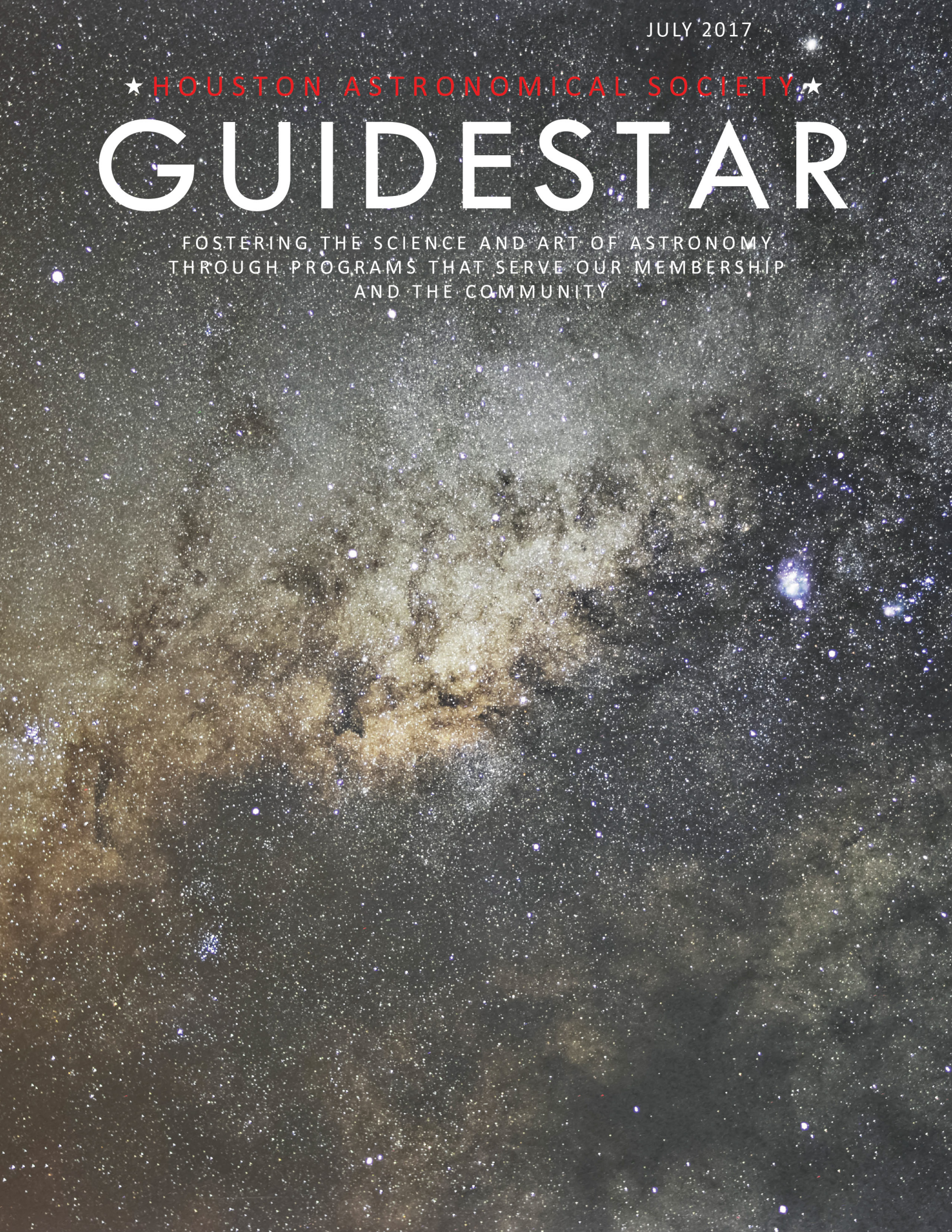
JULY 2017

★ HOUSTON ASTRONOMICAL SOCIETY ★

GUIDESTAR

FOSTERING THE SCIENCE AND ART OF ASTRONOMY
THROUGH PROGRAMS THAT SERVE OUR MEMBERSHIP
AND THE COMMUNITY



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ABOUT THE COVER

The Milky Way from the HAS Member Photo Galleries of Edgar Najera (Dark Site Pictures 1.0) taken in June of 2016.

JULY 7, 2017 GENERAL MEETING

GENERAL MEETING TOPIC | The Insperity Observatory At Humble ISD By Dr. Aaron Clevenson

Aaron Clevenson has been an adjunct astronomy professor for the past 12 years with Lone Star College - Montgomery. He is the author of the astronomy textbook Astronomy for Mere Mortals. He is also the Observatory Director at the Insperity Observatory in Humble ISD, is the immediate past president of the North Houston Astronomy Club, and is a retired Chair of Astronomy Day in Southeast Texas. He is one of the Observing Program Directors with the Astronomical League and is responsible for working with the coordinators of the 53 different Observing Programs and Awards. He is the author of the Constellation Hunter Observing Programs, the Galileo Observing Program, The NASA Observing Challenges, the Planetary Transit Special Observing Awards, and most recently the Solar Eclipse 2017 Special Observing Award. He currently Coordinates the Master Observer Progression for the Astronomical League.

