March, 2014 Volume 55, Issue #3

The Prairie Astronomer

The Official Newsletter of the Prairie Astronomy Club

IN THIS ISSUE:

March Program

Mark Dahmke will talk about 3D printers and amateur astronomy, or “how to print your own telescope, accessories and replacement parts.” Topics covered will include an overview of 3D printing technology, software and hardware, how to design objects, how to select a printer, how to use a service bureau, plus a live demo of the Wanhao Duplicator 4. If you have an interest in astronomy or want to learn more about 3D printing, please consider attending the next meeting. The meeting is at 7:30pm on March 25th at Hyde Observatory at Holmes Lake (south side, near the golf course). Meetings are open to the public.

Featured photo: Sh2-65/LBN 91, a small emission nebula in Aquila just north of Scutum. By Rick Johnson. 14" LX200R @ f/10, L=4x10' RGB=2x10' STL-11000XM, Paramount ME.

Night Sky Network

The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc. Membership expiration date is listed on the mailing label. Membership dues are: **Regular $30/yr, Family $35/yr**. Address all new memberships and renewals to: **The Prairie Astronomy Club, Inc., PO Box 5585, Lincoln, NE 68505-0585**. For other club information, please contact one of the club officers listed to the right. Newsletter comments and articles should be submitted to: **Mark Dahmke, P. O. Box 5585, Lincoln, NE 68505 or** mark@dahmke.com, no less than ten days prior to the club meeting. The Prairie Astronomy Club meets the last Tuesday of each month at Hyde Memorial Observatory in Lincoln, NE.

Meeting Minutes

February 25, 2014, submitted by Dale Bazan.

Jack Dunn called meeting to order at 7:38. Welcomed club members and 4 visitors, 1 new paid member. Introduced program "Robotic Remote Observatories" presented by Brett Boller and Tom Miller.

Next PAC meeting Tuesday March 25th with Mark Dahmke talking about 3D printing.

Jim Kvasnicka presented March Observing Report. February star parties were Feb 21 and 28. March 8 ISAN 7 (International Sidewalk Astronomy Night) encouraging as many telescopes as possible to be on sidewalks. Next star parties will be March 21 and 28.

Treasurer report provided by Bob Kacvinsky. 2013 Audit Completed 2/15/2013 by Bob Leavitt and Jim Kvasnicka. Audit was passed around for member review. Final year summary was provided, and financials have been stagnant as expected by a non-profit.

Memberships Dues: Jan Denise Wally, Feb: Dean Baughman, Dale Bazan, Bethany Fenress, Nathan Fillipi, Dan Kincheloie, Art Sharp, March Gilles Basset, Bob Kacvinsky, Steve Luther Jason Noelle, Zach Thompson.

Student memberships $10/Year, Individual Membership $30/year, and Family Membership $35/year.

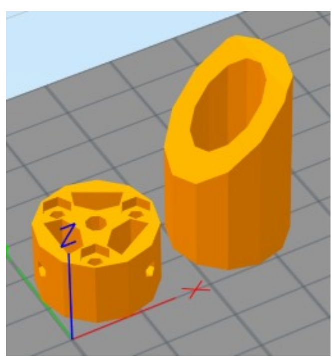
SASM Museum Star Parties and other parties were reported as positive with good turnouts.

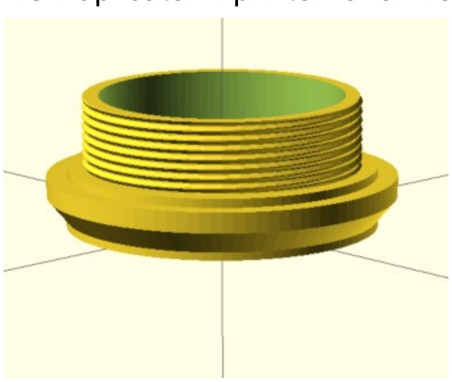
Other business: SAC star parties and other events such as joint dinners will no longer be held because of fees that would be required. Some discussion of NSP Star parties at Mahoney State Park.

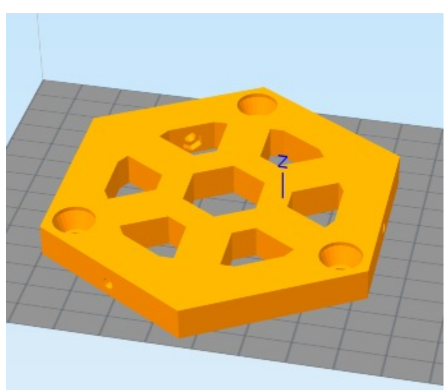
Business portion of meeting adjourned at 7:54 PM.

