

SIDEREAL TIMES

Austin Astronomical Society

keeping astronomy weird since 1969

www.austinaastro.org

April 2016

MONTHLY MEETING

April 8, 2016
7:30 PM
ETC 2.136 - UT Campus
Engineering Teaching Center
Dean Keeton and Speedway

Adam McKay
UT-Austin
Rosetta, Dawn and
spectral analysis

See Page 3 for details.

PRACTICAL ASTRONOMY

No PA session this month.

Come to The Varsity after the meeting
for food and conversation.



Austin Astronomical Society



Sidereal Times
Vol. 48 No. 4

<http://www.austinaastro.org>

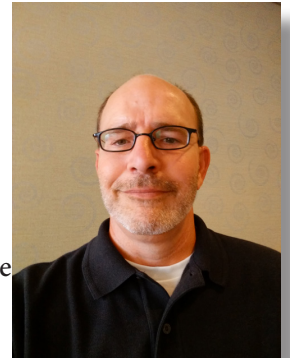
Sidereal Times is the official monthly publication
of the Austin Astronomical Society.

PRESIDENT'S CORNER

By David Mathias, 2015-16 President

Watering Hole, Disneyland and Habitat

In case you haven't noticed, this Friday AAS is holding elections for officers for the year to come. That means it's time for me to reflect on the year that has been, and look forward to the year ahead. It seemed fitting to look back a few years and get a sense for continuity and change within our Society. I read through every back issue of *Sidereal Times* posted on our beautiful new website. If you haven't taken that opportunity yet, I strongly recommend it.



I came away impressed with the love and dedication exhibited by a solid core of members and leadership over the past 4 years. I saw surges of experimentation. I saw occasional hints of opportunities for donations of land for the Society. I saw life changes interrupting plans and best intentions. I saw the beginnings of generational changes in perspectives, the growth of social media for society communications, the newness and potential of astronomy apps, an ebb and flow of scholarly contributions to the newsletter, and the growth of outreach as a vital part of the Society's activities.

You see the mark of the unique contributions of each member, and then you miss them when the contributions or the members no longer appear on those pages. Erika Rix, for example, did a great job making sure there were lots of photographs of members participating in activities. Alan Carruth's presentations of historical correspondence were very special contributions that reminded us of the longer perspective of the hobby and the science of astronomy.

The Society contains and is sustained by the contributions of its members. And, the more I thought about it, the more I realized that our membership has three kinds of experiences of the hobby: the watering hole, Disneyland, and Habitat.

For many of us, astronomy started as an experience we shared with a few trusted friends and family members. We could swim in the shallows or in the deep end of scientific study, but observation was a personal and nonjudgmental experience. For many of us, this "watering hole" was our experience before we joined a club or society. (Sometimes joining a society works for these members. Sometimes the social aspect turns out not to be what they were looking for.)

For some of our members, participation is more akin to a visit to Disneyland.

Banner: April 2015 Image of the Month: Anis Abdul, Sunflower Galaxy M63

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(President's Corner continued from page 1)

They pay the admission and they hope to be entertained. They may not think hard about the effort that goes into that entertainment, and they may not look closely at the magic (or the physics) of how it happens. It's fun. The family likes it, and they can have as much or as little of it as they like. But visiting Disneyland isn't central to who they are, and they aren't tempted to submit a job application there. (Sometimes these members stick around. Sometimes they move on to a different hobby.)

And then for other members, participation is akin to a barn-raising or to working with Habitat for Humanity to construct a building. They may or may not have specialized skills, but they collaborate for the larger purpose of creating something valuable to their neighbors. What skills they don't have they can learn from others.

Barn-raising may be every bit as structured an activity as building a Habitat house, but the Habitat house requires permits, workflow structures, infrastructure and an organization to coordinate and fund the activity. Barn-raising is more like an amateur activity, while Habitat represents activities performed by a nonprofit organization. It's very likely you'll build fewer barns than Habitat houses will be built.

AAS is both a membership organization and a nonprofit 501c3 organization. Membership organizations tend to look more inwards towards fulfilling private goals. 501c3 organizations are required to serve a purpose that

benefits the public. They come with their own rules and laws and liability and paperwork. My perspective is that we should do what is required of us as a 501c3 so that we can serve our members, and so that we can leverage the advantages of being a 501c3 to serve our members better. Otherwise, maybe we should stop being a 501c3 and just stick to being a membership organization.

As I look back over this last year, from a programmatic standpoint, very little has changed from what I read in the back issues of *Sidereal Times*. We held meetings and educated our members with presentations, we recognized our members' achievements, we conducted outreach for the public, we produced a newsletter, we participated in well-received special events, we shared news about our hobbies on social media, we recruited new members and we raised money for the benefit of the society. In the year to come, I want to keep doing all of that. I want to do even more with member services. However, we have to get the 501c3 stuff right as well.

AAS' story is a great one, and your EC did well this year. We now have over 600 members, and we are continuing to grow. Our bank balance is still in the black. We will have a larger board, and it will have some fresh eyes and perspectives to bring. In a few months, I'll be back in touch to lay out our vision and plans for the year ahead.