Aaron's first astronomy related event that he can remember is from when he was 6 years old. His older sister built him a solar observatory from a cardboard refrigerator box to view a solar eclipse using pinhole projection. His interest in astronomy persisted until about 20 years ago when he purchased his first telescope. And he became "one with the universe" at that time.

His philosophy of astronomy is best described by his quote near the door of the Insperity Observatory which says, "The Universe awaits all those who make the journey. Enter here!"

NOVICE MEETING – INTRO TO ASTROPHOTOGRAPHY

By John Haynes

If you know nothing about astrophotography; if you've asked someone like John (naively) about hooking your camera to a telescope, then this presentation is for you. This will be the absolute beginner's guide.

He will (very briefly) discuss types of Astrophotography (AP) targets, equipment used for each, and how such images are processed. The idea is to help people understand the scope of what AP involves before they jump in with both feet.

John grew up under fairly clear, dark skies in the High Desert of California where he took his first star trail photos in about 1992. He joined HAS in 2009 and soon afterwards bought his first "real" telescope. Since then he's been learning astrophotography through trial and error and with the help and input of several more experienced HAS members and a lot of time researching on the internet. He claims not to be the world's biggest expert, but he's proud of having learned a lot along the way. You can see some of his work on his website at http://astro.jmhastronomy.com

CALENDAR

JULY 2	8:00 a.m.	Juno at opposition
JULY 7	7:00 p.m.	HAS Novice Meeting, U of H
	8:00 p.m.	HAS General Meeting, U of H
JULY 8	11:07 p.m.	Full Moon
JULY 15	7:30 p.m.	WSIG/TX45, Dark Site
JULY 16	2:26 p.m.	Last Quarter Moon
JULY 19	7:00 p.m.	VSIG Meeting, Mendenhall Community Center
JULY 22		Prime Night, Dark Site
JULY 23	4:46 a.m.	New Moon
JULY 30	12:00 a.m.	Mercury at greatest elongation E
	10:23 a.m.	First Quarter Moon
AUGUST 4	7:00 p.m.	HAS Novice Meeting, U of H
	8:00 p.m.	HAS General Meeting, U of H
AUGUST 7	1:11 p.m.	Full Moon
AUGUST 12	2:00 p.m.	Perseid meteors peak
AUGUST 14	8:15 p.m.	Last Quarter Moon
AUGUST 16	7:00 p.m.	VSIG Meeting, Mendenhall Community Center
AUGUST 19		Prime Night, Dark Site
AUGUST 21	1:30 p.m.	New Moon
AUGUST 26	7:15 p.m.	Novice Lab, Dark Site
AUGUST 29	3:13 a.m.	First Quarter Moon

SEND CALENDAR EVENTS TO DOUG MCCORMICK SKYGAZER10@SBCGLOBAL.NET FOR THE LATEST INFORMATION ON CLUB EVENTS, GO TO **ASTRONOMYHOUSTON.ORG**

OTHER MEETINGS

JOHNSON SPACE CENTER ASTRONOMICAL SOCIETY | jscas.net

Meets in the the Lunar and Planetary Institute on the 2nd Friday of each month.

FORT BEND ASTRONOMY CLUB | fbac.org/club_meetings.htm.

Meets the third Friday of the month at 8:00 p.m. at the Houston Community College Southwest Campus in Stafford, Texas.

NORTH HOUSTON ASTRONOMY CLUB | astronomyclub.org

Meets at 7:30 p.m. on the 4th Friday of each month in the Teaching Theatre of the Student Center at Kingwood College. Call 281-312-1650 or E-mail bill.leach@nhmccd.edu.

BRAZOSPORT ASTRONOMY CLUB

Meets the third Tuesday of each month at the Brazosport planetarium at 7:45 p.m. The Brazosport planetarium is located at 400 College Boulevard, Clute, TX, 77531. For more information call 979-265-3376.

HAS MEETINGS

All meetings are at the University of Houston Science and Research building. See the last page for directions to the location and more information.

NOVICE MEETING

7:00 P.M. room 117 Science & Research 1 Bldg

GENERAL MEETING

8:00 P.M room 117 Science & Research 1 Bldg

GENERAL MEMBERSHIP MEETING

The Houston Astronomical Society holds its regular monthly General Membership Meeting on the first Friday of each month, unless rescheduled due to a holiday or a conflict with other events at the University of Houston.