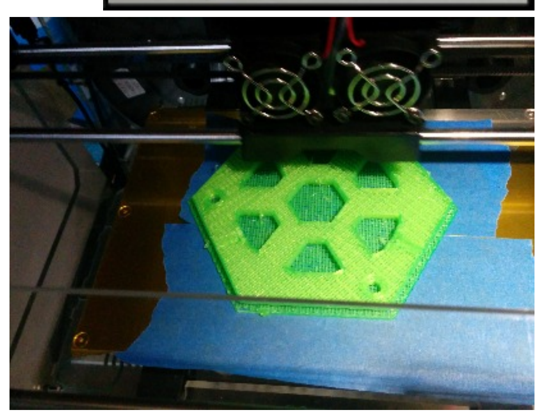
How to Print Your Own Telescope

3D printing is revolutionizing manufacturing, but is also now an affordable solution for home use. Open source CAD software and models are available from websites such as thingiverse.com. At the March meeting, Mark Dahmke will present an introduction to 3D printing for amateur astronomy, showing how to print telescope parts, create your own CAD models for custom or replacement parts, and will also bring his Duplicator 4 printer for a live demo.









ANNUAL MEMBERSHIP

REGULAR MEMBER - $30.00 per year. Includes club newsletter, and 1 vote at club meetings, plus all other standard club privileges.

FAMILY MEMBER - $35.00 per year. Same as regular member except gets 2 votes at club meetings.

STUDENT MEMBER - $10.00 per year with volunteer requirement.

If you renew your membership prior to your annual renewal date, you will receive a 10% discount.

Club members are also eligible for special subscription discounts on Sky & Telescope Magazine.

Club Telescopes

To check out one of the club telescopes, contact Cassie Etmund. If you keep a scope for more than a week, please check in once a week, to verify the location of the telescope and how long you plan to use it. The checkout time limit will be two weeks, but can be extended if no one else has requested use of a club scope.

100mm Orion refractor: Available

10 inch Meade Dobsonian: Available

13 inch Truss Dobsonian: Available

PAC Star Party Dates

Dates in bold are closest to the new moon

2014 Star Party Dates
January 24, **31**
February 21, **28**
March 21, **28,** April 25
May 2, 23, **30,** June 20, **27**
July 18, **25**
NSP: July 27-Aug 1
August **22**, 29, Sept 19, **26**
Oct 17, **24,** Nov 14, **21**
Dec 12, **19**

Lunar Party Dates
May 9, June 6, Sept 5, Oct 3
* Lunar party dates are tentative, sites to be determined.

PAC E-Mail:
info@prairieastronomyclub.org

PAC-LIST:
To subscribe send a request to PAC. To post messages to the list, send to the address:

pac-list@ prairieastronomyclub.org

Events

PAC Meeting
Tuesday March 25th, 2014
@Hyde Observatory
Program: 3D Printing and Amateur Astronomy

Astronomy Day, April 26th
@Morrill Hall

PAC Meeting
Tuesday April 29th, 2014
@Hyde Observatory

PAC Meeting
Tuesday May 27th, 2014
@Hyde Observatory

PAC Meeting
Tuesday June 24th, 2014
@Hyde Observatory

Newsletter submission deadline April 18, 2013

Links

PAC: www.prairieastronomyclub.org
Night Sky Network: https://nightsky.jpl.nasa.gov/
CafePress (club apparel) www.cafepress.com

www.hydeobservatory.info
www.nebraskastarparty.org
www.OmahaAstro.com
Panhandleastronomyclub.com
www.universetoday.com/
www.planetary.org/home/
http://www.darksky.org/

NGC4603 Credit: NASA

Astronomy Day is Not That Far Away- Jack Dunn, PAC President

It is not too soon to be thinking about Astronomy Day. The national date is May 10th, however, a number of complications make it better for us to do the event in the Museum on April 26th. There is a chance this could be my last Astronomy Day in Lincoln. So I want to make it a good one. We will have Clayton Anderson back as a speaker - and that should be a good draw. The giant prehistoric snake exhibit in Morrill Hall's Elephant Hall takes up the entire room, so we will have less room available this year. But we are adjusting.

The most important point is that you should be notifying Cassie, our Outreach Coordinator, that you will be available to help. We have some traditional displays like the solar system one. Most importantly, we want a good display of different kinds of telescopes. So whatever you have from the big to the small, we need it to show our visitors. They are educational tools. They will provide examples so that we can explain what is good and bad, what is practical, and what is easy to use (and what isn't). We usually try having a few solar scopes out front of the building if it is clear. And if you have one we can use you. But if you are doing solar, you need to have a backup position inside in place and be ready to do it. It is not enough just to be there with no job. We will have some opportunities for folks new to PAC to volunteer as well. There will be signup sheet at the meeting.

What we want is for you to contact Cassie and let her know you will be available. Telling her you won't be available - you don't need to do that. What we want to know is who CAN be available. At the March meeting, we'll have some pictures from the past to indicate some activities. And if you can't make the meeting, still contact Cassie if you can help that day.

We are also trying to set up an evening for teachers at Hyde Observatory. This is to promote both Hyde and the club. We'll keep you advised. Watch for messages through Night Sky Network. Likewise, I'm going to do a short presentation about the Cosmosphere. Would like to organize a club trip there this spring. It can both be fun and a way to have some comradere with other club members. It has been years since PAC made this trip and those that went can tell you about good times. Will have more details at the meeting.

I'm very excited for this month's program by Mark Dahmke on 3D printing. This technology offers all sorts of possibilities and some very unique ones for amateur astronomers.

See you there.

