May, 2014 Volume 55, Issue #5

The Prairie Astronomer

The Official Newsletter of the Prairie Astronomy Club

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May Program

Michael Sibbernsen will talk about high altitude balloons.

As Special Projects Facilitator with Nebraska Space Grant, Michael creates and provides aerospace related activities such as public and private star parties, various space-science teacher training workshops, K-12 and higher education rocket workshops, high altitude ballooning classes and experiences, RockSat programming, meteorite programs, telescope training and lending programs, solar astronomy and solar telescope lending programs, and solar energy workshops.

Comet C/2012 K1 (PANSTARRS) by Rick Johnson. At the time of the image the comet was 2.069 AU from the sun and 1.472 AU from the earth (May 4 about 8 hours UT).

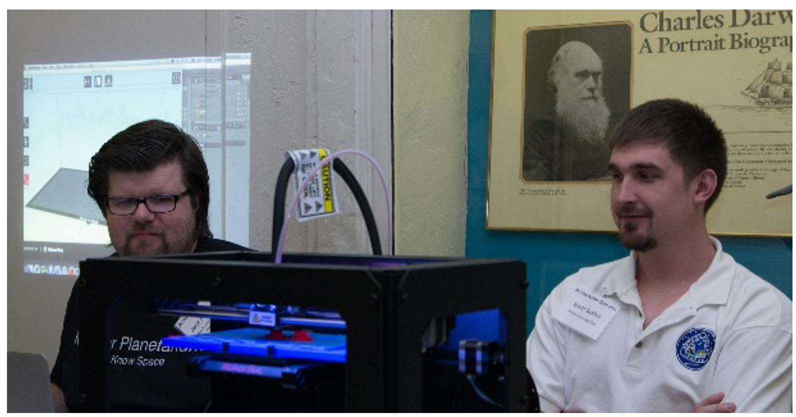
Night Sky Network

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

Minutes from the April PAC Meeting:
Meeting was opened and president Jack Dunn mentioned upcoming meetings and star parties. Jim Kvasnicka presented the observing report. Jack Dunn then recapped Astronomy Day with Nebraska Astronaut Clayton Anderson and presented the program which was a video interview with SETI pioneer Frank Drake by Andrew Franknoi of the Astronomical Society of the Pacific. Next meeting is Tuesday, May 27th. Program will be Michael Sibbernsen.

Astronomy Day 2014



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 Spale. 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 May 27th, 2014
@Hyde Observatory

MSRAL 2014
June 6-8, St Lous, MO

PAC Meeting
Tuesday June 24th, 2014
@Hyde Observatory

PAC Meeting
Tuesday July 29th, 2014
@Hyde Observatory

PAC Meeting
Tuesday August 26th, 2014
@Hyde Observatory

Newsletter submission deadline June 14, 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/

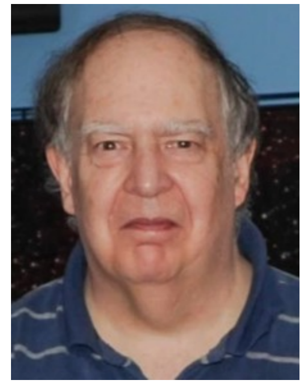
NGC4603 Credit: NASA

Astronomy Day and Beyond- Jack Dunn, PAC President

At the time of our last meeting we were only a few days after Astronomy Day featuring Astronaut Clay Anderson. Clay did his usual great job with the public and we had around 500 visitors for the day. Plus another 80-90 showed up that evening

at Hyde. While he was in Lincoln about 10 days before, I arranged with Lincolnite Don Cox for Clay to take his Tesla Roadster for a spin. The roadster achieves 0 to 60 mph in 3.9 seconds and is a true sports car – and fully electric. We are going to have more opportunities to discuss electric vehicles in the future. And Astronomy and Engineering have some natural alliances and common interests. Don, himself, is a great fan of Radio Astronomy, and we hope to get him to share some of his experiences with it.

While we had some great experiences on Astronomy Day, and engaged a lot of the public, I would like to point out one somewhat negative aspect that came to my attention. We know everyone is a volunteer and has family and other obligations. However for us to successfully carry out making a good presentation to the public representing our hobby, we need to make commitments and keep them. We know that we were short several people who are usually in town for the event. However, I need to address some concerns about those that were there. We did try to make it possible for all volunteers to hear one of Clay's talks. However, we had a number of people abandoning stations and not supporting those who were working them (even when Clay was not speaking). Specifically, we need to know in advance if you intend to leave the event early. Not to mention, we need both people at a station throughout the day unless



they were taking restroom breaks or the lunch break. Again, we do not begrudge you needing a break, but we had folks abandoning their post and spending too much time in the lunchroom or hanging out at other stations. Having the free lunch is a courtesy for volunteers, but should not be the reason for volunteering.

In fact, due to the lack of participation, and the difficulty this presents on creating a successful full-day event, myself and Museum staff have suggested that next year's Astronomy Day, if it is held, should be a half-day event on a Sunday. It would be possible to work this into the Museum's "Sunday with a Scientist" program. It would see easier to get enough people to cover all the stations and would be easier with a shorter run. Of course, with the event just taking place in the afternoon, there would be no free lunch. But if we cannot sustain a longer day, better to do well with a smaller event.