Clear skies,
David



<http://darksky.org/>



<https://www.astroleague.org/>



<http://www.canyonoftheeagles.com/>



<http://nepris.com/>

COME TO THE APRIL MEETINGS

When: Friday, April 8, 7:30 PM

**Where: ETC 2.136 - UT Campus, Engineering Teaching Center
Dean Keeton and Speedway**

General Assembly

Our presenter this month will be Adam McKay postdoc researcher at UT. Adam specializes in comets and other small solar system objects. His talk will focus on the Rosetta mission to comet 67P/Churyumov-Gerasimenko, and he may also cover aspects of the recent Dawn mission to the asteroids Vesta and Ceres, and the New Horizons mission to Pluto. Also, continuing our recent theme on the applications of spectroscopy, Adam will discuss how he makes use of spectral analysis in his research on these solar system bodies.

EXECUTIVE COMMITTEE ELECTION

The nominees for Executive Committee positions for 2016-17 are as follows:

President	David Mathias
Vice-President	Carl Lindemann
Secretary	Vacant
Treasurer	Dhaval Brahmabhatt
Outreach	Vacant
Member Services	Joi Chevalier
Equipment	Domingo Rochin
Communications	Vacant
Members at Large	Tara Krzywonski
	Amy Jackson
	Andrea Tole
	Philip Schmidt
	Terry Phillips
	Vacant

The election will be held at the General Assembly meeting on Friday, April 8, 2016 and is open to all members in good standing. If you have any questions, please don't hesitate to contact any of the current Officers for assistance.

NOTICE OF STOLEN TELESCOPE

The Astronomical Society of Eastern Missouri (ASEM) conducts public telescope viewing every clear Friday evening at the Broemmelsiek Park Astronomy Site in St. Charles County, Missouri. The C-14 telescope that we had permanently mounted in the Park observatory was recently stolen. If you hear of anyone getting a pre-owned C-14, and have suspicions about the telescope's origin, please contact jtwellman@asemonline.org and we can communicate further. If needed, we can provide images specific to the stolen telescope.

EEO WORK DAY

All things need a little TLC, and that includes our very own Eagle Eye Observatory.

We've had so many great nights viewing, so many visitors, weather extremes, use and abuse of the site and our scopes, that it's time to give back to our dark sky site and make sure it's in its best condition for members and our visitors.

But work is always better when it's a party!

So on June 4th Members' Night, come out to EEO early (around 10am) and help fellow members with some light repairs and maintenance. Tools, materials, and drinks will be on site. We'll need to:

- clean and improve the pathway to EEO (soil will be delivered on site!)

- test, repair and repaint field tables

- fix path lighting

- repair and paint guideposts and parking lot signs

- clean out counters, shelving, storage areas

More hands make light the work, as they say - and there's a party at the end to celebrate!

Make sure you RSVP to Domingo Rochin, our Equipment Chair, so that we know how many are coming and to ensure you're in the dinner count. We'll dine on the field, clean up, and then prepare for a lovely Summer Triangle night! Stay tuned for more details as we get closer to June 4th!



Photo of COE upper field by David Lynch, CTSP, April 2015

TXMOST /AAS ASTROPHOTOGRAPHY EXHIBIT

The Texas Museum of Science & Technology is having Earth Day celebrations on the 23rd, and they wish to celebrate the sciences by including AAS! We would become part of a new exhibit called *In Your Own Backyard: Images from the Austin Astronomical Society*.

The storyline for visitors is to see the incredible sights 'in your own backyard.' By stepping outside and looking up, visitors can see the things that we see any night of the year. The exhibit would be on display for a year, with a wall caption beside it giving the specifics on the image, how it was captured, and any short comment from you, the photographer.

All of the work to coordinate the exhibit for this will be handled by TXMOST and the AAS Communications Chair and Webmaster - we'd like to keep this as simple as possible since its our first exhibit with TXMOST, and to make it easy for you to participate. So here's the relevant information:

Technical Specifications

Your image(s) are high-res digital files only, printed on TXMOST's in house large format printer, and beautifully framed by TXMOST for display with wall caption.

The images will be shown in the exhibit for a year, **after which they will be returned, gifted with the framing, to the photographer!**

A waiver is **required**, and any digital image **will be deleted** by TXMOST once printed, so that the only images are the printed & framed exhibit items.

Exhibit spots range from 8" x 10" or 11" x 17" with a couple 2' x 3' spots.

We'll need about 20 images: astrophotographers can submit more than one, though we'd like to take at least one from each person who wants to participate.

The virtual version of the exhibit will be on the AAS site too.

We'll need to have images in by **April 12th** or so, so they can be framed.

Joining the Exhibit

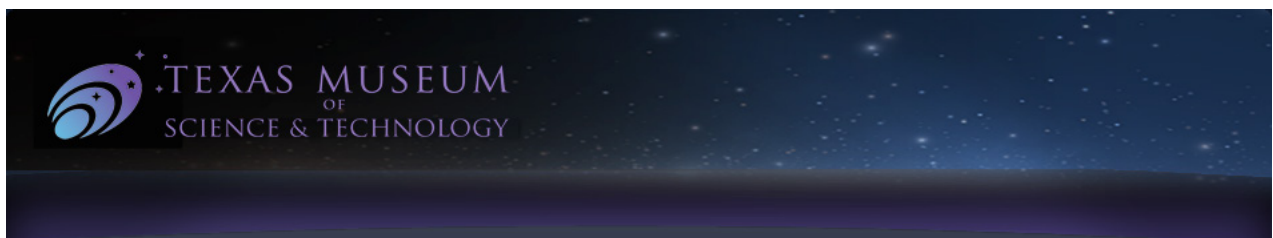
Send an e-mail to communications@austinastro.org with your interest. We'll send the waiver to you asap!