Jack

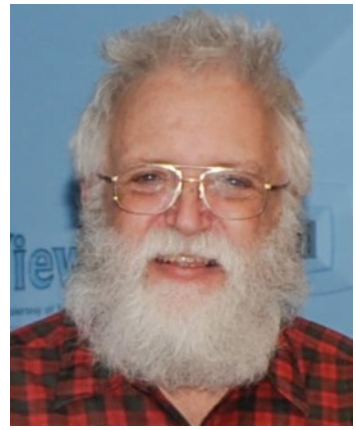
Designing My Remote Observatory—Rick Johnson

Part I

Over 2 years prior to moving to Minnesota I was planning on the observatory I'd build at the same time as the house. Since the club is thinking of doing this I thought it might be useful to cover what I went through doing my simpler design. Simpler in that it had to fit the needs of only one person, me. Also simpler because it was the next building over so the connections were simpler and if something went wrong (and it will) it was a short walk to it to see to the problem. Murphy will be your constant companion until you get the bugs worked out. This can take quite a while unless you have lots of experience. Many start such projects but those without the needed experience almost always fail. I had 50 years of Murphy at my side and still it took a couple months to get everything working smoothly.

My first consideration was what did I want it to do. There are three basic types of imaging I could have done; planetary, wide field deep sky of structures of large angular size (up to several degrees across) and narrow angle of objects of less than half a degree in size. Each is rather incompatible with the others. Imagers I know that do more than one also use more than one scope, camera and mount. They don't try and make do with the wrong equipment.

Planetary work uses large aperture scopes to reduce exposure times to less than 1/60th of a second and cameras capable of taking up to 120 frames or more per second in order to capture enough frames for lucky image type processing. The idea being to capture enough frames in each color that caught those instants of perfect or near perfect seeing that, when stacked, results in a good enough signal to noise ratio that heavy processing can be applied giving a smooth result without generating false data. A less than top notch mount is fine as drifting actually helps image quality when processed correctly or you can move a top notch mount slowly to create this effect. Camera's and focal length need be such that each pixel is about 0.1" to 0.2" of arc. This spreads light thin meaning a 12" or larger scope is best for fast rotating planets like Jupiter to get enough frames before its rotation blurs the image and short enough exposure to freeze seeing.



Again, there are ways that processing can "unrevolve" the planet but they can only do so for a few minutes time in the case of Jupiter and can't help with moving lunar terminator shadows. Cost of the camera is relatively low (good ones start at only a few hundred dollars) but large aperture scopes and mounts sufficient for their weight are costly.

Wide angle deep sky imaging needs a deep sky camera. These require regulated cooling and are designed for long exposures of up to 30 minutes or longer. They take several seconds or longer (mine takes 28 seconds) to download an image to keep noise to a minimum and often can't take exposures faster than 0.1 seconds and even those will expose the center more than the edge due to how the shutter works. Most are a poor choice for planetary work. While some are relatively inexpensive ($2,000 new) they use a small chip meaning they take in a rather small field of view unless used on very small scopes (say of 400mm to 600mm). APO refractors are best for such cameras, somewhat negating the camera's low cost. Since the image scale will be low (probably 3" of arc or more per pixel) such systems don't require top notch mounts and are rather immune to seeing conditions meaning they can be used on nights too poor for planetary or narrow angle work. For beginners this is a good place to start as it puts a lot less pressure on getting every last detail right. Processing such images, especially near light pollution takes a lot of skill however due to gradients the light pollution adds. This does also put great stress on the quality of your calibration images. Something I find most beginners have big trouble accomplishing judging by the 30 or so questions a month I get from beginners unable to do usable calibration, especially under light polluted skies. This type of imaging is helped in many cases by the use of narrow band filters (H alpha of 6nm or less and OIII and SII filters of 3nm band width. This can add over $1000 to the cost of the system but makes imaging from in or near towns of emission nebula much easier — IF you can guide accurately for 30 minutes at a time.

Narrow field imaging puts heavy demands on the quality of the optics, and mount. Tracking for 10 minutes to 30 minutes needs to be accurate over that time to a small fraction of a second of arc. Far from what most beginners can achieve with typical mounts. Such imaging is best with large aperture scopes. This too puts heavy demands on the mount.

Since the field of view is very small pointing accuracy that would put the object in a visual 1 degree field is far too poor to find much of anything. A mount that can point to one or two minutes of arc or better is a requirement. Though the mounts capable of such pointing are also the ones capable of high tracking accuracy so meet one need and you likely meet the other. Since the focal length of such systems is rather large (3650mm in my case) you need a large imaging chip or you get only a soda straw view and miss the setting your target lies in.

Unfortunately such cameras start at about $8,000 new and use 2" or larger (65mm square) filters which are far more expensive than 1.25" round filters. Add narrow band filters for some planetary nebulae and small emission nebulae and watch the filter cost go over $4000 depending on size and bandwidth (narrower is better but really expensive).

Since I had a lot of imaging experience and had taken many wide field images and wasn't much interested in planetary work I decided I was ready for narrow field imaging so planned the observatory accordingly.

My first decision was the mount. Most imagers will tell you it is by far the most important piece of equipment you will ever buy for this hobby.