Hopefully, in the future we'll attract more new members and volunteers. It's not every year we can count on having a known speaker like Clay Anderson. But we have a great amateur astronomy story to tell. This year we did give a one-year membership to the person who won the Celestron telescope. Marq Corrigan is actually from Omaha, as is Vienne Kemper, one of the binocular winners. The other binocular winner Thomas Scott is from Lincoln. We hope to recruit even more new members.

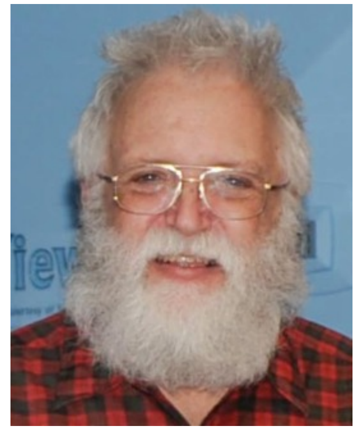
So Astronomy Day is now over and we look forward to another club barbeque, the joint PAC/OAS dinner and of course NSP. If you are planning on attending the latter, I would get my reservations in for whatever lodging you wish right away. I have just learned of two more fishing tournaments in the area during that time.

Designing My Remote Observatory Part III—Rick Johnson

Camera, Roof and other Issues

OSC (One Shot Color) sounded like the greatest thing since achromatic optics but was it really? Gather all data at once, no filters or filter wheel to buy so much cheaper and to read the ads it almost made your morning coffee. I had been in contact with an amateur about a 70 minute drive from here that was a top notch imager who made a good income selling his images. The maker of the first OSC cameras using Sony CCDs had given him one to test. He also had a similar Sony mono camera. Different chip but otherwise similar. I drove down to learn from the expert. What sounded great turned out not to be so hot after all. The QE was much lower. It took him nearly twice as long to get a good image with the OSC camera due to this. The dye filters blocked much of the light that mono cameras dielectric filters passed. The camera he had used CYM filters which were more efficient than RGB but not enough so. They made processing more difficult and photometry or narrow band imaging nearly impossible. He found one use for it however. He could save imaging time by using two complete systems simultaneously, one gathering mono data with the mono camera while another telescope with the OSC camera gathered the color data. Watching him work was like watching that guy in the circus keeping all those spinning plates going. Also it doubled the cost. With one scope I'd have to stick to mono. After playing with his data for a few days and measuring the noise levels and color accuracy I realized OSC wasn't what many think it to be. They have an advantage with moving objects like bright comets but that's about it. Might as well go with a DSLR for that and save a lot of money.

By now I had an observatory but no roof. I need to backtrack on this. I had planned on a clamshell design that was being designed for me for free by the head architectural engineer for 3M. They have a huge facility on the lake and want to keep it natural as possible. They didn't want my observatory to mess that up so he was volunteered to do the design work and their crew would build most of it for materials cost. But he never seemed to get moving. Promised dates passed. Finally he admitted he didn't know how to do it! Now I had a building, snow coming and no roof. A roll off roof over 16' in the air seemed nearly impossible but maybe that would have to do. When my carpenter needed a 4th hand he'd hire this rather kooky guy who was rather rattle brained but followed direction well. He said his dad could do it. Not if he was like this son. But my carpenter said that might be a good idea. I went to see him. He was as laid back as the son was hyper. Talked like a 78 record at 33 rpm. Drove me nuts. But everyone said he was a mechanical genius. I told him that it couldn't use tie downs yet needed to be secure in high winds. No way I wanted to go out at –40° to open up and close down as we do at Hyde. He said he'd think about it. A week later he had a design that did everything I wanted and a source of all materials. Seems my timing was perfect. The local potato plant just got the contract to provide about 80% of the French fries used by McDonald's. But to get the contract all their equipment had to be aluminum or stainless steel. The plant's galvanized steel production lines had to be totally replaced. This fellow had the contract to keep up the plants huge parking lot for snow, cleaning and repairs to the surface, hundreds of semi trucks a day do a number on it. He was able to get everything needed at scrap steel prices from their scrapped production lines. My roof now rolls on rollers that used to move tons of potatoes about the plant. All the parts needed to keep the roof firmly tied down to the track and yet roll were already made! A bit of modification and the roof would be ready. But he also has the snow removal and street cleaning duties for several small towns. We had a very snowy year that year and it all went into the observatory (no mount) as he had no time to do the roof. Finally in March it was done. Thanks to the rollers it rolled with ease using just one finger. Though it is powered by a modified garage door opener and can be opened from the house using the car remote. (I



later learned to keep that in a drawer when a cat walked across it opening the roof during a rain storm!) Now I had a roof (after a ton of shoveling as the snow was 4 feet deep in the observatory). It's no fun shoveling it up and out over 5.5 foot walls! But no scope, it was still only available on their insufficient mount and I'd not decided on the camera.