Please return the signed waiver PDF'd, with your selected image(s), and the metadata and text for the wall caption (you'll want to include your name, title/subject, date/time, location, any relevant image metadata [shutter speed, ISO, aperture, focal length, hardware, any processing])

Short artist's statement in your e-mail about your image, you and your love of AP, how you got started - anything that allows folks understand what you do or how you (or they can) got started in your backyard. :)

More information is on the AAS website, and we'll update there.

Any questions or ready to submit? Please contact the Communications team asap at the e-mail address above!



EXECUTIVE COMMITTEE MINUTES

By Ron Carman, Secretary

February 1, 2016

The meeting was called to order at 7:00 pm by President David Mathias. Other EC members present were Terry Phillips, Ron Carman, Tara Krzywonski, Brian Lippincott, Carl Lindemann, Dawn Davies, Alan Carruth, and Domingo Rochin, constituting a quorum. Also present were Joyce Lynch, editor, and Dhaval Brahmhatt, who is assisting Tara with the treasurer's duties. Joi Chevalier arrived at 7:46 pm.

The minutes of the January 2016 EC meeting were displayed and approved. David introduced Susan Franzen, who discussed with the committee the duties and responsibilities of officers and members of nonprofit organizations in order to maintain a tax-exempt 501c3 status.

Terry gave the Vice-President's report; the program at the February general meeting will be given by Ron Carman and in March by Dr. Sneden of the UT Astronomy Department. He has a list of criteria for dark sites.

Tara gave the Treasurer's report and introduced Dhaval Brahmhatt, who is helping with treasurer duties, and said due to her duties she will need someone else to handle the club's loaner telescopes. She did inform the El Dorado Star Party persons that the AAS will give back half of the \$350 from the last ESP and she has received a check for our share of \$175. We also need to submit IRS forms for tax-exemption purposes.

Joi showed examples of our new website pages and asked for any more suggestions from members.

Dawn gave the Outreach report; she listed the various events coming in February and said they will be shown on the web site. Also Dawn will have the March Practical Astronomy program, and in May there will be an additional Public Night at EEO down by the boat

dock at the lake below the resort.

Domingo gave the Equipment report; the 25-inch mirror has been re-aluminized and Galaxy Optics is sending it back; also, is adding members to his committee and wants to consider incentives for trained persons to operate the observatory on Public Nights. The Equipment Committee will handle the loaner telescopes. and he wants to maintain one of the loaners at EEO for on-site use.

Tara gave the IDA report in Tim Brown's absence; the AAS has received \$500 plus \$70 extra in donations toward participating in the Dark Sky Festival at Dripping Springs on March 5.

Brian Lippincott, Member-at-Large, will have a short presentation on "What's New in Astronomy" to give at the February general meeting; there were no other reports from the Members-at-Large.

Unfinished Business: David reported that the resort at Canyon of the Eagles is reclaiming the park store by the boat dock for retail sales and dining, so the AAS will not be able to use it for observing purposes. We are also considering restoring a telephone line at EEO and trying to obtain emergency contact phone numbers to post inside the observatory. Also, David is putting together a Nominating Committee and intends to announce its members at the general meeting on 12 February.

New Business: David discussed Amplify Austin and how the AAS may benefit from participating; both President and Treasurer need to attend training sessions; the cost is \$150. He moved that AAS participate in Amplify Austin for 2016. The motion was seconded by Joi and passed after discussion.

The meeting was adjourned at 9:18 pm.

CALENDAR OF EVENTS

8 April 2016
General Assembly Meeting
7:30 PM
ETC 2.136 - UT Campus
Engineering Teaching Center

9 April 2016
Members Only Star Party
Canyon of the Eagles

30 April 2016
Outreach Opportunity
Public Star Party
Canyon of the Eagles

2 May 2016
Executive Committee Meeting
7:00 PM
Cafe Express

13 May 2016
General Assembly Meeting
7:30 PM
St. Stephen's Episcopal School

For additional Outreach events,
see Page 9.

*Please see the AAS Calendar of
Events webpage for more details:*
<http://www.austinastro.org/events>

GENERAL ASSEMBLY MINUTES

By Ron Carman, Secretary

February 12, 2016

The meeting was called to order at 7:30 pm by President David Mathias with a quorum present. Jim Spigelmire, Member Services Chair, asked visitors and new members to introduce themselves.

The minutes of the January meeting were displayed on the screens and approved as corrected.

Vice-President Terry Phillips announced that he has arranged programs for the March and April meetings, but due to final examinations at UT we will need a different meeting site for May. He also said that he and Domingo Rochin, Equipment Chair, will re-install the mirrors in the 25-inch telescope the next weekend and they will need a place to store it once it is back in operation.

Treasurer Tara Krzywonski handed out two Observer's Handbooks to members who had bought them and gave her report; bank accounts currently total \$33,686 and we had 568 members as of 24 January. David mentioned that Dhaval Brahmhatt is assisting Tara with the treasurer's duties and Tara invited any other interested members to help on the Treasury Committee.

Joi Chevalier, Communications Chair, displayed the new AAS website on the screens and invited all members to submit articles and pictures they might like to go on the website as well as any suggestions or comments they may have for improvements or corrections.

Dawn Davies, Outreach Chair, announced the events scheduled for the rest of February and into March. The Night Sky Festival in Dripping Springs will be 5 March and Austin Under the Stars will be 23 July.

Domingo Rochin, Equipment Chair, said the EEO building needs several repairs and that he and Terry will re-assemble the 25-inch Dobsonian telescope this coming weekend. David displayed pictures of an articulated relay eyepiece that may be used on EEO scopes to make them usable by handicapped visitors.