BOARD OF DIRECTORS MEETING

The Board of Directors Meeting is held on dates and at locations scheduled by the board. Information provided to GuideStar will be published. The meetings are open to all members of the Society in good standing. Attendance is encouraged.

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GuideStar_HAS

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HAS BOARD MEETING

HAS Board meetings are scheduled regularly. All members are invited to attend these meetings, but only board members can vote on issues brought before the board. Meetings are held at the Trini Mendenhall Community Center (1414 Wirt Road) at 6:30 p.m. on the date specified the calendar.

DO YOU HAVE A "FOREVER" SCOPE?

What I mean is a single, last (if need be) telescope that would see you through aperture fever, maintenance issues, portability concerns, possible moves, could be set up alone and would have really, really nice optics.

The forever scope must also have some basis in reality. I met up with reality this year at the Dark Site when I became an observatory telescope operator. One requirement of the TO is being able to close the observatory roof in an emergency. In case of power failure, for example, the roof and south window must be closed manually using the wall-mounted hand winch. This requires a lot of muscle, or failing that, dogged determination and time. Though I passed this test, I realized I'd never again be able to knock out 20 pushups as in my girlhood days and thereby my dream of a 20+ inch truss Dob was forever gone.

Happily, a new contender recently fell into my lap: an 11-inch f/4.3 Starmaster reflector. The Starmaster is no longer made, or more properly, crafted, so when one comes available it's snapped up quickly. The Starmaster was billed as a portable telescope, and while there are many even more portable telescopes now, the unique truss and mirror/rocker box design of the Starmaster reflector ensures rock steady viewing and balance when the easily lifted sections are fitted together. This Starmaster "shorty" version allows me to view the zenith flatfooted and for every other part of the sky, I can observe comfortably seated. The Starmaster is also outfitted with a Zambuto mirror and Starlight Feather Touch focuser.

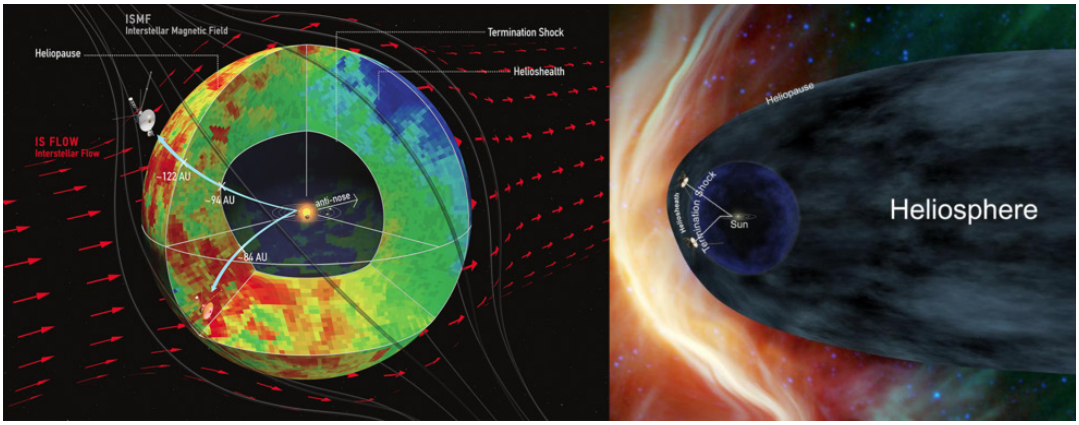
Obviously this new-to-me telescope was previously owned, which as a rule, I don't do. The thing about getting a used telescope is one needs the time, knowledge, and persistence to get it into working order, a learning curve one generally doesn't face with a new scope.

So far, I've run into problems fitting the trusses singlehanded, the secondary mirror has four adjustment screws, not three, the Bob's Knobs I ordered don't fit due to one funky design year change, the focuser works nicely but slips on the cage, and that beautiful mirror is not only dirty, but looks to have a couple of scratches. When I release it from its mirror box to clean it, I'll know for certain. In any case, I'm excited about developing the skills it will take to get her in shape and keep her that way.

With all this care and attention, I feel called upon to give her a name. Naming a telescope seems a new trend at HAS, particularly by members of the Women's Special Interest Group. The owners of Astraea and Stella are WSIG members—I believe I'll follow these women's lead. My forever scope will have to give me a hint about her name herself, though. Maybe the work will be straightforward and a simple Astra will do. If more involved, and I hope so, a more befitting name may spring to mind, like Athena from Zeus' forehead.

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!

