



the Skyscraper

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

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Friday, November 3 at Seagrave Observatory

A New Window on the Universe from an Old Wave-Band

The first radio telescopes used for astronomy operated at meter wavelengths or longer, but with the advent of better computers and new science cases, observations shifted to the centimeter regime. Centimeter observations are simpler than meter wave for several reasons, but over the last decade, several new meter wave radio telescopes have been constructed with the hope of observing a unique signature from the first stars and galaxies in the universe. This talk

will present the science behind these observations and describe the latest efforts to detect long-wavelength cosmological emission from the early universe.

Jonathan Pober is an assistant professor of physics at Brown, where he has been since 2016. He received his PhD from UC Berkeley, and was an NSF Astronomy Postdoctoral fellow at the University of Washington before coming to Brown.



**Skyscrapers
Board Meetings**
Third Monday of the Month
All Members Welcome

Upcoming Meetings

Saturday, December 9 at North Scituate Community Center: Meredith Hughes, Wesleyan University: Discs around newly formed stars

Phases of the Moon

Full Hunter's Moon
November 4 05:23

Last Quarter Moon
November 10 20:36

New Moon
November 18 11:42

First Quarter Moon
November 26 17:03



Seagrave Memorial
Observatory
Open Nights

Saturdays st 7:00 pm
weather permitting



Participants of the 2017 Eclipse line up for a photo at AstroAssembly, each wearing a T-shirt bearing the location from which they observed the eclipse.

Fall Workshops Series

Skyscrapers Fall Astronomy Workshop Series will be beginning soon. We're still working out the details and a specific schedule, and a notice will be sent out soon.

Follow us on Twitter, Facebook or contact [Francine Jackson@brown.edu](mailto:Francine_Jackson@brown.edu) to stay informed.



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 15** 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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Francine Jackson Francine_Jackson@brown.edu

Public Relations Spokesperson

Francine Jackson Francine_Jackson@brown.edu

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Alex Bergemann astroalex@verizon.net

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Dave Huestis dhuestis@aol.com

Archivist

Jim Crawford jcrawford@cox.net

Editor

Jim Hendrickson jim@distantgalaxy.com

Wonders of the Universe at the University of Rhode Island Planetarium

University of Rhode Island Planetarium
Upper College Road
Kingston, RI

Saturday, November 17th, 2017, 6:00 P.M.
Contact: Francine Jackson: 401-527-5558

Peer deep into space through the eyes of the orbiting Hubble Space Telescope and travel back billions of years in time to witness the birth of the universe.

On this breathtaking excursion, you'll witness the formation of galaxies and explore some of the most wondrous nebulae and astronomical structures yet discovered.

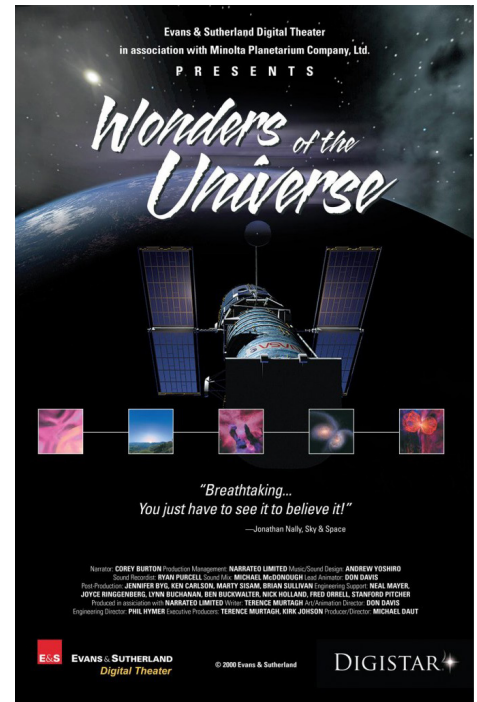
As your travels continue, you'll fly deep into our own Milky Way Galaxy and return home to Earth on a spectacular tour through the Solar System.

Wonders of the Universe, a planetarium program for audiences of all ages, will be

shown at the URI Planetarium, Upper College Road, on the URI campus, at 6:00 P.M. Admission, to benefit the URI Planetarium Memorial fund, is \$5.00. Cosmic Colors will be preceded by a 6-minute award-winning presentation on light pollution, Losing the Dark, and will be followed by a live segment showing the Skies above the URI campus.