After talking with my friend with the OSC cameras and watch him work I decided it might be a good idea to learn the system with a much shorter focal length that was far more forgiving to guiding and pointing errors. Besides, he said it would be foolish to start with such a long focal length. So I mounted my 6" f/4 on the Paramount ME and borrowed a very well used ST-7 from that imager and started to learn how to run the observatory using the software that came with the mount which included camera control software. At this point, to keep things simple I worked from in the observatory, it was a warm spring, rather than networked to the house. Anything to simplify things. Of course I did everything the hard way at first but got good results (good to me at the time now I consider them rather poor) right off by using a pixel size of 3" rather than the 0.6" I was shooting for. I was working in mono only, again to keep things simple. I started with short exposures and no guiding. I added guiding and longer exposures as I got more confident in the system. Besides, I hadn't determined how to best control things from the house. I quickly discovered a major problem — midge flies! Millions were attracted to the computer screen. They live only one night so they died by the thousands on the screen falling into the keyboard which after two nights was completely unusable. I was dead until I could get in a new one. I'd have to move to the house and fast, but how? I could set up a small computer in the observatory and use a network between it and a computer in the house. This seemed the most obvious except temperatures in winter hit –40° and colder. Hard drives don't boot at such temperatures. Today I might have uses a solid state drive but that option didn't exist in 2006. I could build an insulated compartment for the computer and put in a simple heating system. I'd have to turn that on hours before I planned to use the observatory which meant leaving the heater on much of the time for even bad weather can clear unexpectedly. Thinking that the way I'd go I had the two cat 5 lines run from the house to the observatory when it was built so that part was ready to go.

Then Mark Dahmke gave me the suggestion of using a simple device that converted USB 1.1 to a signal that could be carried by cat 5 wiring then reconverted to USB 1.1 at the other end. This was only $100. All my gear was USB 1.1. Nothing at the time used USB 2. It seemed a quick and dirty way to get going so I ordered one. It and the keyboard arrived the same day. Quick keyboard replacement in the laptop and I was ready to try it out — in the observatory. I needed to first see if it would work. So I ran the USB line to the wall. Converted to Cat 5 and sent it to the house. There a short cable ran it back into the other line and back out to the observatory. Now I plugged that into the converter to go back to USB and that into the computer and — IT WORKED. Quickly I shut down before many midge flies showed up. I went into the house as it certainly would work there.

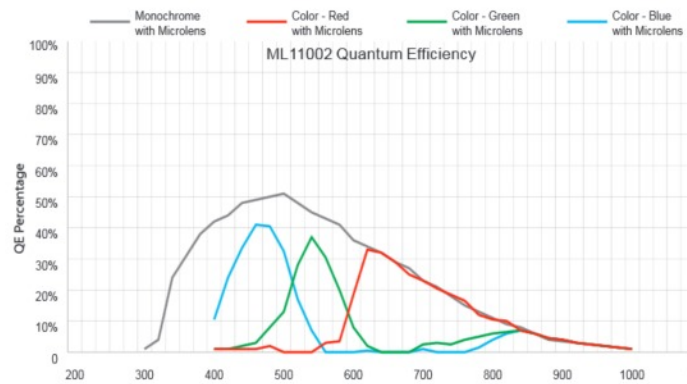
I plugged into the Cat 5 cable at the house, converted back to USB and fired it up. It failed! Couldn't see the observatory at all. The Cat 5 was installed by my electricians who we quickly learned to call "Dumb and Dumber". I put in two lines to the house just to have the second for expansion as doing so later would be difficult with walls and basement ceiling in place. On a hunch I plugged the house side into the other cable position. Yep it now worked. Dumb or Dumber had reversed the cable wiring. The top socket in the observatory was the lower one in the house. Not only that I later found the wiring for the Cat 5 through the house often had crossed wires so none of it worked until I rewired it all. Some wires that appeared correct were broken in the insulation so the circuit was open. Dumb and Dumber indeed! I now can run the observatory from anywhere in the house.

I was quickly learning another lesson. You need proper software to process these images and that isn't cheap. I was trying to get by with free software that came with the camera and mount.

Designing My Remote Observatory Part III, Continued

While it could take and calibrate the images it fell woefully short for everything else it claimed to do (not much) and if I was going to get much out of the images I'd need software that worked with the full 16 bit range of the FITs images rather than the limited 8 bit range of most image processing software out there but for Photoshop at the time. This was quickly turning into a black hole for money. One package did a great job of stacking images and rejecting noise but couldn't handle stacking images that varied in image scale. That took another expensive program. Then, even if I bought Photoshop it couldn't read FIT files and the free software didn't make good TIF files from the FITS. While that software wasn't expensive it so took over the computer it was a major headache. Later NASA published FITSLiberator that solved this for free. Still assembling the required software was a major headache and several thousands of dollars later I finally had software that could do the job. Today there are ways to cut that in half but they didn't exist then. Also I found my computer woefully inadequate for the severe CPU needs of noise rejection stacking. That could take 30 minutes a stack and it would take many tries to find the one best method for this particular stack And that was with a rather small imaging chip. The one I intended to use was many times larger and would give new meaning to SLOW. Also these programs would need 16 gigabytes of RAM with the larger chip size. I'd thought my computer pretty good. Not for this chore! I also found just learning to do image processing was far more difficult than I had imagined. No matter the software the learning curve is very steep. I'm still climbing it. Sometimes I think I see the top then it recedes back into the fog of ignorance again. From email I get I must make it look simple in my observatory mailing list. It isn't as the ton of very poorly processed images on the net will attest.