THE SHAPE OF THE SOLAR SYSTEM By Marcus Woo



Caption: New data from NASA's Cassini and Voyager show that the heliosphere — the bubble of the sun's magnetic influence that surrounds the solar system — may be much more compact and rounded than previously thought. The image on the left shows a compact model of the heliosphere, supported by this latest data, while the image on the right shows an alternate model with an extended tail. The main difference is the new model's lack of a trailing, comet-like tail on one side of the heliosphere. This tail is shown in the old model in light blue. Image credits: Dialynas, et al. (left); NASA (right)

When Stamatios (Tom) Krimigis was selected for the Voyager mission in 1971, he became the team's youngest principal investigator of an instrument, responsible for the Low Energy Charged Particles (LECP) instrument. It would measure the ions coursing around and between the planets, as well as those beyond. Little did he know, though, that more than 40 years later, both Voyager 1 and 2 still would be speeding through space, continuing to literally reshape our view of the solar system.

The solar system is enclosed in a vast bubble, carved out by the solar wind blowing against the gas of the interstellar medium. For more than half a century, scientists thought that as the sun moved through the galaxy, the interstellar medium would push back on the heliosphere, elongating the bubble and giving it a pointy, comet-like tail similar to the magnetospheres—bubbles formed by magnetic fields—surrounding Earth and most of the other planets

"We in the heliophysics community have lived with this picture for 55 years," said Krimigis, of The Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland. "And we did that because we didn't have any data. It was all theory."

But now, he and his colleagues have the data. New measurements from Voyager and the Cassini spacecraft suggest that the bubble isn't pointy after all. It's spherical.

Their analysis relies on measuring high-speed particles from the heliosphere boundary. There, the heated ions from the solar wind can strike neutral atoms coming from the interstellar medium and snatch away an electron. Those ions become neutral atoms, and ricochet back toward the sun and the planets, uninhibited by the interplanetary magnetic field.

Voyager is now at the edge of the heliosphere, where its LECP instrument can detect those solar-wind ions. The researchers found that the number of measured ions rise and fall with increased and decreased solar activity, matching the 11-year solar cycle, showing that the particles are indeed originating from the sun.

Meanwhile, Cassini, which launched 20 years after Voyager in 1997, has been measuring those neutral atoms bouncing back, using another instrument led by Krimigis, the Magnetosphere Imaging Instrument (MIMI). Between 2003 and 2014, the number of measured atoms soared and dropped in the same way as the ions, revealing that the latter begat the former. The neutral atoms must therefore come from the edge of the heliosphere.

If the heliosphere were comet-shaped, atoms from the tail would take longer to arrive at MIMI than those from the head. But the measurements from MIMI, which can detect incoming atoms from all directions, were the same everywhere. This suggests the distance to the heliosphere is the same every which way. The heliosphere, then, must be round, upending most scientists' prior assumptions.

It's a discovery more than four decades in the making. As Cassini ends its mission this year, the Voyager spacecraft will continue blazing through interstellar space, their remarkable longevity having been essential for revealing the heliosphere's shape.

"Without them," Krimigis says, "we wouldn't be able to do any of this."

To teach kids about the Voyager mission, visit the NASA Space Place: **https://spaceplace.nasa.gov/voyager-to-planets**

ASTRONOMERS PROVE WHAT SEPARATES TRUE STARS FROM WANNABES 5 June 2017 | Austin

Astronomer Trent Dupuy of The University of Texas at Austin has shown what separates true stars from wannabes. Not in Hollywood, but in the whole universe. He will present his research today in a news conference at the semi-annual meeting of the American Astronomical Society in Austin.

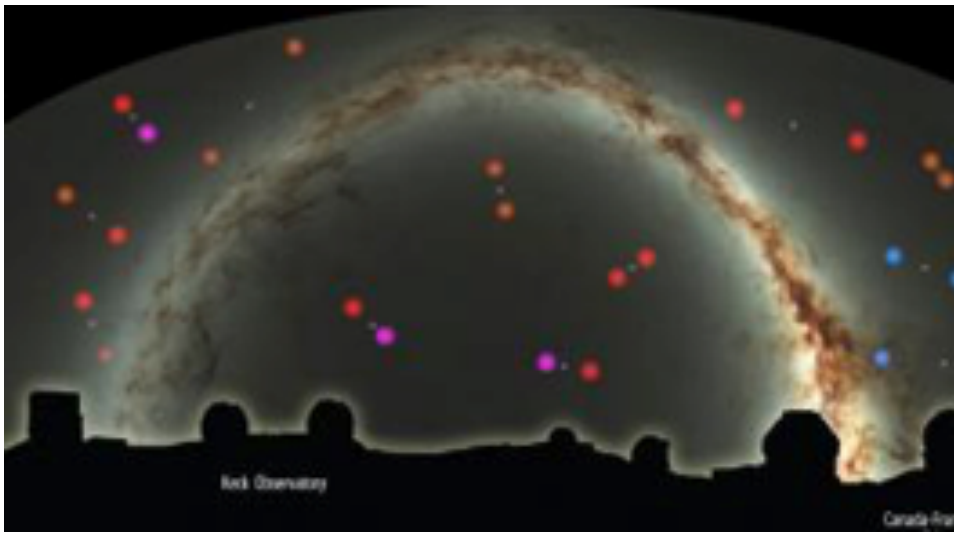
"When we look up and see the stars shining at night, we are seeing only part of the story," Dupuy said. "Not everything that could be a star 'makes it,' and figuring out why this process sometimes fails is just as important as understanding when it succeeds."