Come and see the beauty of color!

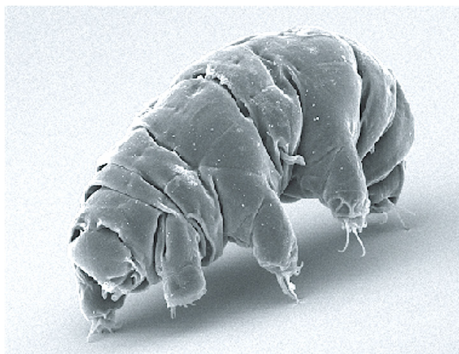
The University of Rhode Island Planetarium is available for programs of many varied topics of astronomical interest for all age groups. For more information, please call 401-527-5558.



Tardigrades: The Hardest Little Organisms

by Francine Jackson

I can remember several years ago hearing of a television show that stated that, were man to be wiped out, the next primary civilization would be cats. Looking at mine, it terrifies me that they could actually take over the Earth; however, the real heads of our planet, the ones we should try to emulate, specially if we want to travel off



SEM image of *Milnesium tardigradum* in active state. Schokraie E, Warnken U, Hotz-Wagenblatt A, Grohme MA, Hengherr S, et al.

the planet, are most likely the “cutest” little animals ever found, tiny tardigrades. These hardy creatures have been known to exist in and on places we could only dream of: buried in a time capsule in Norway (they were fairly dried up, but still alive), frozen to one degree above absolute zero, even hitching a ride on the outside of an ESA space craft.

What gives these adorable little animals, often nicknamed water bears, this super-power ability has been suggested to come from a unique accomplishment: DNA theft. It appears approximately one sixth of their own DNA has come from other organisms, mainly bacteria. This apparently occurs, courtesy of one major study, through a process called horizontal gene transfers, seemingly common in bacteria and other tiny microbes. If other animals can possibly exist in environments totally lethal to large organisms (such as us), it appears tardigrades can, and much better. In fact, their incredible survival occurs because of their

amazing ability to adapt: They can exist without water by replacing it with a sugar called trehalose; they are so small (about 1.5 millimeters long) they can easily hide from predators; their teeth are so sharp, they can spear algae and other tiny animals; plus, they have been here longer than almost any other animal on Earth. Some of you might recall even Neil deGrasse Tyson enjoyed speaking of them on his COSMOS: A Spacetime Odyssey several years ago. If only mankind could learn some tricks from this minianimal. It would make the possibility of space travel so much easier.



Francine Jackson is Skyscrapers Public Relations Spokesperson, writes the weekly newsletter for Ladd Observatory and serves as planetarian at the University of Rhode Island. See more at <http://theskyscrapers.org/francine-jackson>

November Sky Events

by Dave Huestis

Each day the Sun is setting earlier and earlier as we approach the northern hemisphere Winter Solstice on December 21. Amateur astronomers can begin observing immediately following supertime. The skies of November are usually clear and transparent, allowing stargazers at every interest level to explore the heavens to best advantage. Today I'll highlight a few sky events that will lure you out into the cool fall air to experience some astronomical delights.

First, many folks were confused that October's full moon on the 5th was called the Harvest Moon instead of the Hunter's Moon. This anomaly occurred because the Harvest Moon is the only full moon that derives its title based on astronomical circumstances. It is the full moon closest to the autumnal equinox—beginning of fall, which occurred back on September 22. Traditionally September is the full Harvest Moon.

However this year September's full moon occurred on the 6th, 16 days before the equinox. Therefore, since the October 5 full moon was closer to the equinox, only 13 days after, it became the Harvest Moon... the first time since 2009. September became the full Corn Moon, another agricultural reference. So as best as I can determine, there was no Hunter's Moon in 2017.

Fortunately the November 4 full moon name is not complicated. It is the full Beaver Moon, so named by Native Americans who harvested beaver pelts at this time of year for warmth during the long and cold winters.