With OSC off the table I was back to the 12" LX200R and a camera using the KAI-11000 chip. Though the KAF-6303 was also an option I was starting to discount it. But I'd still not decided on the camera maker and the scope was still only sold with their mount. I'll cover the issues of deciding which maker of the camera I'd go with and why I ended up with a different scope next month. Also software options have increased greatly since 2006 though the cost is still astronomical to say the least. I'll try and cover such changes in a later installment of this saga. Also hardware (scope and camera) has expended greatly as well. That too is for later on. Other issues I had to solve include how to focus and take calibration images remotely. And then there was the issue of how to turn on only the gear I needed that night. Lots of little things you don't think about until you realize you needed to when you can't do something that's necessary.



The above graph shows the quantum efficiency of the OSC version compared to the mono version of the KAI-11002. (The KAI-11000 has been replaced with the KAI-11002.) Note that only one fourth the pixels even see blue and red light with half seeing the small portion of green. Add the areas under the three colors together and they are about half the area under the mono version. The RGB filters used in mono imaging have nearly vertical cutoffs; all light of their color is collected not just some of it. Then too all pixels see each color so red and blue (by far the most important colors) collect at about 8 times the rate they do with OSC. Also note they do see some IR light which means that light must be filtered out or color balance will skew. This explains why OSC is actually slower than mono imaging. But far cheaper with only one filter to buy and no filter wheel to buy. Mono camera color filters block all UV and IR light so no separate filter is needed. DSLRs already have the IR block filter and is cheaper than a similar sized CCD OSC camera. But their IR filter also blocks H alpha light, important to astro imaging so an entire industry for replacing the filter has sprung up. ■

June 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 -3.9.
Neptune: Rises in the middle of the night.
Uranus: Rises 1½ hours after Neptune.
Mercury: Visible in the WNW 45 minutes after sunset.
Jupiter: Sets 3 hours after the Sun to start June and 1 hour at the end of June.
Mars: Starts the month at magnitude -0.5 and ends the month at 0.0.
Saturn: Dims a little in June from 0.2 to 0.4. The rings are 21° from edge on.

Messier List – The Virgo Galaxy Cluster

M58: Oval shaped galaxy with a brighter core.
M59: A hazy oval patch.
M60: Oval patch of light.
M84/M86: Both fit in the same FOV, the start of Markarian's Chain.
M87: Round fuzzy patch with a bright core.
M88/M90: Both fit in the same FOV.
M91: Hazy oval patch.
M98: Long, pencil like shape.
M99: Round fuzzy patch of light.
M100: Round hazy glow.
Last Month: M49, M51, M61, M63, M64, M85, M94, M101, M102, M104
Next Month: M3, M4, M5, M53, M68, M80, M83

NGC and other Deep Sky Objects

NGC 6124: Open cluster in Scorpius.
NGC 6229: Globular cluster in Hercules.
NGC 6293: Globular cluster in Scorpius.
NGC 6369: Little Ghost Nebula, PN in Ophiuchus.
NGC 6503: Oval shaped galaxy in Draco.
NGC 6543: Cat's Eye Nebula, PN in Draco.

Double Star Program List

Sigma Corona Borealis: Equal bright yellow stars.
16/17 Draconis: Equal white stars.
Mu Draconis: Pair of close white stars.
Kappa Herculis: Yellow pair.
Alpha Herculis: Orange primary with a greenish secondary.
Delta Herculis: Bright white star with a blue-purple secondary.
Rho Herculis: Close pair of white stars.
95 Herculis: Equal yellow-white stars.
Alpha Librae: Wide yellow and white pair.

Challenge Object

NGC 6144: Globular cluster only 40' NW of Antares. This faint globular cluster is difficult to see due to the glow of Antares.

NGC Objects—Jim Kvasnicka

The Cat's Eye Nebula, NGC 6543 is a planetary nebula found in the constellation Draco. It was discovered in 1786 by William Herschel. English astronomer William Huggins (1824-1910) examined the Cat's Eye Nebula spectroscopically in 1864, making it the first planetary nebula to be so studied. Before this date, astronomers thought such objects were unresolved spheres of stars. Huggins, however, recognized the spectrum to be that of luminous gas different from those of stars he observed through his spectroscope.

NGC 6543 is situated almost exactly in the direction of the Ecliptic North Pole. Through an 8 inch telescope most observers note the blue-green color of NGC 6543 right away. Though it is small in size at 20 arc seconds NGC 6543 does have an extended halo of matter that is 5 arc minutes in diameter. This halo is visible in a 12 inch telescope.

NGC 6543 is part of the Herschel 400 list and also Caldwell object #6.

14 Red Dwarf Stars to View with Backyard Telescopes–David Dickinson

They're nearby, they're common and — at least in the latest exoplanet newsflashes hot off the cyber-press — they're hot. We're talking about red dwarf stars, those "salt of the galaxy" stars that litter the Milky Way. And while it's true that there are more of "them" than there are of "us," not a single one is bright enough to be seen with the naked eye from the skies of Earth.

A reader recently brought up an engaging discussion of what red dwarfs might be within reach of a backyard telescope, and thus this handy compilation was born.

Of course, red dwarfs are big news as possible hosts for life-bearing planets. Though the habitable zones around these stars would be very close in, these miserly stars will shine for trillions of years, giving evolution plenty of opportunity to do its thing. These stars are, however, tempestuous in nature, throwing out potentially planet sterilizing flares.