Stars form when a cloud of gas and dust collapses under gravity, and the resulting ball of matter is hot enough and dense enough to sustain nuclear fusion at its core. Fusion produces huge amounts of energy — it's what makes stars shine. In the Sun's case, it's what makes most life on Earth possible.

But not all collapsing gas clouds are created equal. Sometimes, the collapsing cloud results in a ball that isn't dense enough to ignite fusion. These 'failed stars' are known as brown dwarfs.

This definition that separates stars from brown dwarfs has been around for a long time. In fact, astronomers have had theories about how massive the collapsing ball has to be in order to form a star (or not) for more than 50 years. However, the dividing line in mass has never been confirmed by experiment.

Now a team led by Texas astronomer Trent Dupuy has done just that. He and Michael Liu of the University of Hawaii found that an object must weigh at least 70 Jupiters in order to ignite fusion. If it weighs less, the light does not switch on. It's a brown dwarf.



This image shows several of the binaries from this study, each orbiting around its center of mass, which is marked by an 'x.' Colors indicate surface temperatures, from warmest to coolest: gold, red, magenta, or blue. The background image is a map of the entire sky visible from Hawaii and a silhouette of Mauna Kea (home of Keck Observatory and the Canada-France-Hawaii Telescope, where this study was conducted over the past decade). Each binary is shown roughly where it is located in the night sky. The actual sizes of these orbits on the sky are very small (about one billionth the area covered by each 'x'), but the orbit sizes shown in the animation are accurate relative to each other. The animation is also in extreme fast-forward; each second corresponds to approximately two years of real time. (Credit: Trent Dupuy/Karen Teramura/PS1SC) You can see the animation at: https://www.youtube.com/watch?v=YX3hSaBO2rM

How did they reach that conclusion? For a decade, Dupuy and Liu studied 31 faint binaries (pairs of either brown dwarfs or the lowest mass stars that orbit each other) using two powerful telescopes in Hawaii — the Keck Observatory and the Canada-France-Hawaii Telescope — as well as data from the Hubble Space Telescope.

Their goal was to find out the masses of the objects in these binaries, since mass defines the boundary between stars and brown dwarfs. Astronomers have been using binaries to measure masses of stars for more than a century. To determine the mass of a binary, one measures the size and speed of the stars' orbits around an invisible point between them where the pull of gravity is equal, called the "center of mass." However, binary brown dwarfs orbit much more slowly than binary stars, due to their lower masses. And because brown dwarfs are dimmer than stars, they can only be well-studied with the world's most powerful telescopes.

To measure their masses, Dupuy and Liu collected images of the faint binaries over several years, tracking their orbital motion using high-precision observations. They used the 10-meter Keck Telescope, along with its laser guide star adaptive optics system, and the Hubble Space Telescope to obtain the extremely sharp images needed to distinguish the light from each object in the pair.

However, the price of such zoomed-in, high-resolution images is that there is no reference frame to identify the center of mass. Wide-field images from the Canada-France-Hawaii Telescope containing hundreds of stars provided the reference grid needed to measure the center of mass for every system. Such data also yielded a precise distance to each system. Because these faint binary pairs are much closer to the Earth than other stars in the images, they appear to move back and forth slightly every year as Earth orbits the

Sun (an effect called "parallax"), and the exact amounts they move can be used to compute their distances.

The result of the decade-long observing program is the first large sample of brown dwarf masses.

"As they say, good things come to those who wait. While we've had many interesting brown dwarf results over the past 10 years, this large sample of masses is the big payoff. These measurements will be fundamental to understanding both brown dwarfs and stars for a very long time," Liu said.

The information they have assembled has allowed them to draw a number of conclusions about what distinguishes stars from brown dwarfs.

Objects heavier than 70 Jupiter masses are not cold enough to be brown dwarfs, implying that they are all stars powered by nuclear fusion. Therefore 70 Jupiters is the critical mass below which objects are fated to be brown dwarfs. Their determination for the mass dividing line is somewhat lower than theories had predicted but still consistent with the latest models of brown dwarf evolution.