Jim Spigelmire, Member Services Chair, showed a list of Member Nights and Public Nights for the coming year; he may also try to revive the Dam Astronomers program monthly at Mansfield Dam.

Tim Brown, IDA Representative, reminded everyone of the Night Sky Festival in Dripping Springs which will be on 5 March. Persons who bring telescopes for observing will be allowed to camp overnight. He showed their website on the screens; AAS is listed as a Supernova level sponsor.

David announced that he has two members, Marcha Fox and Jon Etkins, for the Nominating Committee but he still needs a third person. After some discussion, Bob Rickert volunteered to be the third member. He also showed pictures of the Amplify Austin website and explained to the members the purposes and benefits we may receive from being a member and said the AAS has been made a member of it.

WELCOME NEW MEMBERS

Billy Baty
Jerry Emmanuel
Michael Hutchinson
Elizabeth Lathan
Trent Mann
Heather McClure Mann
Christopher McFadden
Robert Primeaux
Sameer Rai

David also reported on the status at Canyon of the Eagles; the resort will also be reclaiming the use of the park store building near the lake, so AAS won't be able to use it for observing.

Brian Lippincott, Member-at-Large, gave the "What's Happening in Astronomy" report on gravitational waves, black holes, Gecko grippers for use in space, and evidence of liquid water on Mars.

Vice-President Terry Phillips then introduced the program, a demonstration and talk on spectroscopy given by AAS Secretary Ron Carman.

February 2016 Treasury Report

By Tara Krzywonski, Treasurer

Deposits

<i>Dues payments</i>	
Checks	\$ 0
PayPal	\$257.50
Dues payments totals	\$257.50

Interest earned-checking	\$0.79
Interest earned-CD	\$0.24
Interest earned-CD	\$0.23
Total interest earned	\$1.26

Total other income \$0

Deposit Totals February 1 - 29, 2016 **\$258.76**

Expenses

COE internet	\$ 62.87
Night Sky Festival donation	\$ 1,140.00
Christmas party expense	\$ 16.36
Outreach expense	\$ 56.85
Post office box one-year renewal	\$ 107.00
UPS - 25" telescope shipping	\$ 247.11

Expense Totals February 1 - 29, 2016 **\$1,630.19**

Bank Balances

University Federal Credit Union Checking	\$19,502.92
University Federal Credit Union Donations Savings	\$ 30.00
University Federal Credit Union C.D.	\$ 5,808.37
University Federal Credit Union C.D.	\$ 5,789.18
University Federal Credit Union Scholarship	\$ 462.96

Total Cash **\$31,593.43**

Total of 603 AAS members as of April 3, 2016

Total of 475 AAS memberships as of April 3, 2016

OUTREACH REPORT

By Dawn Davies, Outreach Chair

We've a fair number of excellent and exciting star parties on the horizon and I implore you all to try and come out to at least one in the next month. They are all posted to our website and beckoning you to break out your gear and/or your night sky knowledge and come join.

Please see the list below and let me know if you are able to attend any or all of the functions we have in store. They are located at all times of day and all around the city so check them out and feel free to contact me if you have any questions.

Dawn
512.663.2249
dawnmunroedavies@gmail.com

10 April, Sunday

Kealing Middle School Stargazing Camp
McKinney Falls
5808 McKinney Falls Parkway, Austin, Texas 78744
Set Up Time - 7:30p
Event Time - 8:00p - 9:00p
In need of astronomers with scopes and binoculars

16 April, Saturday

Private Girl Scout Event
The Texas Museum of Science and Technology
1220 Toro Grande Dr. Cedar Park, Texas 78613
Set Up Time - 3:30p
Event Time - 4:00p - 9:00p
In need of astronomers with solar scopes and telescopes
Also in need of someone who can spearhead this event and be the onsite contact.

18 April, Monday

Brushy Creek Elementary School Star Party
3800 Stonebridge Drive, Round Rock, Texas 78681
Set Up Time - 6:00p
Event Time - 6:30p - 8:00p
In need of astronomers with solar scopes, telescopes and binoculars

23 April, Saturday

Lockhart State Park Star Party
2012 State Park Road, Lockhart, Texas 78644
Golf Course Hole #1 Fairway
Set Up Time - 8:00p
Event Time - 8:30 - 10:00p
In need of folks with binoculars and telescopes as well as other to talk about the night sky

29 April, Friday

Belterra Community Star Party
801 Belterra Drive, Austin, Texas 78737
Set Up Time - 5:30p
Event Time - 6:00p - 8:00p
In need of astronomers with solar scopes, telescopes and binoculars

30 April, Saturday

Public Star Party at Eagle Eye Observatory
Canyon of the Eagles
16942 Ranch Road 2341, Burnet, Texas 78611
Set Up Time - 6:30p
Event Time - 7:30p - 11:00p
In need of astronomers with solar scopes, telescopes, binoculars and folks to help out with the welcome table.
RSVP joycedelynch@gmail.com

From Joi Chevalier:

Our **May 7th** Members Only Night at EEO coincides with a busy Mother's Day weekend at Canyon of the Eagles. Normally, it'd be a black-out weekend, but despite the complex calendaring, we will be able to access the field for a May Members' Night. While we are at EEO, CotE has asked that a few members join their Park Store / Lakeside star party to help guests see the skies. Please contact communications@austinaastro.org if you can help for a bit at Lakeside!

Mark your calendars!