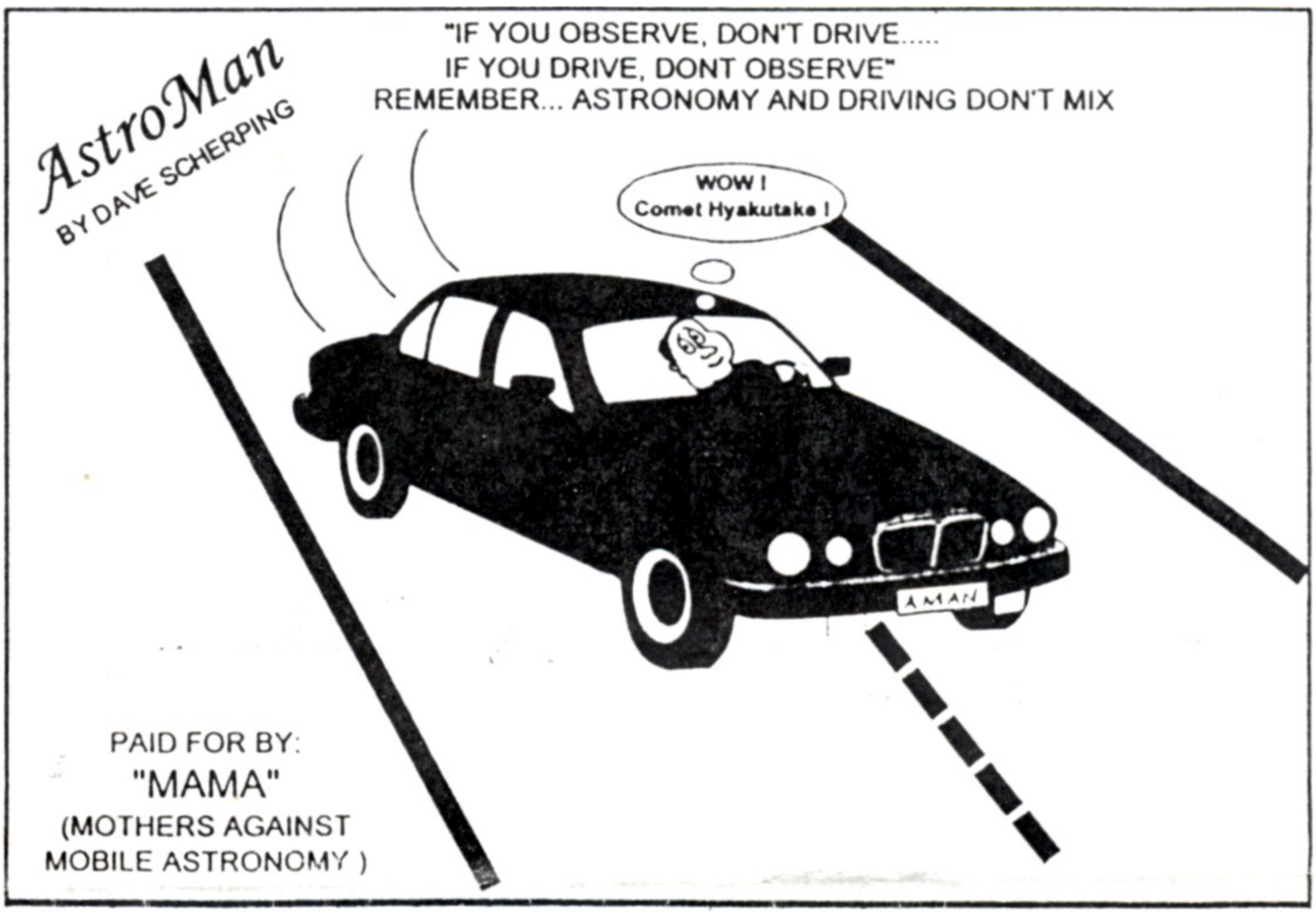
I strongly agree. A good mount will often eat up half your equipment budget. At the time there were only a few to choose from that met my needs. While several offered the weight and tracking abilities I needed few were truly robotic mounts designed to be woken up from afar. In fact I found only two manufacturers with mounts that met my requirements. AstroPhysics 1200 and the Paramount ME (just announced as an upgrade from their Paramount GT-11000S). Others have since entered the market and the AP 1200 replaced with an even better mount but that's true of the Paramount ME as well. The AP was several thousand of dollars cheaper but wasn't as fully robotic as the Paramount. It required syncing to get its bearings each time it was turned on. It couldn't easily track asteroids and comets with a single click of the mouse but needed special ASCOM software and lots of manual intervention I wanted to avoid. Many use it in remote observatories but, at the time, nothing AP made had through the mount cables (they now have such mounts). When running remote I can't see if a cable is about to snag. I have to tie all up securely yet allow full mount motion and hope one doesn't come loose or a mouse gnaw through a tie etc. The through the mount cabling of the Paramount meant no worries about cables and pretty well sealed the deal.