In addition to the mass cutoff, they discovered a surface temperature cutoff. Any object cooler than 1,600 Kelvin (about 2,400 degrees Fahrenheit) is not a star, but a brown dwarf.

This work will help astronomers understand the conditions under which stars form and evolve — or sometimes fail. In turn, the success or failure of star formation has an impact on how, where, and why solar systems form.

This research will be published soon in The Astrophysical Journal Supplement.

— END —

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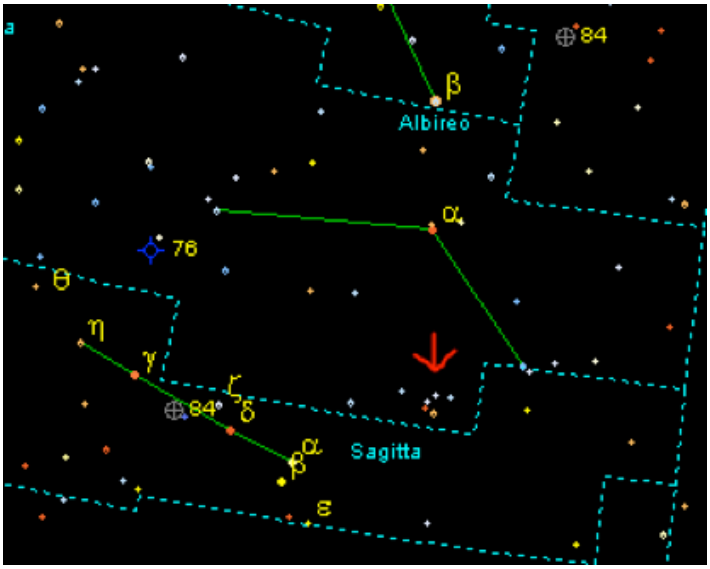
STARDATE.ORG/MAGAZINE

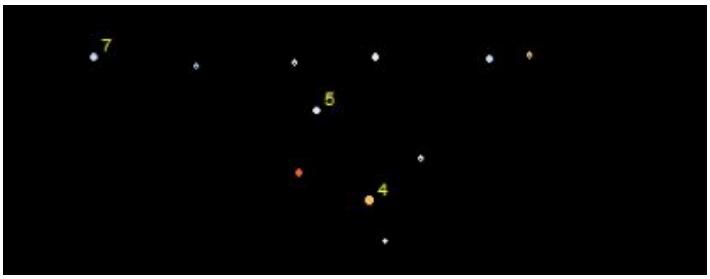
ASTERISMS – COAT HANGER, COLLINDER 399

Asterism: a grouping of stars that form a recognizable pattern.
Constellation: Vulpecula
Right Ascension: 19 h, 26 m 12s
Declination: 20o 06' 00"
Magnitude: 3.6
Size: 60' (minutes)

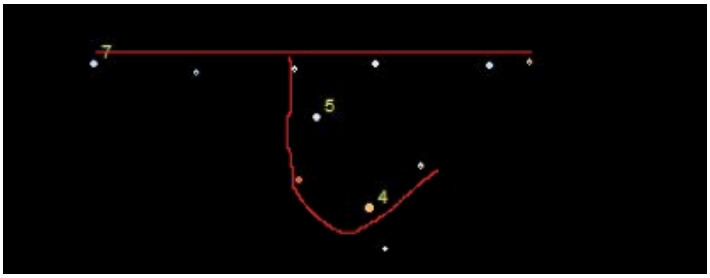
The "Coat Hanger" is a group of stars in the constellation Vulpecula, between Cygnus and Sagitta. It is easily located between the star Albireo in Cygnus and the 2 brightest stars in Sagitta: Alpha and Beta. This open cluster has the official names of Collinder 399 (CR 399) and OCL 113 (Open Cluster).



This object is seen easier in binoculars than with a telescope. And is a good object at public outreach events if you use binoculars.



This object was featured on "Astronomy Picture of the Day" on Dec 23, 2008. Here is a link: https://apod.nasa.gov/apod/ap081223.html



The H.A.S. GuideStar is published monthly by the Houston Astronomical Society. All opinions expressed herein are those of the contributor and not necessarily of Houston Astronomical Society. The monthly Meeting Notice is included herein. GuideStar is available on the HAS web site to all members of H.A.S., and to persons interested in the organization's activities. Contributions to GuideStar by members are encouraged. Electronic submission is helpful. Submit the article in text, unformatted MS-Word format via email GuideStar@astronomyhouston.org. Copy must be received by the 15th of the month for inclusion in the issue to be available near the end of the same month. Or, bring copy to the General Membership Meeting and give it to the Editor, or phone to make special arrangements. Contact the editor for writting guidelines.