During the first couple weeks of November the Earth will pass through a stream of

debris left in orbit by Comet Encke. These often very bright yellow fireballs (meteors that explode and fragment into multiple pieces) comprise the Taurid meteor shower. The Taurids are fairly slow and enter our atmosphere at approximately 17 miles per second. You can expect no more than a half dozen shooting stars emanate from the sky in the constellation Taurus. To locate Taurus find the V-shaped pattern that defines the bull's face, or locate the Pleiades — the Seven Sisters.

One very important "event" to note will occur on Sunday, November 5 at 2:00 a.m. That's when we set our clocks back one hour as we return to Eastern Standard Time (EST) from Eastern Daylight Time (EDT). Everyone knows the phrase, "Spring ahead and fall back/behind." Use that hour to catch up on your sleep!

Later that same day you'll be able to observe the waning gibbous Moon pass in front of (occult) Taurus' bright star Aldebaran. As the moon slides eastward (left) through the sky it will cover Aldebaran at around 8:03 p.m. along the Moon's bright edge. While this event can be seen with the naked-eye, binoculars can provide a better view. However, a telescope with medium magnification will enhance the experience as the star slowly winks out behind the lunar profile. Aldebaran will reappear along the Moon's dark limb at approximately 8:58 p.m.

On the mornings of November 12-14, early risers will see a conjunction (close pairing) of Venus and Jupiter only a few degrees above the eastern horizon during twilight. Venus will be the brighter of the

two planets. They will be at their closest on the 13th, being well less than one full moon diameter apart. And on the 15th a very narrow waning crescent Moon may be visible about five degrees above the then separated Jupiter and Venus.

In addition, on the night of November 17-18, the peak of the annual Leonid meteor shower occurs. While this shower displays high numbers of meteors every 33 years, we are not close to one of those meteor storm years. Even though there will be a New Moon which won't brighten up the sky, we can expect about 10-15 green or blue shooting stars per hour between midnight and dawn on the 18th.

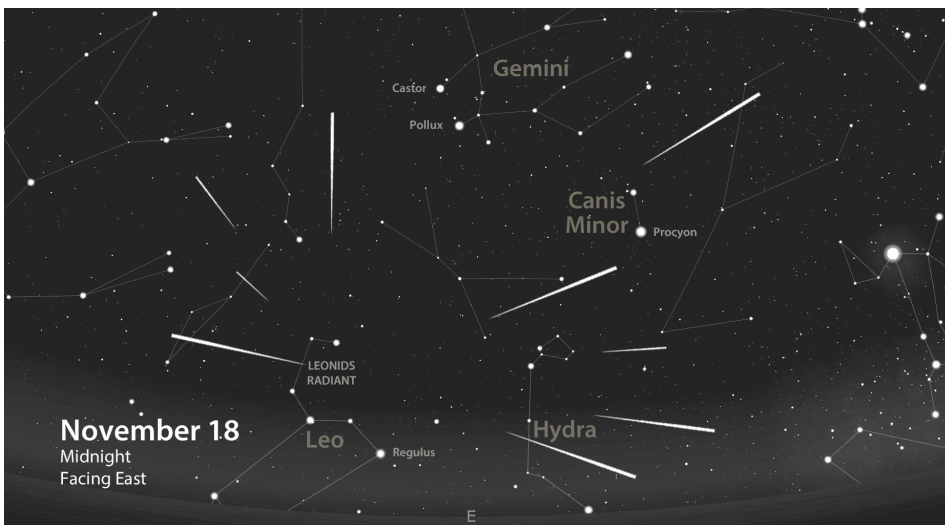
The Leonids blaze across the sky at around 44 miles per second as they hit the Earth's atmosphere nearly head-on. The resulting display produces many fireballs, with about half of them leaving trains of dust that can persist for minutes. The area of sky where the meteors appear to radiate from is in the Sickle (backwards question mark) asterism in Leo. Best of luck in seeing a handful of shooting stars.

And finally, if you'd like to get a glimpse of our solar system's innermost planet Mercury, then give it a try during evening twilight on the 24th. It will be only 5-8 degrees above the southwest horizon, but it should be visible. Use Saturn, which will be about six and a half degrees above it, to locate Mercury.