Also since it was newly announced they were offering a price break of several thousand of dollars. That made it not all that more expensive than the AP and included about $1000 of software all of which I'd have to buy with the AP mount further making it a simple decision. Though I was still two years away from even starting construction I put in a down payment to lock in the introduction price. It was backordered for 18 months I was told. It came in 11 as it turned out. Still it would be another two years before I had an observatory compete enough to test it out. When it came the Fed Ex driver was a little gal under 5 foot tall (she sat on two pillows to drive the truck) and the truck couldn't go up our steep drive in Lincoln without tearing up the concrete. Shipping weight was about 200 pounds so I ended up having to get it out of the truck (no lift) and onto a cart to carry it up the drive and into the garage. My back has never been the same. I should have told them to get a driver that could do the lifting but new mount and adrenalin flowing I somehow managed it. Being 10 years younger helped a lot! The mount sat in the garage in Lincoln a year then in the garage here for a year before I could even test it out. When I did I found it in perfect condition and it remains so 8 years of heavy use later.

New cameras and telescopes (OTA for Optical Tube Assembly) were hitting the market constantly so I wasn't ready to buy this far in advance. That turned out to be good because I had a ton of learning to do before I'd be ready to make an intelligent choice for either. I knew film work but had no concept of what was involved in digital imaging. I spent the next year going to "CCD university". I found it was quite important to understand the theory of how CCD imaging worked in order to make an intelligent choice of scope and camera. I get a lot of email from folks who didn't do their homework and now are trying to make their bad decisions work and hope I have a magic wand to make it all right. I don't.

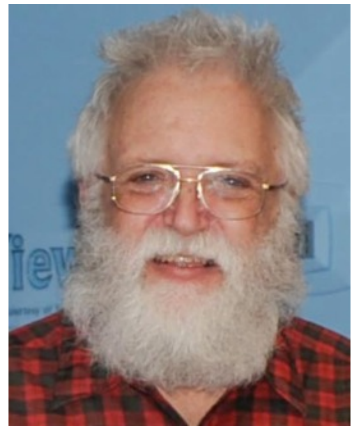
It turns out the scope and camera are so interrelated you it is best to consider them as one. A camera good for one scope may be lousy for another scope or vise versa. They need be matched rather closely if high resolution work is the goal. I also had to learn at least the theory of processing digital images. What it takes to get accurate calibration (varies with cameras) and how to pull the detail out of the numbers collected. All images start as a number between 0 and 65535. Turning those numbers into an image is easy, turning them into a good image is far from easy.

I'll get into what I found I needed to learn just to make a good match of scope and camera in the next installment. It was far more than I ever expected. I'll get to the actual construction later. That turned out to be the easy part and depended somewhat on the scope and camera combination I chose.



Reprinted from the March, 1996
Prairie Astronomer.

Observatory Update: 2014CU13—Rick Johnson



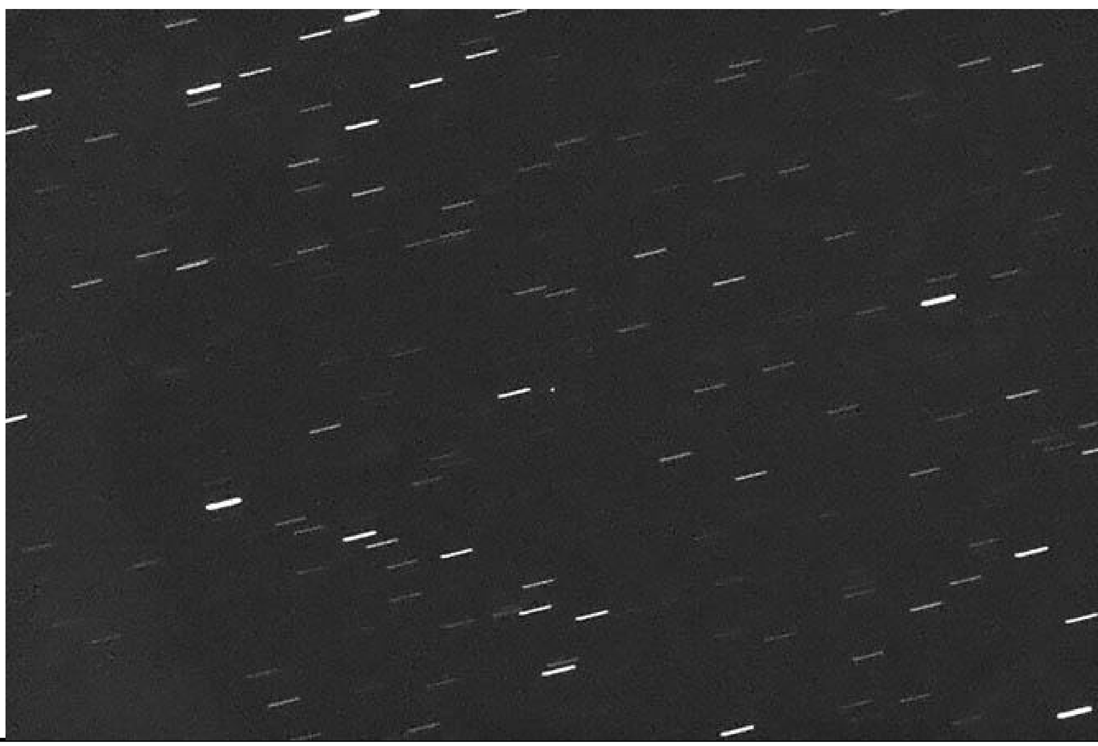
Near earth asteroid 2014CU13 passed by us March 11 about 5 hours UT. Since it was forecast (and really was) cloudy at that time I tried for it just before dawn the night before, March 10. There were some clouds but they soon cleared. I was able to get 30 minutes of data before dawn started to brighten the sky. First few frames were dimmed a bit by the clouds but otherwise it worked well. The asteroid was about 1.2 million miles from us at the time of the movie and about 1.1 million miles at closest approach the following night so the difference is rather small. We had three other asteroids pass by, one only 38,000 miles out the last few days but all were either clouded out or too far south or lost in the sun from my view.