**Austin Under the Stars
will be held at
St. Stephen's
Episcopal School on
Saturday, July 23.**

APRIL 2016 OBSERVING TARGETS

By Brian Cuthbertson

Spring means galaxies; they are everywhere. You can start in Ursa Major, drop down through Canes Venatici and Coma Berenices, into Leo and Virgo. Galaxies all over the place. They start to thin out south of there, in the regions of Corvus and Hydra. But really, how many do you need? So get out and get lost amid the island universes. It's billions of light years of an amazing cosmos, and you don't need a warp 10 spacecraft to reach it. So enjoy!

Y Canes Venatici rating: EASY
"La Superba" - extremely red
semi-regular variable star
RA 12h 45.1m Dec +45d 26.6'
(2000)
Magnitude 4.8

Do you like red? As in really really red? As in almost rusty red? Well here's a star for you. Just step right up and take a look at Y Canes Venatici. Y CVn for short. Y Cvn is one of the reddest of all the naked-eye stars, with a truly odd and vivid hue in large telescopes.

To locate the neighborhood of Y, start at 2nd magnitude Alioth (the Big Dipper handle star closest to the bowl) and imagine a line extending SSW to Cor Caroli (Alpha CVn). Roughly 2/3 of the way down that line, and about 2 degrees west, puts you in the vicinity of Y; it can be found without too much difficulty due to its color.

Y CVn is a giant carbon star: its atmosphere is filled with large amounts of carbon-containing molecules like C₂, C₃, CN and SiC. Such compounds absorb much of

the star's blue light, leaving it with an unusually vivid reddish orange color. The beauty of its spectrum earned it the name "La Superba" from the 19th-century Italian spectroscopy pioneer Pietro Angelo Secchi.

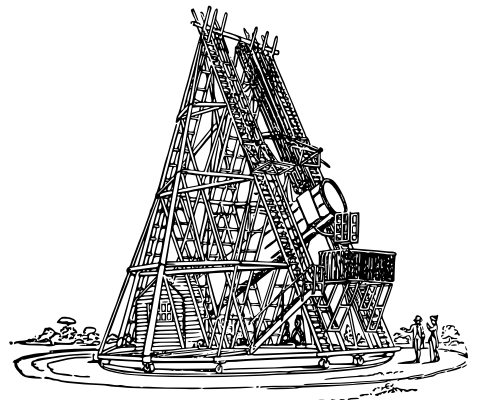
The star is also extremely cool, among the coolest known, with a surface temperature of just 2600 Kelvin. And it is variable: it has a maximum visual brightness of about 4.8 and a visual range of about 1.5 magnitudes in a semi-period averaging 160 days. A longer period of 2100 days may also be involved.

Truly an observing experience that will leave you seeing red.

Arp 120 rating: MEDIUM
interacting galaxy pair in Virgo
RA 12h 27.7m Dec +13d 00.5'
(2000)
Magnitude 10.2 (NGC 4438) +
10.8 (NGC 4435)

Arp 120 can be found in the heart of the Virgo cluster, just south of Virgo's border with Coma Berenices. It consists of two interacting galaxies, NGC 4435 and NGC 4438, together nicknamed "the Eyes." NGC 4438 features a long tidal tail, probably caused by its interaction with NGC 4435 just 5' N, and also possibly nearby elliptical giant M86, just 20' W. If either of the two galaxies were originally a spiral, such structures were disturbed long ago by gravitational encounters.

In a 17-inch scope NGC 4438 is bright, elongated 5-to-2 running SSW to NNE, with a small bright core. It forms a striking pair with



William Herschel's telescope
From a drawing in 'The Imperial History of England, comprising the entire work of D. Hume,' David Hume, 1891.
openclipart.org

NGC 4435 5' NNW. But its core isn't bright as that of NGC 4435, which in addition to its bright core, also has a stellar nucleus.

Both galaxies are around 40 MLY away. They are part of a huge line of galaxies running through the Virgo cluster called Markarian's Chain, which happens to be centered on NGC 4435. The chain is a stretch of galaxies which line up in a smooth curve. It was named after Armenian astrophysicist B.E. Markarian, who discovered their common proper motion in the early 1960s. Member galaxies include M84, M86, NGC 4477, NGC 4473, NGC 4461, NGC 4438, and NGC 4435.

NGC 4517 rating: HARD
galaxy in Virgo
RA 12h 32.8m Dec +0d 06.4'
(2000)
Magnitude 10.4, 10x1.5'

Porrina (Gamma Virgo), our embarkation point, is a 3rd-magnitude star at the base of the "bowl" of stars holding the Virgo

galaxy cluster. The bowl's eastern rim is marked by 3rd-magnitude Vindemiatrix (Epsilon Virgo), and its western rim is defined by 4th-magnitude Nu Virgo. The bulk of the Virgo cluster sits high in the bowl, some of it above the rim, like an overloaded ice cream dish. But galaxies dribble off deep into the bowl, down to and even past Porrima. NGC 4517 is one of these, located near the bottom of the bowl roughly 3 degrees NW of Porrima. To find NGC 4517 visually, draw a line from Porrima WNW to 4th-magnitude Eta Virgo. You'll find NGC 4517 about a degree N of the midpoint of the line.

NGC 4517 was discovered in 1784 by William Herschel, who described

it as having "a pretty bright star situated exactly north of the center of an extended milky ray." This 10th-magnitude star is a foreground member of the Milky Way and stands out prominently in any image of the galaxy.

In 1828 Herschel's son John also recorded the galaxy as a new discovery, but with an error of 5 minutes in RA. John's description makes it certain that he was observing the same object. His re-observation became NGC 4437, giving the galaxy two entries in the New General Catalog.

