly

ahead-or-behind the object's main nucleus. While both the dust and ion tails are blown well off of the main orbit, the small pieces that break off are stretched, over time, into a diffuse ellipse following the same orbit as the comet or asteroid it arose from. And each time the Earth crosses the path of that orbit, the potential for a meteor shower is there, even after the parent comet or asteroid is completely gone!

This relationship was first uncovered by the British astronomer John Couch Adams, who found that the Leonid dust trail must have an orbital period of 33.25 years, and that the contemporaneously discovered comet Tempel-Tuttle shared its orbit. The most famous meteor showers in the night sky all have parent bodies identified with them, including the Lyrids (comet Thatcher), the Perseids (comet Swift-Tuttle), and what promises to be the best meteor shower of 2014: the Geminids (asteroid 3200 Phaethon). With an orbit of only 1.4 years, the Geminids have increased in strength since they first appeared in the mid-1800s, from only 10-to-20 meteors per hour up to more than 100 per hour at their peak today! Your best bet to catch the most is the night of December 13th, when they ought to be at maximum, before the Moon rises at about midnight.

The cometary (or asteroidal) dust density is always greatest around the parent body itself, so whenever it enters the inner solar system and the Earth passes near to it, there's a chance for a meteor storm, where observers at dark sky sites might see thousands of meteors an hour! The Leonids are well known for this, having presented spectacular shows in 1833, 1866, 1966 and a longer-period storm in the years 1998-2002. No meteor storms are anticipated for the immediate future, but the heavenliest of showers will continue to delight skywatchers for all the foreseeable years to come!

What's the best way to see a meteor shower? Check out this article to find out: <http://www.nasa.gov/jpl/asteroids/best-meteor-showers>.

Kids can learn all about meteor showers at NASA's Space Place: <http://spaceplace.nasa.gov/meteor-shower>.

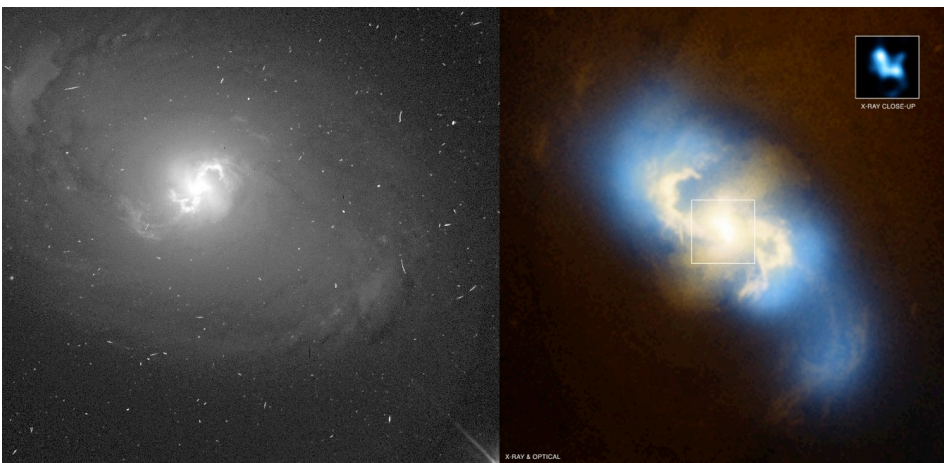
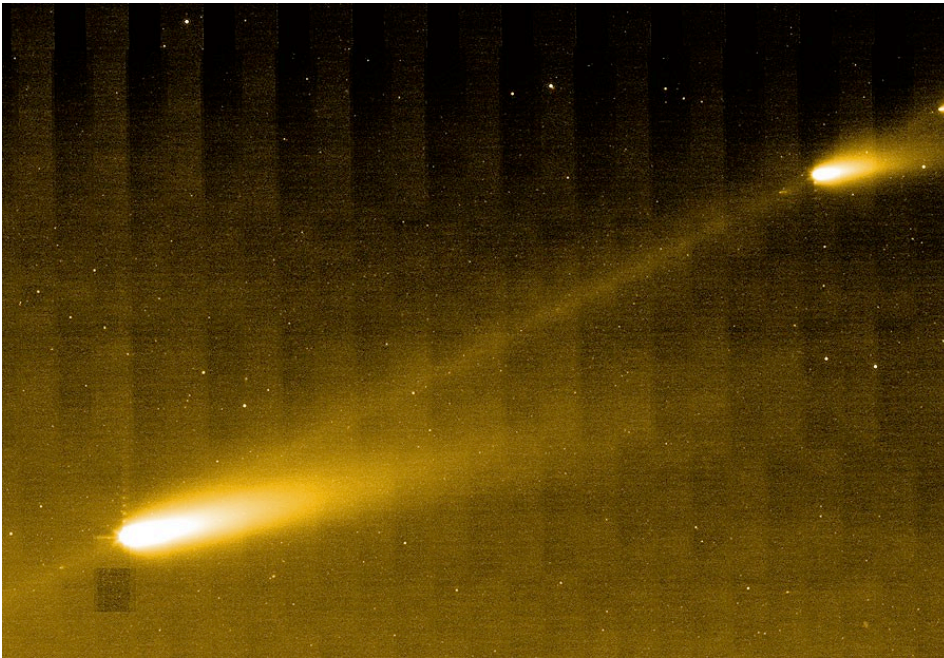


Image credit: NASA / JPL-Caltech / W. Reach (SSC/Caltech), of Comet 73P/Schwassman-Wachmann 3, via NASA's Spitzer Space Telescope, 2006.

Directions to Seagrave Memorial Observatory

From the Providence area:

Take Rt. 6 West to Interstate 295 in Johnston and proceed west on Rt. 6 to Scituate. In Scituate bear right off Rt. 6 onto Rt. 101. Turn right onto Rt. 116 North. Peeptoad Road is the first left off Rt. 116.

From Coventry/West Warwick area:

Take Rt. 116 North. Peeptoad Road is the first left after crossing Rt. 101.

From Southern Rhode Island:

Take Interstate 95 North. Exit onto Interstate 295 North in Warwick (left exit.) Exit to Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.

From Northern Rhode Island:

Take Rt. 116 South. Follow Rt. 116 thru Greenville. Turn left at Knight's Farm intersection (Rt. 116 turns left) and follow Rt. 116. Watch for Peeptoad Road on the right.

From Connecticut:

- Take Rt. 44 East to Greenville and turn right on Rt. 116 South. Turn left at Knight's Farm intersection (Rt. 116 turn left) and follow Rt. 116. Watch for Peeptoad Road on the right.
- or • Take Rt. 6 East toward Rhode Island; bear left on Rt. 101 East and continue to intersection with Rt. 116. Turn left; Peeptoad Road is the first left off Rt. 116.

From Massachusetts:

Take Interstate 295 South (off Interstate 95 in Attleboro). Exit onto Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.



47 Peeptoad Road
North Scituate, Rhode Island 02857