2014CU14 was discovered exactly one month ago, February 11, 2014. It is quite large so it is good it kept its distance. Estimates put it at about 200 meters in diameter.

The movie consists of 30 one minute frames and covers about 32 minutes of time as it takes a few seconds to download each frame. The frames were taken at 1.5" per pixel then downsized to 3" per pixel to reduce the size of the animation but keep the full frame. Due to the bright moon not far away the image is rather noisy which greatly enlarged the file. During the imaging run the mount was tracking on the asteroid rather than the stars. No alignment of the frames was needed. While its motion was calculated from orbital data a couple days prior to the night the earth hadn't perturbed the orbit to any great extent so the values I used to offset from the sidereal rate were sufficient to keep the asteroid near the center of the frame. Computers and today's robotic mounts make such feats rather easy to accomplish. Not long ago even the pros had a hard time doing this type of tracking. The asteroid moved about 1 minute of arc per minute of time. So the star trails pretty well define 1 minute of arc.

The frame below is taken from the first of the 30 frames used for the animation. Since the animation is over 3 meg in size I've only included a link to it.

14" LX200R @ f/10, 30x1' binned 3x3, STL-11000XM, Paramount ME



April Observing—Jim Kvasnicka

This is a partial list of objects visible for the upcoming month.

Planets

Venus: Low in the east at dawn shinning at -4.3.
Mercury: Low in the bright dawn sky and difficult to see.
Neptune: Below Venus and difficult to see.
Uranus: In conjunction with the Sun and not visible.
Jupiter: Shines at magnitude -2.0 with a disk 35” in diameter.
Mars: This is the largest and brightest Mars has been since 2007. It reaches its maximum brightness of -1.5 with a disk 14.5” in diameter.
Saturn: Rises about 10:30 pm to start April and by 8:30 pm to end the month.
Moon: Total eclipse the night of April 14-15. See page 60 in April Sky & Telescope.

Messier List

M40: Double star in Ursa Major.
M65/M66: Part of the Leo Triplet Group.
M95/M96: Galaxy pair in Leo both fit in the same FOV.
M105: Galaxy in Leo.
M106: Galaxy in Canes Venatici.
M108: Galaxy in Ursa Major.
M109: Galaxy in Ursa Major.
Last Month: M41, M44, M46, M47, M48, M50, M67, M81, M82, M93
Next Month: M49, M51, M61, M63, M64, M85, M94, M101, M102, M104

NGC and Other Deep Sky Objects

NGC 4244: The Silver Needle Galaxy in Canes Venatici.
NGC 4449: Irregular galaxy in Canes Venatici.
NGC 4490: The Cocoon Galaxy in Canes Venatici.
NGC 4559: Elongated galaxy in Coma Berenices.
NGC 4565: The Needle Galaxy in Coma Berenices.

Double Star Program List

Alpha Leonis: Regulus, white and yellow stars.
Gamma Leonis: Algieba, pair of yellow stars.
54 Leonis: Yellow primary and greenish secondary.
Alpha Canum Venaticorum: Cor Caroli, bluish-white and greenish yellow pair.
Zeta Ursa Majoris: Mizar, pair of white stars.
Gamma Virginis: Porrima, close yellow pair.
24 Comae Berenices: Yellow and pale blue pair.
Delta Corvi: White primary with a rose colored secondary.

Challenge Object

Copeland’s Septet: For those with larger telescopes this is a good challenge. Even in dark skies this group of seven galaxies in Leo is just visible in a 16 inch telescope.

NGC Objects—Jim Kvasnicka

The Needle Galaxy - NGC 4565 is a large bright edge on galaxy in Coma Berenices. It is 31 million light years distant and 100,000 light years across, about the size of our own Milky Way Galaxy. Most astronomers say that if our Milky Way galaxy was viewed edge on it would look just like NGC 4565. It was discovered in 1785 by William Herschel. NGC 4565 has a listed magnitude of 9.6 and its apparent size is 16’ x 3’.

NGC 4565 is considered to be the most beautiful of all edge on galaxies. Through a 10 inch telescope NGC 4565 is an incredible sight. It is elongated 12’ x 1.5’ NW-SE with a bulging core.

NGC 4565 is one of the brightest galaxies in the Coma 1 Galaxy Cloud. It is part of the Herschel 400 list and also Caldwell #38.

"Death Stars" Caught Blasting Proto-Planets—David Dickinson, Universe Today

It's a tough old universe out there. A young star has lots to worry about, as massive stars just beginning to shine can fill a stellar nursery with a gale of solar wind.