Red dwarf stars range from about 7.5% the mass of our Sun up to 50%. Our Sun is very nearly equivalent 1000 Jupiters in mass, thus the range of red dwarf stars runs right about from 75 to 500 Jupiter masses.

For this list, we considered red dwarf stars brighter than +10th magnitude, with the single exception of 40 Eridani C as noted.

I know what you're thinking… what about the closest? At magnitude +11, Proxima Centauri in the Alpha Centauri triple star system 4.7 light years distant didn't quite make the cut. Barnard's Star (see below) is the closest in this regard. Interestingly, the brown dwarf pair Luhman 16 was discovered just last year at 6.6 light years distant.

Also, do not confuse red dwarfs with massive carbon stars. In fact, red dwarfs actually appear to have more of an orange hue visually! Still, with the wealth of artist's conceptions (see above) out there, we're probably stuck with the idea of crimson looking red dwarf stars for some time to come.

Notes on each:

Groombridge 34: Located less than a degree from the +6th magnitude star 26 Andromedae in the general region of the famous galaxy M31, Groombridge 34 was discovered back in 1860 and has a large proper motion of 2.9″ arc seconds per year.

Star	Magnitude	Constellation	R.A.	Dec
Groombridge 34	+8/11(v)	Andromeda	00h 18'	+44 01'
40 Eridani C	11	Eridanus	04h 15'	-07 39'
AX Microscopii/Lacaille 8760	6.7	Microscopium	21h 17'	-38 52'
Barnard's Star	9.5	Ophiuchus	17h 58'	+04 42'
Kapteyn's Star	8.9	Pictor	05h 12'	-45 01'
Lalande 21185	7.5	Ursa Major	11h 03'	+35 58'
Lacaille 9352	7.3	Piscis Austrinus	23h 06'	-35 51'
Struve 2398	9	Draco	18h 43'	+59 37'
Luyten's Star	9.9	Canis Minor	07h 27'	+05 14'
Gliese 687	9.2	Draco	17h 36'	+68 20'
Gliese 674	9.9	Ara	17h 29'	-46 54'
Gliese 412	8.7	Ursa Major	11h 05'	+43 32'
AD Leonis	9.3	Leo	10h 20'	+19 52'
Gliese 832	8.7	Grus	21h 34'	-49 01'

Locating Groombridge 34. Created using Stellarium.

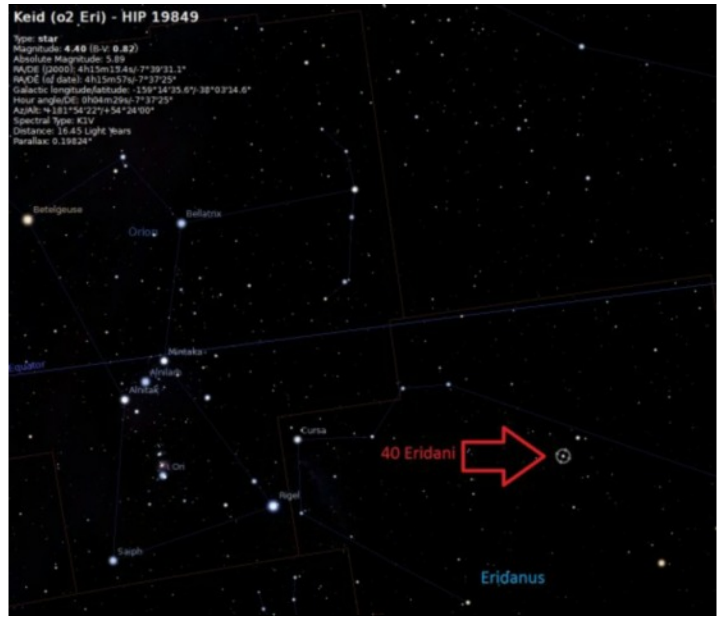
40 Eridani C: Our sole exception to the “10th magnitude or brighter” rule for this list, this multiple system is unique for containing a white dwarf, red dwarf and a main sequence K-type star all within range of a backyard telescope. In sci-fi mythos, 40 Eridani is also the host star for the planet Richese in Dune and the controversial location for Vulcan of Star Trek fame.

AX Microscopii: Also known as Lacaille 8760, AX Microscopii is 12.9 light years distant and is the brightest red dwarf as seen from the Earth at just below naked eye visibility at magnitude +6.7.

A 20 year animation showing the proper motion of Barnard's Star. Credit: Steve Quirk, images in the Public Domain.

A 20 year animation showing the proper motion of Barnard’s Star. Credit: Steve Quirk, images in the Public Domain.

Barnard’s Star: the second closest star system to our solar system next to Alpha Centuari and the closest solitary red dwarf star at six light years distant, Barnard’s Star also exhibits the highest proper motion of any star at 10.3” arc seconds per year. The center of many controversial exoplanet claims in the 20th century, it’s kind of a cosmic irony that in this era of 1790 exoplanets and counting, planets have yet to be discovered



Locating 40 Eridani. Created using Stellarium.

around Barnard’s Star!