Seagrave Memorial Observatory (<http://www.theskyscrapers.org>) in North Scituate is open to the public every clear Saturday night. Ladd Observatory (<http://www.brown.edu/Departments/Physics/Ladd/>) in Providence is open every clear Tuesday night. The Margaret M. Jacoby Observatory at the CCRI Knight Campus in Warwick (<http://www.ccri.edu/physics/observatory.htm>) is open every clear Thursday night. Frosty Drew Observatory (<http://frosty-drew.org/>) in Charlestown is open every clear Friday night year-round.

Enjoy the crisp autumn weather as you explore the beauty of our universe.

Keep your eyes to the skies.



Dave Huestis is Skyscrapers Historian and has been contributing monthly columns to local newspapers for nearly 40 years. See more at <http://theskyscrapers.org/dave-huestis>

The Sun, Moon & Planets in November

This table contains the ephemeris of the objects in the Solar System for each Saturday night in November 2017. All times are in Eastern Daylight (UTC-4 through November 4) and Eastern Standard (UTC-5 after November 4). Ephemeris times are for Seagrave Observatory (41.845N, 71.590W).

Object	Date	RA	Dec	Const	Mag	Size	Elong	Phase(%)	Dist(S)	Dist(E)	Rise	Transit	Set
Sun	4	14 37.3	-15 21.6	Lib	-26.8	1935.2	-	-	-	0.99	07:22	12:29	17:36
	11	15 05.3	-17 24.5	Lib	-26.8	1938.4	-	-	-	0.99	06:30	11:30	16:29
	18	15 34.0	-19 12.8	Lib	-26.8	1941.4	-	-	-	0.99	06:39	11:31	16:23
	25	16 03.4	-20 44.2	Sco	-26.8	1944.2	-	-	-	0.99	06:47	11:33	16:18
Moon	4	2 34.3	9 08.0	Cet	-12.8	1982.3	174° E	100	-	-	18:25	01:31	07:45
	11	9 32.8	13 53.9	Leo	-11.9	1893.3	88° W	49	-	-	23:14	06:20	13:18
	18	15 14.8	-13 32.5	Lib	-6.6	1776.6	7° W	0	-	-	06:29	11:45	16:56
	25	21 02.8	-17 04.3	Cap	-11.4	1801.5	71° E	34	-	-	11:59	17:16	22:37
Mercury	4	15 38.7	-21 13.3	Lib	-0.3	5.1	16° E	91	0.46	1.33	08:51	13:32	18:13
	11	16 20.9	-23 46.1	Sco	-0.2	5.4	19° E	85	0.45	1.25	08:17	12:47	17:17
	18	17 01.6	-25 19.5	Oph	-0.2	5.9	21° E	76	0.42	1.14	08:36	13:00	17:23
	25	17 36.6	-25 45.2	Oph	-0.2	6.8	22° E	61	0.38	1	08:45	13:06	17:28
Venus	4	13 37.2	-8 33.5	Vir	-3.8	10.5	16° W	96	0.72	1.62	05:58	11:30	17:01
	11	14 10.4	-11 44.3	Vir	-3.8	10.3	14° W	97	0.72	1.64	05:16	10:35	15:54
	18	14 44.4	-14 41.6	Lib	-3.8	10.2	13° W	98	0.72	1.65	05:34	10:42	15:50