NGC 4517 is a spindle-shaped edge-on spiral galaxy - Herschel's "extended milky ray." In a 6-inch scope it is just

visible, on the the SW side of the star noted by Herschel. In a 10-inch it appears faint and very elongated, slightly wider at the center and tapering toward each end. Visible with averted vision at 77x, it is best at just above 100x, but starts to fade into the background at powers around 250x. Deep images show that the galaxy has no visible nucleus. But it does have a bright core about 1x0.2' in size, and a complex structure with many dark lanes.

NGC 4517 lies about 40 million light-years away, and forms a non-interacting pair with NGC 4517A, a mag. 12.2 face-on spiral 17' to the NW.

IMAGE OF THE MONTH



Congratulations!

**ROB
PETTENGILL**

**TERLINGUA
GHOST TOWN
OMEGA
CENTAURI**

Terlingua Texas ghost town is the perfect spot to image Omega Centauri, a globular cluster believed to be the remains of another galaxy captured by the Milky Way long ago. I found a spot down in the gully behind our cabin for this POV. The edge on galaxy in the lower right is NGC 4945 (enlarge for a better view). Sony NEX-5N with vintage Vivitar 135mm lens on a Vixen Polarie tracking mount. Exposed March 14, 2016 at ISO 3200 for 30 sec at f 5.6 with 59 images stacked. Foreground image illuminated by open cabin door exposed for 15 sec at ISO 3200. Stacking in Nebulosity. HDR composite in Photoshop.

MEMBERS' GALLERY

Whirlpool Galaxy By Chase Kincannon

Easter 2016
Meade 10" SCT on
Celestron CGEM. 13 frames
@120 seconds, ISO 1600 on
Canon T2i with H-alpha conver-
sion. Deep Sky Stacker and PS
edits.



Aurora By Dave Clark

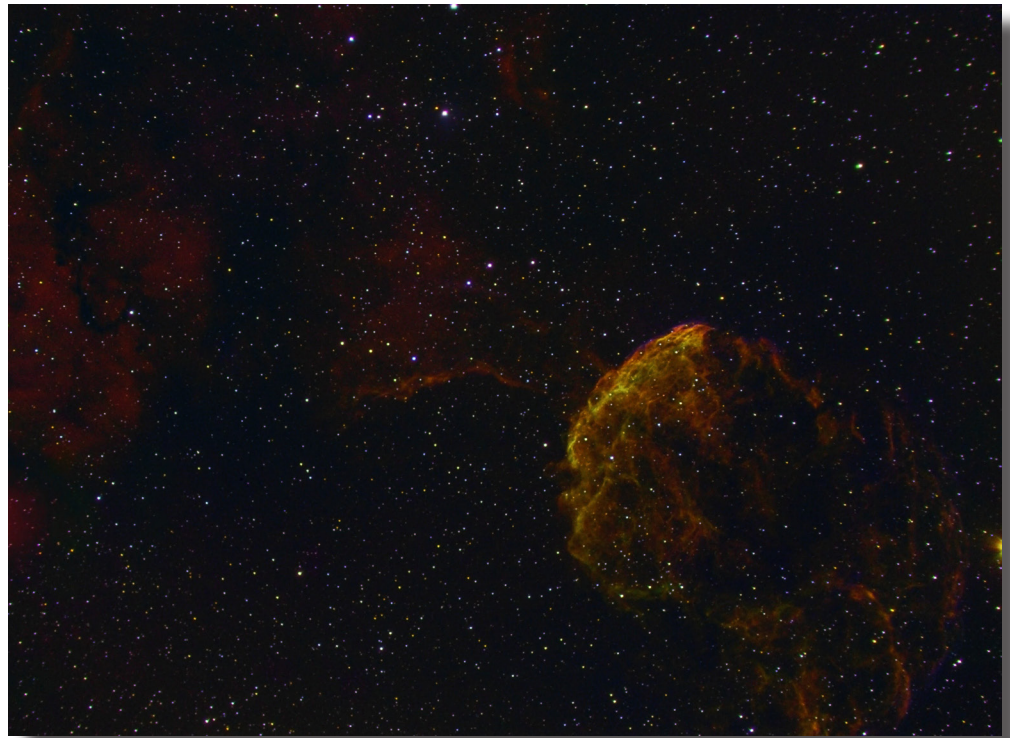
April 2015
Yellowknife, NW Territories, Canada
Canon Rebel T1a, with 14mm f2.8 lens
15 seconds



MEMBERS' GALLERY (continued)

IC443 Jelly Fish Nebula

HA 7nm - 5 Hours
(15x1200s)
OIII 5nm - 4 Hours
(12x1200s)
SII 7nm - 3 Hours (9x1200s)
Total Integration 12 Hours
Location, my Austin backyard



Images by Nathan Morgan

Horse Head Nebula / Flame Nebula

HA 7nm - 7 Hours 15 Minutes (29x900)
RGB - 4 hours 45 minutes
Total Integration 12 Hours
Location, my Austin backyard



MEMBERS GALLERY (continued)