Kapteyn’s Star: Discovered by Jacobus Kapteyn in 1898, this red dwarf orbits the galaxy in a retrograde motion and is the closest halo star to us at 12.76 light years distant.

Lalande 21185: currently 8.3 light years away, Lalande 21185 will pass 4.65 light years from Earth and be visible to the naked eye in just under 20,000 years.

Lacaille 9352: 10.7 light years distant, this was the first red dwarf star to have its angular diameter measured by the VLT interferometer in 2001.

Struve 2398: A binary flare star system consisting of two +9th magnitude red dwarfs orbiting each other 56 astronomical units apart and 11.5 light years distant.

Luyten’s Star: 12.36 light years distant, this star is only 1.2 light years from the bright star Procyon, which would appear brighter than Venus for any planet orbiting Luyten’s Star.

Gliese 687: 15 light years distant, Gliese 687 is known to have a Neptune-mass planet in a 38 day orbit.

Gliese 674: Located 15 light years distant, ESO’s HARPS spectrograph detected a companion 12 times the mass of Jupiter that is either a high mass exoplanet or a low mass brown dwarf.

Gliese 412: 16 light years distant, this system also contains a +15th magnitude secondary companion 190 Astronomical Units from its primary.

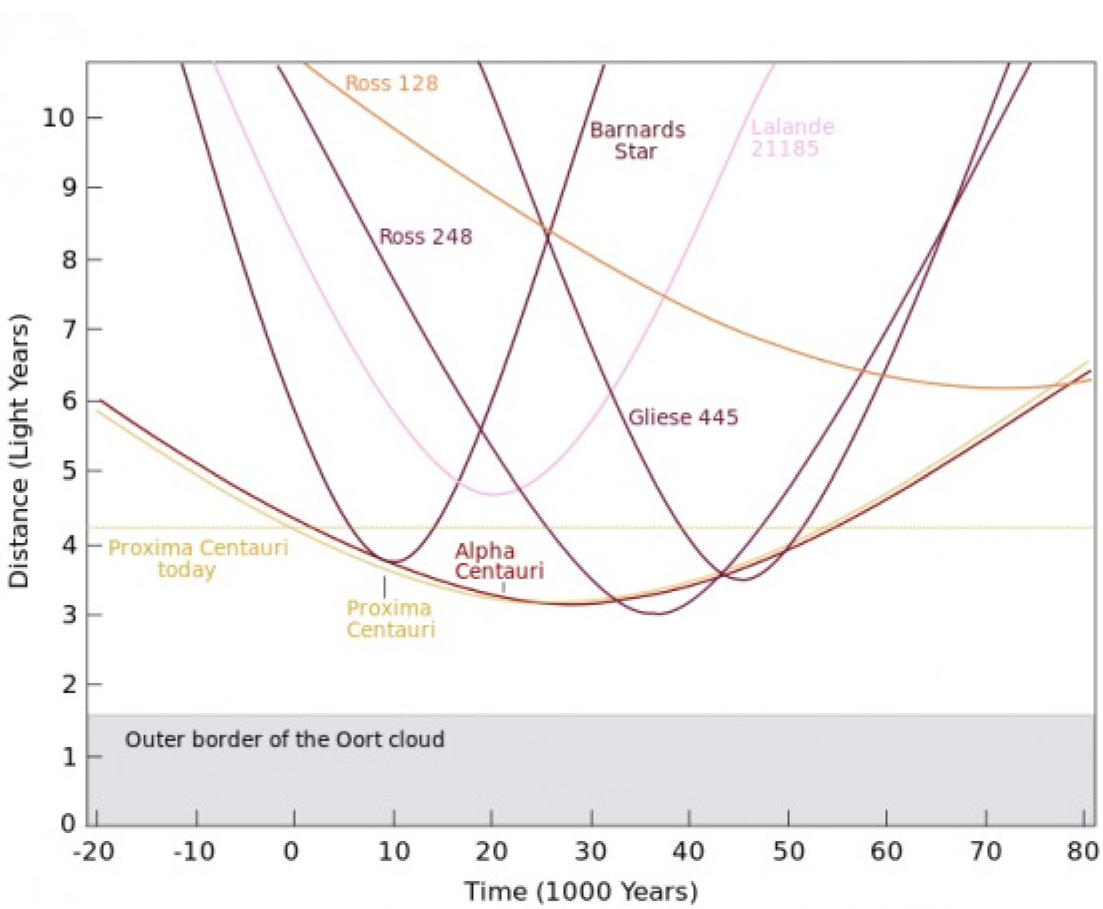
AD Leonis: A variable flare star in the constellation Leo about 16 light years distant.

Gliese 832: Located 16 light years distant, this star is known to have a 0.6x Jupiter mass exoplanet in a 3,416 day orbit.

Consider this list a teaser, a telescopic appetizer for a curious class of often overlooked objects. Don't see you fave on the list? Want to see more on individual objects, or similar lists of quasars, white dwarfs, etc in the range of backyard telescopes in the future? Let us know. And while it's true that such stars may not have a splashy appearance in the eyepiece, part of the fun comes from knowing what you're seeing. Some of these stars have a relatively high proper motion, and it would be an interesting challenge for a backyard astrophotographer to build an animation of this over a period of years. Hey, I'm just throwing that out project out there, we've got lots more in the files…

Read more at Universe Today.