	25	15 19.3	-17 20.8	Lib	-3.8	10.1	11° W	98	0.72	1.67	05:51	10:49	15:47
Mars	4	12 30.1	-2 01.5	Vir	1.8	3.9	34° W	97	1.66	2.39	04:26	10:21	16:16
	11	12 46.4	-3 46.2	Vir	1.8	4.0	37° W	97	1.66	2.35	03:21	09:10	14:58
	18	13 02.7	-5 29.6	Vir	1.8	4.1	39° W	96	1.66	2.3	03:16	08:59	14:41
	25	13 19.1	-7 11.0	Vir	1.7	4.2	42° W	96	1.65	2.25	03:11	08:48	14:24
1 Ceres	4	9 07.3	22 26.9	Cnc	8.5	0.5	89° W	96	2.61	2.42	23:29	06:58	14:28
	11	9 14.6	22 28.5	Cnc	8.4	0.5	95° W	96	2.6	2.33	22:08	05:38	13:07
	18	9 21.0	22 35.4	Cnc	8.3	0.6	100° W	96	2.6	2.24	21:47	05:17	12:47
	25	9 26.4	22 48.4	Leo	8.2	0.6	106° W	97	2.6	2.14	21:23	04:54	12:26
Jupiter	4	14 13.5	-12 20.3	Vir	-1.5	30.6	7° W	100	5.44	6.42	06:46	12:04	17:21
	11	14 19.4	-12 50.4	Vir	-1.5	30.7	12° W	100	5.44	6.4	05:27	10:42	15:57
	18	14 25.2	-13 19.5	Lib	-1.5	30.9	18° W	100	5.44	6.37	05:07	10:20	15:33
	25	14 31.0	-13 47.6	Lib	-1.5	31.1	23° W	100	5.44	6.33	04:47	09:58	15:10
Saturn	4	17 37.9	-22 21.2	Oph	0.6	15.4	43° E	100	10.06	10.76	10:51	15:27	20:04
	11	17 40.9	-22 23.6	Oph	0.5	15.3	37° E	100	10.06	10.84	09:27	14:03	18:39
	18	17 44.1	-22 25.7	Sgr	0.5	15.2	31° E	100	10.06	10.9	09:02	13:38	18:14
	25	17 47.4	-22 27.6	Sgr	0.5	15.1	24° E	100	10.06	10.96	08:38	13:14	17:50
Uranus	4	1 37.0	9 27.1	Psc	5.7	3.7	164° E	100	19.91	18.95	16:48	23:24	05:01
	11	1 36.0	9 21.4	Psc	5.7	3.7	157° E	100	19.91	18.99	15:20	21:56	04:32
	18	1 35.0	9 16.2	Psc	5.7	3.7	150° E	100	19.91	19.05	14:52	21:28	04:03
	25	1 34.2	9 11.5	Psc	5.7	3.7	142° E	100	19.91	19.12	14:24	20:59	03:34
Neptune	4	22 53.4	-8 05.3	Aqr	7.9	2.3	120° E	100	29.95	29.44	15:09	20:41	01:14
	11	22 53.2	-8 06.5	Aqr	7.9	2.3	113° E	100	29.95	29.55	13:41	19:14	00:47
	18	22 53.1	-8 07.1	Aqr	7.9	2.3	106° E	100	29.95	29.66	13:13	18:46	00:19
	25	22 53.0	-8 07.1	Aqr	7.9	2.3	99° E	100	29.95	29.78	12:46	18:19	23:51
Pluto	4	19 14.2	-21 47.1	Sgr	14.3	0.2	65° E	100	33.44	33.84	12:24	17:03	21:42
	11	19 14.8	-21 46.8	Sgr	14.3	0.2	59° E	100	33.44	33.95	10:57	15:36	20:15
	18	19 15.4	-21 46.4	Sgr	14.3	0.2	52° E	100	33.45	34.05	10:30	15:09	19:48
	25	19 16.2	-21 45.8	Sgr	14.3	0.2	45° E	100	33.45	34.15	10:03	14:42	19:21

Spiral Galaxy in Aries

NGC 772

by Glenn Chaple for LVAS
(Mag. 10.3; Size 7.2' X 4.3')