Double Cluster



Images by Todd Hargis

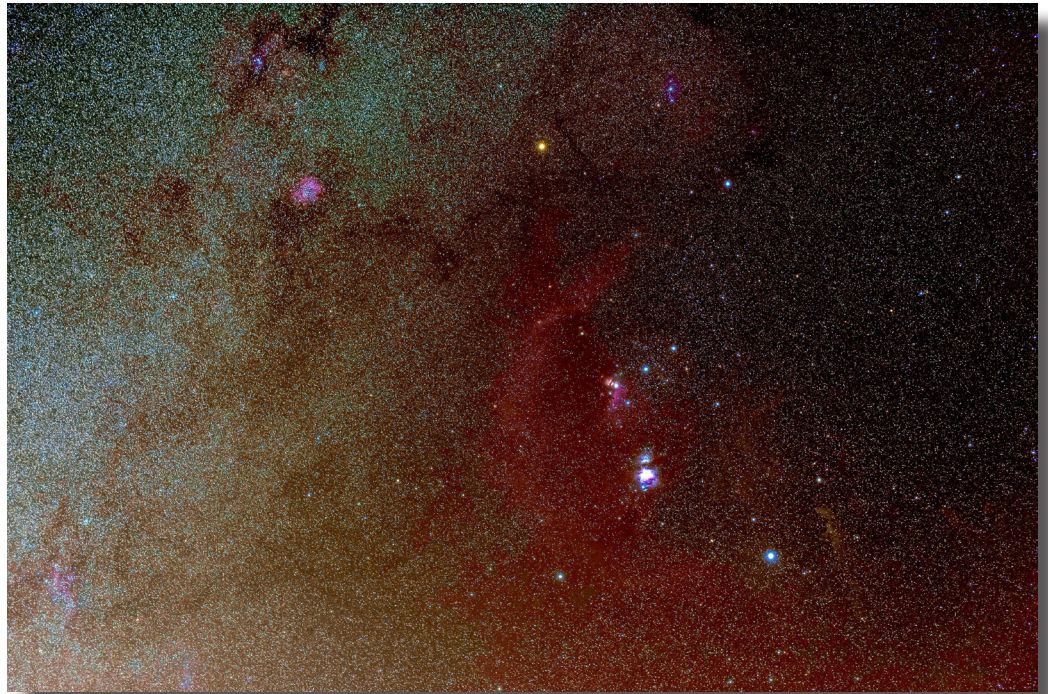
Nikon D810 camera and 500mm F/8 mirror lens & 50mm Sigma lens guided on my AstroTrac.

First quarter Moon



MEMBERS GALLERY (continued)

Orion and surroundings
50mm



Images by Todd Hargis

Nikon D810 camera and 500mm F/8 mirror lens & 50mm Sigma lens guided on my AstroTrac.

Horsehead Nebula
Nikon D810, 500mm f/8



MEET RON CARMAN

By Michael E. Marotta

“When I can see the Owl Nebula with my six-incher, I know that I have a dark sky.”

Ron Carman lives ten miles west of San Marcos. In addition to his six-inch $f/8$ reflector, he owns an 8-inch, and a 10-inch that he built himself in 1991, his first serious telescope. “Something I made actually worked,” he quips. (Although he builds his own telescopes, he does not grind his own mirrors. “Where do you get it aluminized?” he asks rhetorically.) Those are all Dobsonians. His observatory instrument is a 14-inch equatorial fork mount Schmidt Cassegrain. But the six-inch remains his “go to” scope because it is the easiest to carry around. For instance, he often volunteers at San Marcos Academy, where, in fact, he attended the fifth grade years ago.

Like many of us, Ron’s passion for the sky is deeply rooted in his childhood. He remembers the night that “we went out to look at the Moon with my grandparents in 1949. I was seven years old. In Tulsa in 1951 a friend of my father’s had a 6-inch reflector. After my first view of Saturn, I was hooked.”

His first telescope was a 5X bird-watcher from Sears. His first astronomical scope was a small refractor, in his teens. “It was supposed to be 400 power,” he says. But, as we know, it was not much good past 100x. Nevertheless, it did show him the Moon, Jupiter and Saturn.

It was then that he started studying the sky seriously. “After Mars’s close in pass in 1956, I saw a movie, *Forbidden Planet*, that took place on a planet orbiting Altair, and I found out that there really is such a star, and I found out how to locate it. That was my start to learning the sky.”

Growing up in Bartlesville, Oklahoma, a town relatively as small back then as it is now, Ron was a charter member of the Bartlesville Moon Watchers. Their object was not Luna but the first space satellites: those were the days of Sputnik and Vanguard. They did their satellite catching out in the countryside. Their club became the Bartlesville Astronomical Society.



Left: Ron at EEO

Right: Ron at San Marcos Academy with their 10-inch reflector

CARMAN (continued)

In 2000, Ron earned a Messier Award from the Astronomical League for finding all 110 Messier objects “without using a telrad or finder scope,” he says. In addition, he was granted Universe Sampler Award #3 from the Astronomical League. To win that, he located 15 of the 21 brightest stars. (He finally got them all by going to Mexico.) He also located a comet, seven of the then-nine planets, nebulae, double stars and other objects required to earn the pin in 1997. He later earned a Binocular Messier Award in 2004.

Working for the Federal Aviation Administration as an air traffic controller, and earning his certification as a commercial pilot, Ron lived in Houston for many years, in the glare of the Houston Intercontinental Airport. Still his sky gazing continued, and he was a charter member of the North Houston Astronomy Club. When he retired, he moved to central Texas. He joined the AAS on September 10, 2004. “The Austin Astronomical Society made me feel welcome from the start,” he

says. (Editor’s note: Ron has served as AAS President, Vice-President, and Secretary.)