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THE GUIDESTAR IS THE WINNER OF THE
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MABEL STERNS NEWSLETTER AWARD

MEMBER PROJECTS SPOTLIGHT

Image courtesy of wikimedia.org

We want to spotlight the astronomical projects and observations that you are working on.

Send us an email at **GUIDESTAR@ASTRONOMYHOUSTON.ORG** and tell us. Whether it be a specific research project in astronomy that you're working on, an astro league observing program, an astrophotography project, or something else, let us know so we can let the rest of the society know.

GUIDESTAR ADVERTISING POLICIES

PERSONAL ADVERTISEMENTS

- Members in good standing of the Houston Astronomical Society (HAS) may request that an ad be placed in the GuideStar for personal items (for sale or wanted).
- Items offered for sale must be of interest to amateur astronomers.
- No more than two telescopes may be advertised within any calendar year.
- Ads will not run for more than 3 consecutive months
- Ads will be run on a space-available basis.
- Ads must be provided to the editor in electronic format (email, text file) by the 15th of the month preceding the month-of-issue.

COMMERCIAL ADVERTISEMENTS

- Advertisement sizes:

o Full page = 6.875"w x 9"h
o Half page = 6.875"w x 4.25" h
o Quarter page = 3.31" w x 4.25" h (allows for column gutter)

- Commercial advertisements will be run in the GuideStar at the following fee schedule:

Size	One time	One quarter (3 consecutive months)
Full page	$100.00	$250.00
Half page	$50.00	$125.00
Quarter page	$25.00	$62.50

- Artwork provided must be in electronic format (image file, PDF, etc.) and must be in the correct proportions to fit the space provided. Contact editor with questions.
- Artwork may be in color or in black and white.
- Items or services advertised must be of interest to amateur astronomers
- Payment for advertisements must be done in advance (pay to the 'Houston Astronomical Society')

HOUSTON ASTRONOMICAL SOCIETY

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The Houston Astronomical Society is a non-profit corporation organized under section 501 (C) 3 of the Internal Revenue Code. The Society was formed for education and scientific purposes. All contributions and gifts are deductible for federal income tax purposes. General membership meetings are open to the public and attendance is encouraged.

CHECK THE WEBSITE

ASTRONOMYHOUSTON.ORG

The HAS website not only has news and information about our society, but also a variety of features to manage your membership and connect with other club members.

Current members can post photos, trade gear, pay dues, manage discount magazine subscriptions, swap stories in the forum, and more.

Questions about the site? Need a hand to get your account set up? Contact webmaster@astronomyhouston.org.

The HAS web site is the winner of the 2012 Astronomical League award for excellence

THE HOUSTON ASTRONOMICAL SOCIETY welcomes you to our organization.

The HAS is a group of dedicated amateur astronomers, most of whom are observers, but some are armchair astronomers.

The benefits of membership are:

- Access to our 18 acre observing site west of Houston -- a great place to observe the universe!
- A telescope loaner program -- borrow a HAS telescope and try observing for yourself!
- A monthly novice meeting, site orientation meeting, and general meeting with speakers of interest. Access to meeting videos on the HAS web site.
- Opportunities to participate in programs that promote astronomy to the general public (such as Star Parties at schools)
- A yearly all-clubs meeting for Houston area organizations
- Meet other amateurs and share experiences, learn techniques, and swap stories

You're invited to attend our next meeting. You'll have a great time!

All members have the right to participate in Society functions and to use the Observatory Site. Regular and Student Members receive a subscription to The Reflector. The GuideStar, the monthly publication of the Houston Astronomical Society is available on the web site. Associate Members, immediate family members of a Regular Member, have all membership rights, but do not receive publications. Sustaining members have the same rights as regular members with the additional dues treated as a donation to the Society. Sky & Telescope and Astronomy magazines are available to members at a discount.

MEMBERSHIP APPLICATION

You can join (or renew at the organization web site, www.astronomyhouston.org. Click the 'Join HAS' Tab. Send funds to address shown on last page of GuideStar. Attention - Treasurer, along with the following information: Name, Address, Phone Number, Special Interests in Astronomy, Do you own a Telescope? (If so, what kind?), and where you first heard of H.A.S.

EVENT NOTIFICATION OR CANCELLATION

HAS uses RAINEDOUT.NET to communicate late breaking updates about our various events. . Message delivery is via text messaging and e-mail. There are several ways to subscribe. If you would like to receive these notices via text messaging directly to your phone, subscribe to any of the sub-groups which interest you.