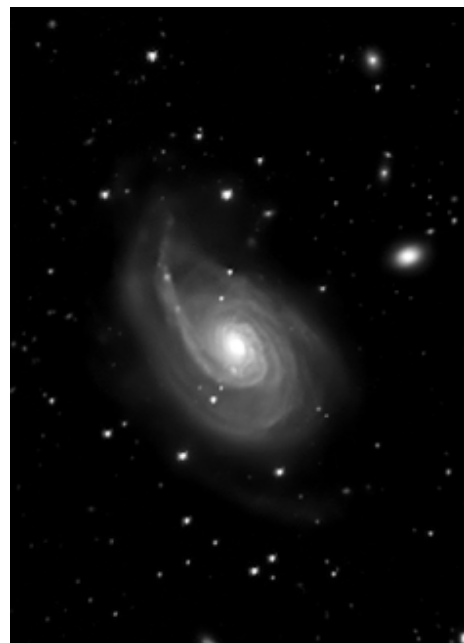
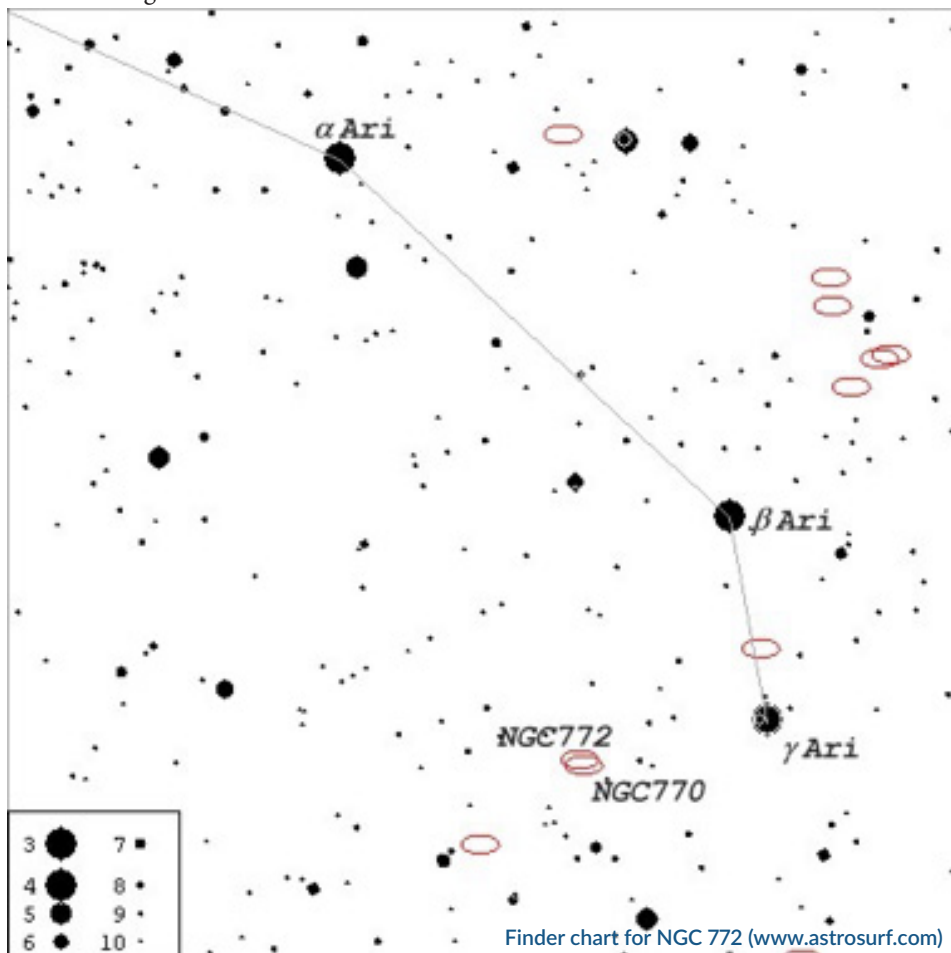
The only times I've ever made a telescopic foray into Aries have been to admire its beautiful double star Mesarthim (gamma [γ] Arietis). This striking pair of white magnitude 4.8 twins gleams like the headlights of some interstellar automobile or perhaps the eyes of a celestial cat. From now on, though, I'll take a moment to redirect my scope 1½ degrees eastward to take in this month's LVAS Observer's Challenge, the galaxy NGC 772. A unique feature of this spiral is a long arm extending westward from the nucleus. Stephen James O'Meara likens its appearance to that of an emerging springtime fern, hence his nick-name the "Fiddlehead Galaxy." The stretched-out arm is likely a result of a tidal interaction with the nearby elliptical galaxy NGC 770 (refer to the Mario Motta and Canada-France-Hawaii Telescope/Coelum images).

There are several challenges to consider when tackling NGC 772. What is the small-

est aperture telescope with which it can be glimpsed? O'Meara states that it's as bright as some of the fainter Messier objects. Are you able to discern any structure – the long spiral arm in particular? Can you pick out 12th magnitude NGC 770?