No, it's not a B-movie flick: the "Death Stars of Orion" are real. Such monsters come in the form of young, O-type stars.

And now, for the first time, a team of astronomers from Canada and the United States have caught such stars in the act. The study, published in this month's edition of The Astrophysical Journal, focused on known protoplanetary disks discovered by the Hubble Space Telescope in the Orion Nebula.

These protoplanetary disks, also known as "tadpoles" or proplyds, are cocoons of dust and gas hosting stars just beginning to shine. Much of this leftover material will go on to aggregate into planets, but nearby massive O-Type stars can cause chaos in a stellar nursery, often disrupting the process.

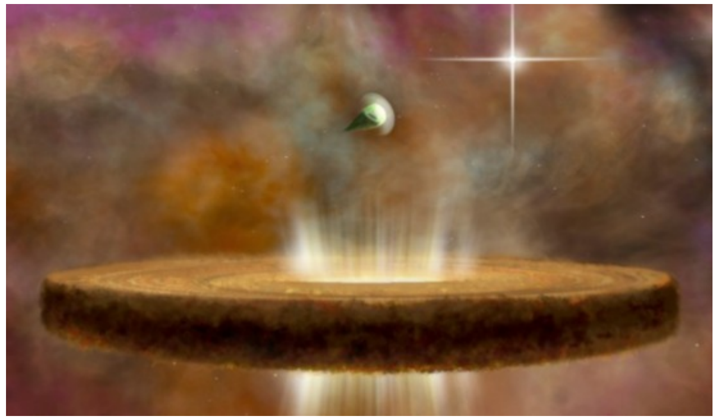
"O-Type stars, which are really monsters compared to our Sun, emit tremendous amounts of ultraviolet radiation and this can play havoc during the development of young planetary systems," said astronomer Rita Mann in a recent press release. Mann works for the National Research Council of Canada in Victoria and is lead researcher on the project

Scientists used the Atacama Large Millimeter Array (ALMA) to probe the proplyds of Orion in unprecedented detail. Supporting observations were also made using the Submillimeter Array in Hawaii.

ALMA saw "first light" in 2011, and has already achieved some first rate results.

"ALMA is the world's most sensitive telescope at high-frequency radio waves (e.g., 100-1000 GHz). Even with only a fraction of its final number of antennas, (with 22 operational out of a total planned 50) we were able to detect with ALMA the disks relatively close to the O-star while previous observatories were unable to spot them," James Di Francesco of the National Research Council of Canada told Universe Today. "Since the brightness of a disk at these frequencies is proportional to its mass, these detections meant we could measure the masses of the disks and see for sure that they were abnormally low close to the O-type star."

ALMA also doubled the number of proplyds seen in the region, and was also able to peer within these cocoons and take direct mass measurements. This revealed mass being stripped away by the ultraviolet wind from the suspect O-type stars. Hubble had been witness to such stripping action previous, but ALMA was able to measure the mass within the disks directly for the first time.



A tale of two proplyds: An artist's conception of a massive star stripping material away from one proto-planetary disk, while a more distant one is able to retain its ring of dust and debris. Credit: NRAO/AUI/NSF; B. Saxton.

The ALMA antennae on the barren plateau of Chajnantor. Credit: ALMA (ESO/NAOJ/NRAO).

And what was discovered doesn't bode well for planetary formation. Such protostars within about 0.1 light-years of an O-type star are consigned to have their cocoon of gas and dust stripped clean in just a few million years, just a blink of a eye in the game of planetary formation.

With a O-type star's "burn brightly and die young" credo, this type of event may be fairly typical in nebulae during early star formation.

"O-type stars have relatively short lifespan, say around 1 million years for the brightest O-star in Orion – which is 40 times the mass of our Sun – compared to the 10 billion year lifespan of less massive stars like our Sun," Di Francesco told Universe Today. "Since these clusters are typically the only places where O-stars form, I'd say that this type of event is indeed typical in nebulae hosting early star formation."

It's common for new-born stars to be within close proximity of each other in such stellar nurseries as M42. Researchers in the study found that any proplyds within the extreme-UV envelope of a massive star would have its disk shredded in short order, retaining on average less than 50% the mass of Jupiter total. Beyond the 0.1 light year "kill radius," however, the chances for these proplyds to retain mass goes up, with researchers observing anywhere from 1 to 80 Jupiter masses of material remaining.

The findings in this study are also crucial in understanding what the early lives of stars are like, and perhaps the pedigree of our own solar system, as well as how common – or rare – our own history might be in the story of the universe.

There's evidence that our solar system may have been witness to one or more nearby supernovae early in its life, as evidenced by isotopic measurements. We were somewhat lucky to have had such nearby events to "salt" our environment with heavy elements, but not sweep us clean altogether.

"Our own Sun likely formed in a clustered environment similar to that of Orion, so it's a good thing we didn't form too close to the O-stars in its parent nebula," Di Francesco told Universe Today. "When the Sun was very young, it was close enough to a high-mass star so that when it blew up (went supernova) the proto-solar system was seeded with certain isotopes like Al-26 that are only produced in supernova events."