Reprinted from Universe Today.



The closest stars to our solar system over the next 80,000 years. Credit: FrancescoA under a Creative Commons Attribution Share-Alike 3.0 Unported license.

NASA Delivers New Insight into Star Cluster Formation

Using data from NASA's Chandra X-ray Observatory and infrared telescopes, astronomers have made an important advance in the understanding of how clusters of stars come into being.

The data show early notions of how star clusters are formed cannot be correct. The simplest idea is stars form into clusters when a giant cloud of gas and dust condenses. The center of the cloud pulls in material from its surroundings until it becomes dense enough to trigger star formation. This process occurs in the center of the cloud first, implying that the stars in the middle of the cluster form first and, therefore, are the oldest.

However, the latest data from Chandra suggest something else is happening. Researchers studied two clusters where sun-like stars currently are forming - NGC 2024, located in the center of the Flame Nebula, and the Orion Nebula Cluster. From this study, they discovered the stars on the outskirts of the clusters actually are the oldest.

"Our findings are counterintuitive," said Konstantin Getman of Penn State University, University Park, who led the study. "It means we need to think harder and come up with more ideas of how stars like our sun are formed."

Getman and his colleagues developed a new two-step approach that led to this discovery. First, they used Chandra data on the brightness of the stars in X-rays to determine their masses. Then they determined how bright these stars were in infrared light using ground-based telescopes and data from NASA's Spitzer Space Telescope. By combining this information with theoretical models, the ages of the stars throughout the two clusters were estimated.

The results were contrary to what the basic model predicted. At the center of NGC 2024, the stars were about 200,000 years old, while those on the outskirts were about 1.5 million years in age. In the Orion Nebula, star ages ranged from 1.2 million years in the middle of the cluster to almost 2 million years near the edges.

"A key conclusion from our study is we can reject the basic model where clusters form from the inside out," said co-author Eric Feigelson, also of Penn State. "So we need to consider more complex models that are now emerging from star formation studies."

Explanations for the new findings can be grouped into three broad notions. The first is star formation continues to occur in the inner regions because the gas in the inner regions of a star-forming cloud is denser -- contains more material from which to build stars -- than the more diffuse outer regions. Over time, if the density falls below a threshold where it can no longer collapse to form stars, star formation will cease in the outer regions, whereas stars will continue to form in the inner regions, leading to a concentration of younger stars there.

Another idea is that old stars have had more time to drift away from the center of the cluster, or be kicked outward by interactions with other stars. One final notion is that the observations could be explained if young stars are formed in massive filaments of gas that fall toward the center of the cluster.

Previous studies of the Orion Nebula Cluster revealed hints of this reversed age spread, but these earlier efforts were based on limited or biased star samples. This latest research provides the first evidence of such age differences in the Flame Nebula.

"The next steps will be to see if we find this same age range in other young clusters," said Penn State graduate student Michael Kuhn, who also worked on the study.

These results will be published in two separate papers in The Astrophysical Journal and are available online. They are part of the MYStIX (Massive Young Star-Forming Complex Study in Infrared and X-ray) project led by Penn State astronomers.

NASA's Marshall Space Flight Center in Huntsville, Ala., manages the Chandra program for NASA's Science Mission Directorate in Washington. The Smithsonian Astrophysical Observatory in Cambridge, Mass., controls Chandra's science and flight operations.

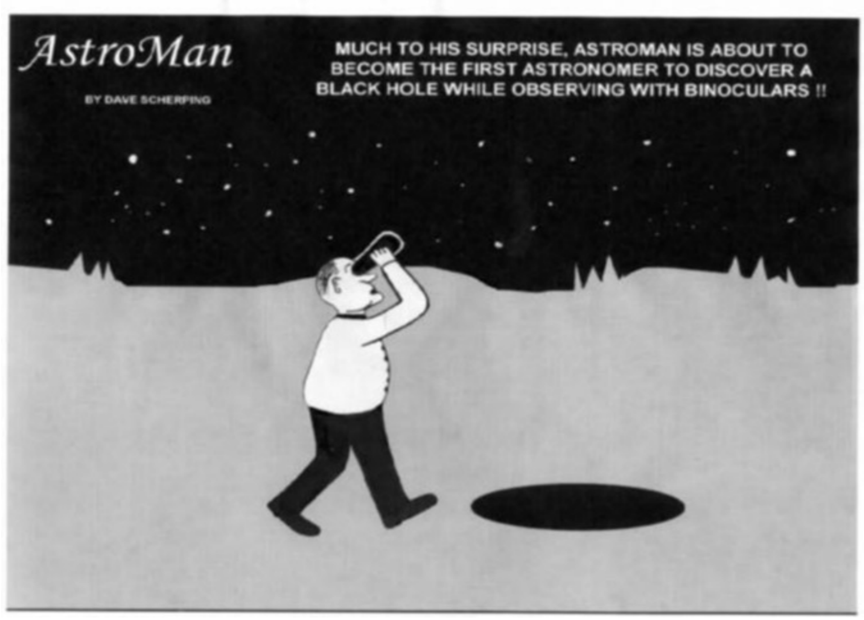
NASA's Jet Propulsion Laboratory, Pasadena, Calif., manages the Spitzer Space Telescope mission for NASA's Science Mission Directorate, Washington. Science operations are conducted at the Spitzer Science Center at the California Institute of Technology in Pasadena. Spacecraft operations are based at Lockheed Martin Space Systems Company, Littleton, Colo. Data are archived at the Infrared Science Archive housed at the Infrared Processing and Analysis Center at Caltech.