NGC 772 was first observed by William Herschel on November 29, 1785. At a distance of 106 million light years, it's twice as large as the Milky Way..

The purpose of the LVAS Observer's Challenge is to encourage the pursuit of visual observing. It is open to everyone that is interested, and if you are able to contribute notes, drawings, or photographs, the LVAS will be happy to include them in our monthly summary. If you would like to contribute material, submit your observing notes, sketches, and/or images to either Roger Ivester (rogerivester@me.com) or Fred Rayworth (queex@embarqmail.com). To find out more about the LVAS Observer's Challenge or access past reports, log on to lvastronomy.com/observing-challenge.



Mario Motta, MD



Canada-France-Hawaii Telescope/Coelum

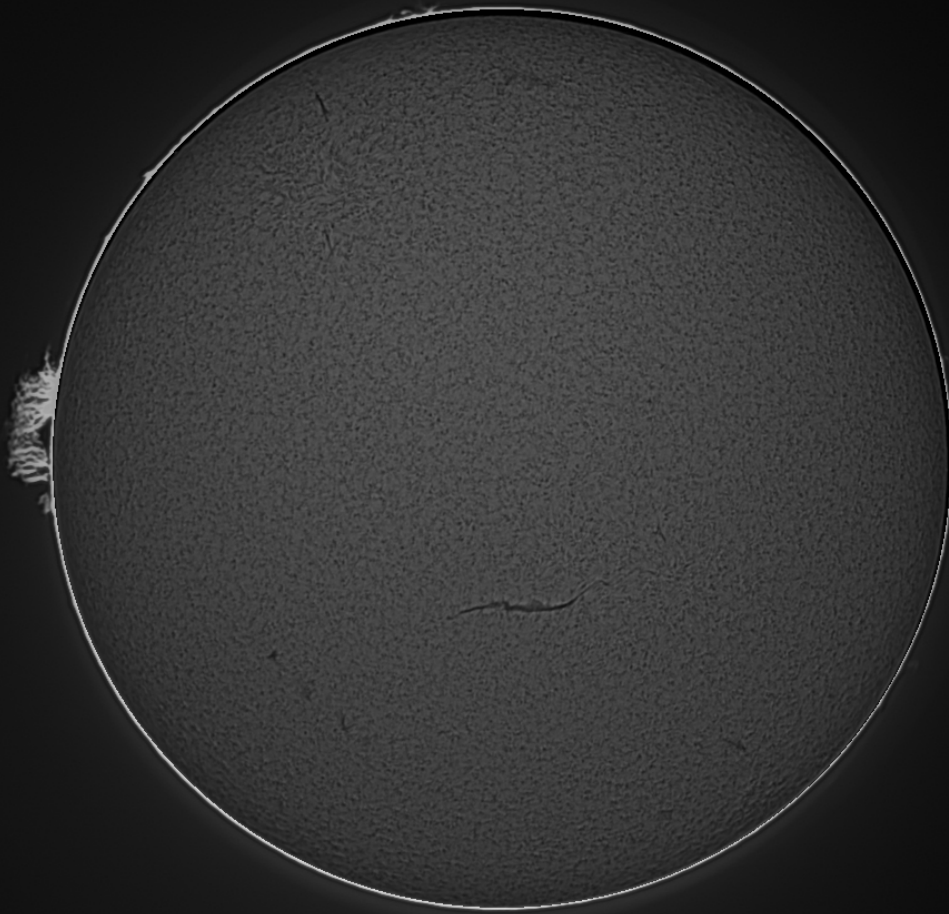