Today, Ron still volunteers at star parties at San Marcos Academy. He also helped with the Night Sky Festival at Dripping Springs. He highly recommends H. A. Rey’s *The Stars: A New Way to See Them*. In that he is not alone. Many advanced and senior amateurs cite the “Curious George” alternative to the formulaic presentations of the constellations found in most distillations of academic astronomy. Ron also helped install the telescopes at the George Observatory in Brazos Bend State Park in 1989-1990.

“Learn the sky” is his best advice for beginners. “Know your way around the sky. We were all novices at one time.”

(With this article, Michael Marotta begins a series of articles about AAS members.)

Ron at EEO



GRAVITATIONAL WAVE ASTRONOMY WILL BE THE NEXT GREAT SCIENTIFIC FRONTIER

By Ethan Siegel

Imagine a world very different from our own: permanently shrouded in clouds, where the sky was never seen. Never had anyone see the Sun, the Moon, the stars or planets, until one night, a single bright object shone through. Imagine that you saw not only a bright point of light against a dark backdrop of sky, but that you could see a banded structure, a ringed system around it and perhaps even a bright satellite: a moon. That's the magnitude of what LIGO (the Laser Interferometer Gravitational-wave Observatory) saw, when it directly detected gravitational waves for the first time.

An unavoidable prediction of Einstein's General Relativity, gravitational waves emerge whenever a mass gets accelerated. For most systems -- like Earth orbiting the Sun -- the waves are so weak that it would take many times the age of the Universe to notice. But when very massive objects orbit at very short distances, the orbits decay noticeably and rapidly, producing potentially observable gravitational waves. Systems such as the binary pulsar PSR B1913+16 [the subtlety here is that binary pulsars may contain a single neutron star, so it's best to be specific], where two neutron stars orbit one another at very short distances, had previously shown this phenomenon of orbital decay, but

gravitational waves had never been directly detected until now.

When a gravitational wave passes through an object, it simultaneously stretches and compresses space along mutually perpendicular directions: first horizontally, then vertically, in an oscillating fashion. The LIGO detectors work by splitting a laser beam into perpendicular "arms," letting the beams reflect back and forth in each arm hundreds of times (for an effective path lengths of hundreds of km), and then recombining them at a photodetector. The interference pattern seen there will shift, predictably, if gravitational waves pass through and change the effective path lengths of the arms. Over a span of 20 milliseconds on September 14, 2015, both LIGO detectors (in Louisiana and Washington) saw identical stretching-and-compressing patterns. From that tiny amount of data, scientists were able to conclude that two black holes, of 36 and 29 solar masses apiece, merged together, emitting 5% of their total mass into gravitational wave energy, via Einstein's $E = mc^2$.

During that event, more energy was emitted in gravitational waves than by all the stars in the observable Universe combined. The entire Earth was compressed by less than the width of a



proton during this event, yet thanks to LIGO's incredible precision, we were able to detect it. At least a handful of these events are expected every year. In the future, different observatories, such as NANOGrav (which uses radiotelescopes to the delay caused by gravitational waves on pulsar radiation) and the space mission LISA will detect gravitational waves from supermassive black holes and many other sources. We've just seen our first event using a new type of astronomy, and can now test black holes and gravity like never before.

This article is provided by NASA Space Place. With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit spaceplace.nasa.gov to explore space and Earth science!

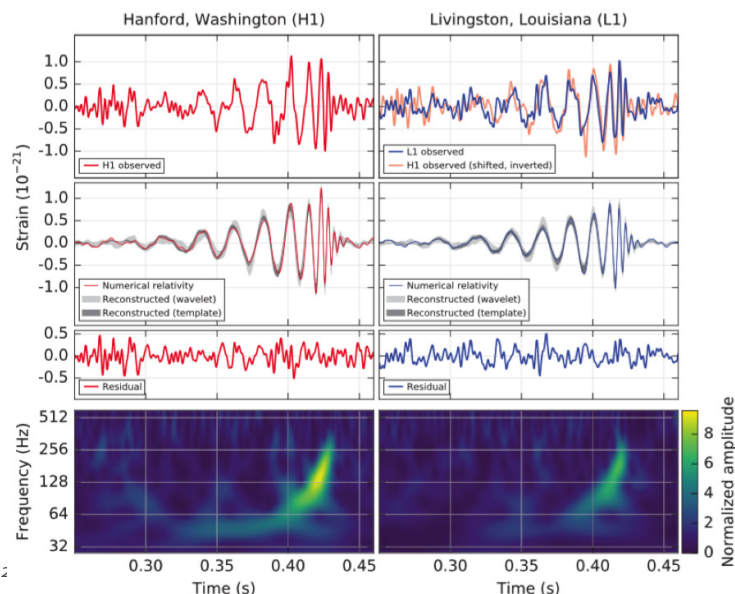


Image credit: Observation of Gravitational Waves from a Binary Black Hole Merger B. P. Abbott et al., (LIGO Scientific Collaboration and Virgo Collaboration), Physical Review Letters 116, 061102 (2016).

JOINING AAS OR RENEWING MEMBERSHIP

To join or renew your membership to AAS, please visit: <http://austinastro.wildapricot.org/JoinAAS>

AAS memberships run from 9/1 to 8/31 and there are five membership levels to choose from:

Household \$40.00 (USD)

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No recurring payments. For members of a household living at the same address.

Junior \$15.00 (USD)

Subscription period: 1 year on September 1st

No recurring payments. For members up to age 18.

Students \$15.00 (USD)

Subscription period: 1 year on September 1st

No recurring payments. For members age 18 and older.

Regular \$25.00 (USD)

Subscription period: 1 year on September 1st

No recurring payments. For individual members.

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