This is the eventual fate of massive O-type stars in the Orion Nebula, though none of them are old enough yet to explode in this fashion. Indeed, it's amazing to think that peering into the Orion Nebula, we're witnessing a drama similar to what gave birth to our Sun and solar system, billions of years ago.

The Orion Nebula is the closest active star forming region to us at about 1,500 light years distant and is just visible to the naked eye as a fuzzy patch in the pommel of the "sword" of Orion the Hunter. Looking at the Orion Nebula at low power through a small telescope, you can just make out a group of four stars known collectively as the Trapezium. These are just such massive hot and luminous O-Type stars, clearing out their local neighborhoods and lighting up the interior of the nebula like a Chinese lantern.

And thus science fact imitates fiction in an ironic twist, as it turns out that "Death Stars" do indeed blast planets – or at least protoplanetary disks – on occasion!

Be sure to check out a great piece on ALMA on a recent episode of CBS 60 Minutes:

Read more:
http://www.universetoday.com/110271/death-stars-caught-blasting-proto-planets/#ixzz2vwv1jWeM

Cassini Nears 100th Titan Flyby with a Look Back

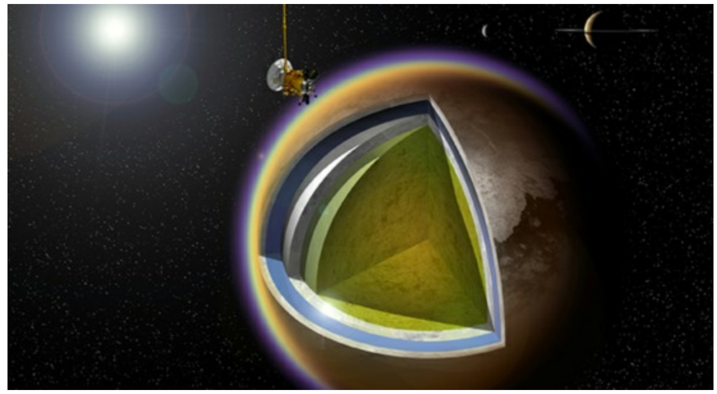
Ten years ago, we knew Titan as a fuzzy orange ball about the size of Mercury. We knew it had a nitrogen atmosphere -- the only known world with a thick nitrogen atmosphere besides Earth. But what might lie beneath the hazy air was still just a guess.

On March 6, NASA's Cassini spacecraft will swoop down within 933 miles (1,500 kilometers) of Titan to conduct its 100th flyby of the Saturn moon. Each flyby gives us a little more knowledge of Titan and its striking similarities to our world. Even with its cold surface temperatures of minus 290 degrees Fahrenheit (94 kelvins), Titan is like early Earth in a deep freeze.

Since its 2004 arrival at Saturn, Cassini's radar instrument has identified remarkable surface features on Titan. The features include lakes and seas made of liquid methane and ethane, which are larger than North America's Great Lakes, and an extensive layer of liquid water deep beneath the surface. Organic molecules abound in Titan's atmosphere, formed from the breakup of methane by solar radiation.

A recent innovation was the discovery that radar could be used to determine the depth of a Titan sea. "It's something we didn't think we could do before," said Michael Malaska, an affiliate of the Cassini radar team at NASA's Jet Propulsion Laboratory, Pasadena, Calif. "The radar can measure the depth by receiving two different bounces: one from the surface and one from the bottom of the sea. This technique was used to determine that Ligeia Mare, the second largest sea on Titan, is about 160 meters [525 feet] deep. When coupled with some laboratory experiments, it gives us information about the composition of the liquid in Ligeia Mare, too."

As spring turns to summer in Titan's northern hemisphere for the first time since Cassini arrived at Saturn, scientists are looking forward to entering potentially the most exciting time for Titan weather - with waves and winds picking up. With increasing sunlight, the north polar lakes and seas can now be seen in near-infrared images, enabling scientists to learn more about their composition and giving them clues about the surrounding terrain.



"Methane is not only in the atmosphere, but probably in the crust," said Jonathan Lunine, a scientist on the Cassini mission at Cornell University, Ithaca, N.Y. "It's a hint there are organics not only in Titan's air and on the surface, but even in the deep interior, where liquid water exists as well. Organics are the building blocks of life, and if they are in contact with liquid water, there could be a chance of finding some form of life."

Linda Spilker, Cassini project scientist at JPL, speculated on the type of life that could exist. "The astrobiological potential for Titan is two-fold," she said. "Could a unique form of methane-based life exist in Titan's liquid lakes and seas? With a global ocean of liquid water beneath its icy crust, could life exist in Titan's subsurface ocean?"

Although the official Cassini mission name for this flyby is T-99, it is, in fact, the 100th targeted Titan flyby of the mission. Why the discrepancy? An extra flyby was inserted early in the mission, after the Titan flybys had been named.

For additional details on this 100th flyby, visit: http://saturn.jpl.nasa.gov/mission/flybys/titan20140306/

For more information about Cassini, visit: http://www.nasa.gov/cassini and http://saturn.jpl.nasa.gov

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. JPL, a division of the California Institute of Technology, Pasadena, manages the mission for NASA's Science Mission Directorate in Washington.

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