8 day old Moon
127 Mak



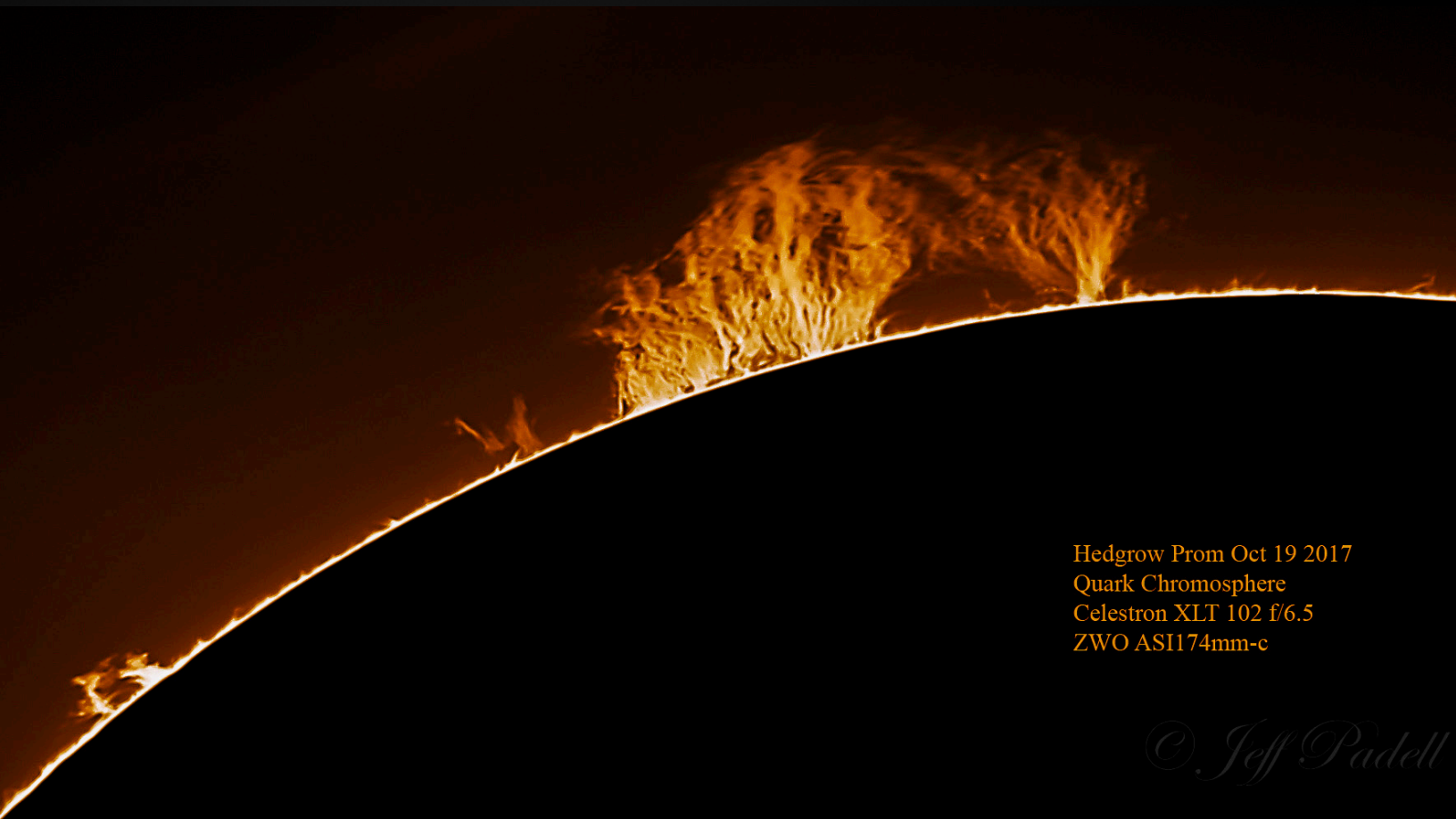
© Jeff Padell



The Scutum Star Cloud featuring Messier 11 (center) and carbon star V Aquilae (past the 2nd bright star to the 10 o'clock position of M11). Photo taken from Seagrave Observatory by Jim Hendrickson using a Canon SLR with 85mm lens on an iOptron SkyTracker. 15 30 second exposures stacked using Photoshop.



Large solar prominence taken October 20 by Conrad Cardano using a Lunt 60mm and a ZWO 174MM camera. Two series of videos were taken. One for the prominence and one for the surface. Each video was 3 minutes. The videos were stacked with AutoStakkert and processed with AstroArt.



Hedgrow Prom Oct 19 2017
Quark Chromosphere
Celestron XLT 102 f/6.5
ZWO ASI174mm-c

© Jeff Padell

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