For an additional interactive image, podcast, and video on the finding, visit: http://chandra.si.edu

For Chandra images, multimedia and related materials, visit: http://www.nasa.gov/chandra

For more information on NASA's Spitzer mission, visit: http://www.nasa.gov/spitzer and http://spitzer.caltech.edu

The California Institute of Technology in Pasadena manages JPL for NASA.



The Hottest Planet in the Solar System– Dr. Ethan Siegel

When you think about the four rocky planets in our Solar System—Mercury, Venus, Earth and Mars—you probably think about them in that exact order: sorted by their distance from the Sun. It wouldn't surprise you all that much to learn that the surface of Mercury reaches daytime temperatures of up to 800 °F (430 °C), while the surface of Mars never gets hotter than 70 °F (20 °C) during summer at the equator. On both of these worlds, however, temperatures plummet rapidly during the night; Mercury reaches lows of -280 °F (-173 °C) while Mars, despite having a day comparable to Earth's in length, will have a summer's night at the equator freeze to temperatures of -100 °F (-73 °C).

Those temperature extremes from day-to-night don't happen so severely here on Earth, thanks to our atmosphere that's some 140 times thicker than that of Mars. Our average surface temperature is 57 °F (14 °C), and day-to-night temperature swings are only tens of degrees. But if our world were completely airless, like Mercury, we'd have day-to-night temperature swings that were *hundreds* of degrees. Additionally, our average surface temperature would be significantly colder, at around 0 °F (-18 °C), as our atmosphere functions like a blanket: trapping a portion of the heat radiated by our planet and making the entire atmosphere more uniform in temperature.

But it's the *second* planet from the Sun -- Venus -- that puts the rest of the rocky planets' atmospheres to shame. With an atmosphere **93 times as thick as Earth's**, made up almost entirely of carbon dioxide, Venus is the ultimate planetary greenhouse, letting sunlight in but hanging onto that heat with incredible effectiveness. Despite being nearly twice as far away from the Sun as Mercury, and hence only receiving 29% the sunlight-per-unit-area, the surface of Venus is a toasty 864 °F (462 °C), with *no difference* between day-and-night temperatures! Even though Venus takes hundreds of Earth days to rotate, its winds circumnavigate the entire planet every four days (with speeds of 220 mph / 360 kph), making day-and-night temperature differences irrelevant.

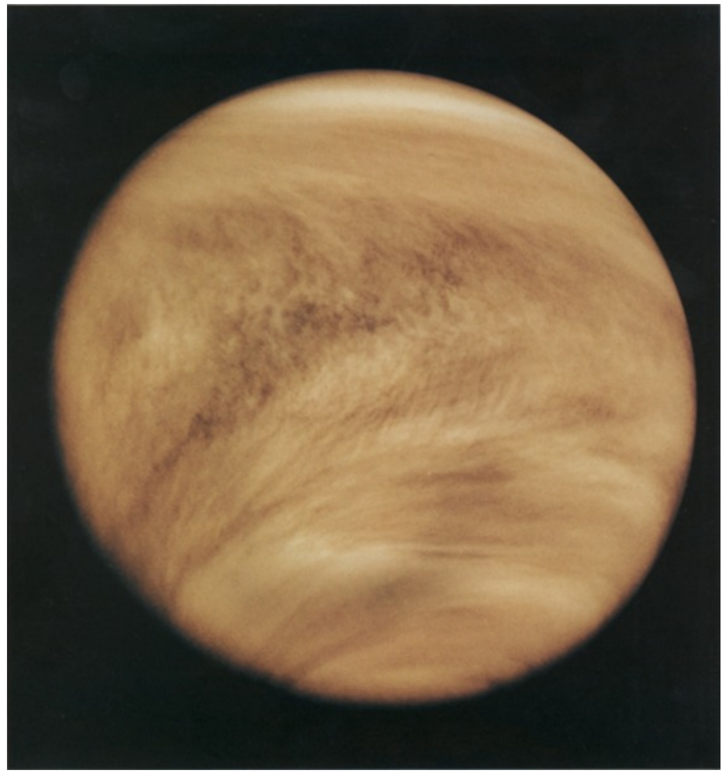


Image credit: NASA's Pioneer Venus Orbiter image of Venus's upper-atmosphere clouds as seen in the ultraviolet, 1979.

Catch the hottest planet in our Solar System all spring-and-summer long in the pre-dawn skies, as it waxes towards its full phase, moving away from the Earth and towards the opposite side of the Sun, which it will finally slip behind in November. A little atmospheric greenhouse effect seems to be exactly what we need here on Earth, but as much as Venus? No thanks!

Check out these "10 Need-to-Know Things About Venus": *http://solarsystem.nasa.gov/planets/profile.cfm?Object=Venus.*

Kids can learn more about the crazy weather on Venus and other places in the Solar System at NASA's Space Place: *http://spaceplace.nasa.gov/planet-weather.*

NASA's Space Place

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