RainedOut notices will also automatically be sent to our e-mail list. Note that regular e-mail list conversations are not part of RainedOut communications and will not be sent to your phone as part of this service. Instructions to sign up for the e-mail list (a great way to keep your finger on the pulse of the club) are found here: http://www.astronomyhouston.org/about/email-list.

To receive text messages, send any or all of the following (one at a time) to 84483

OUTREACH Public Outreach Events
STARPARTY Members only star Parties
URBAN Urban Observing Events
MEETINGS HAS Meetings

You will receive a confirmation message back for each successful enrollment.

For more information, please visit www.RainedOut.net.

DIRECTIONS TO MEETING

From I-45 going south (from downtown)

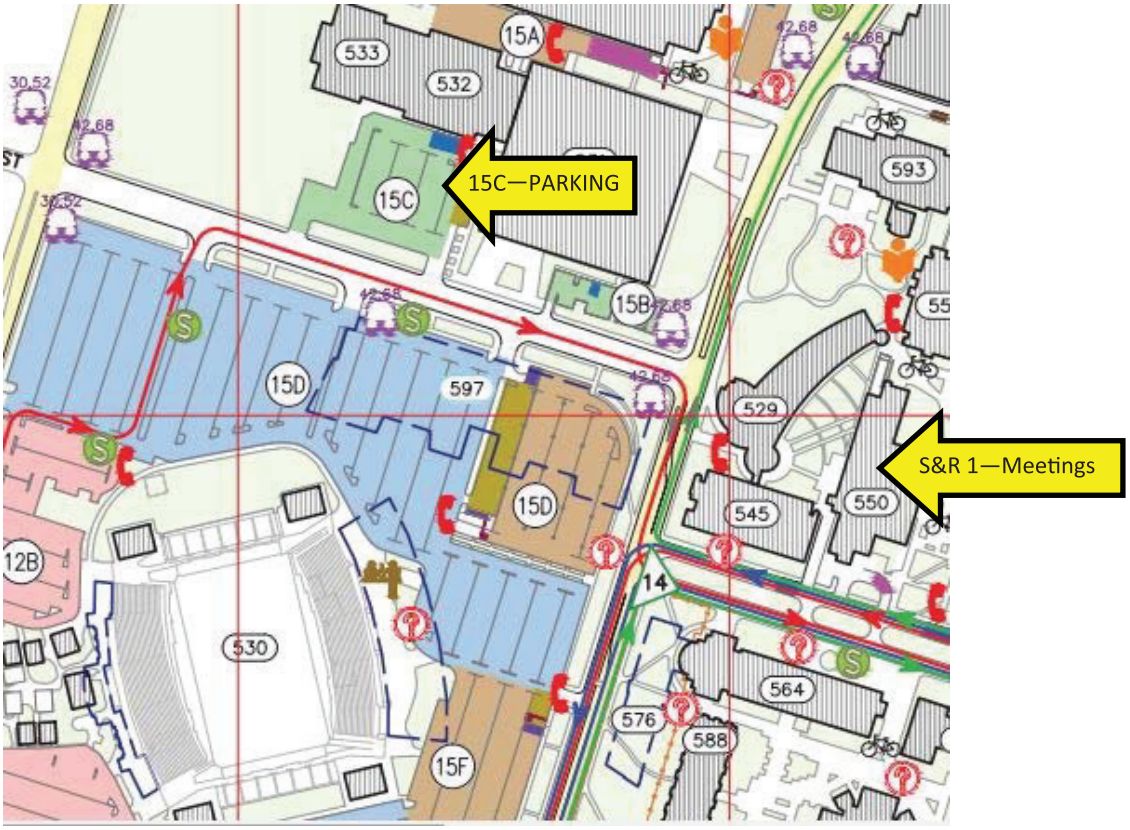
- exit at Cullen Boulevard
- turn right on Cullen
- turn right on Holman Street; the parking lot is past the Hoffeinz Pavilion
- Science and Research is across the street (2nd building back)

From I-45 going north (from NASA/Galveston)

- exit at Cullen Boulevard
- turn left on Cullen
- turn right on Holman Street; the parking lot is past the Hoffeinz Pavilion
- Science and Research is across the street (2nd building back)

PARKING AT THE UNIVERSITY OF HOUSTON MAIN CAMPUS

For the monthly Houston Astronomical Society Meeting
The map below shows the location of the 15C parking lot, west of Cullen Boulevard on Holman Street.

The map is from the University of Houston web site and identifies the lot that is available for parking while attending the Houston Astronomical Society monthly meeting. This parking is available from 6:30 p.m. until 10:00 p.m. on the Friday night of the HAS meeting (usually the first Friday of the month).

This parking is free. If you get a notice from the UH campus police on the night of the meeting, call the UH Security office and let them know that this area has been made available on HAS meeting night by the Parking Department.