# \*HOUSTON ASTRONOMICAL SOCIETY\* GUIDESTAR CHAMPIONING THE ART AND SCIENCE OF ASTRONOMY



# **AT THE JUNE 3<sup>RD</sup> MEETING** HOUSTON SCIENCE & ENGINEERING FAIR WINNERS



In the June Meeting, as in past June meetings, you will be hearing presentations from the winners of the HAS Special Awards given at the 2016 Houston Science and Engineering Fair. The event was held in late February. Below is a list of 5 of the winners that have agreed to speak and the titles of their project:

#### **ANDREW CIANCIOLO**

"UV Light Will Take Your Sight"

#### **AARYAN SHENOY**

Photographic Emulsions in Gratzel Cells"

#### ANIRUDH SURESH

"Modeling Sharp Jumps in Flux Tube Entropy in the Earth's Magnetosphere"

#### **NITHIN PARSAN**

"Applying Kirigami Design to Create NextGen Sun Tracking Solar Panels"

#### HASNAIN KHAN AND MUJTABA HUSSAIN

"Novel EHD Devices and Their Use with Spacecraft"

Also, if time allows, Steve Goldberg will give us a summary of the events that transpired at the 2016 Texas Star Party.

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NOAA'S JOINT POLAR SATELLITE SYSTEM (JPSS) TO REVOLUTIONIZE EARTH-WATCHING

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**

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### CALENDAR -JUNE 3 2:00 A.M. SATURN AT OPPOSITION 7:00 P.M. HAS NOVICE MEETING @ U OF H 8:00 P.M. HAS GENERAL MEETING @ U OF H **JUNE 4** 10:00 P.M. NEW MOON PRIME **NIGHT, COLUMBUS JUNE 5** 4:00 A.M. MERCURY AT GREATEST **ELONGATION WEST JUNE 12** 3:10 A.M. FIRST QUARTER MOON JUNE 20 6:02 A.M. FULL MOON 5:34 P.M. SUMMER SOLSTICE **JUNE 29** 1:19 P.M. LAST QUARTER MOON JUNE 30 7:30 P.M. NOVICE LAB, COLUMBUS

JULY 1 7:00 P.M. HAS NOVICE MEETING @ U OF H 8:00 P.M. HAS GENERAL MEETING @ U OF H **JULY 2 PRIME NIGHT. COLUMBUS JULY 4** 6:01 A.M. NEW MOON JULY 7 11:00 A.M. PLUTO AT **OPPOSITION JULY 12** 7:52 P.M. FIRST QUARTER MOON **JULY 19** 5:57 P.M. FULL MOON 6:30 P.M. HAS BOARD MEETING, **TRINI MENDENHALL COMMUNITY CENTER JULY 29** 6:00 P.M. LAST 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.

## 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

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Houston Astronomical Society

GuideStar\_HAS

STARLINE 832-go4-HASO 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.

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.

## HOUSTON ASTRONOMICAL SOCIETY DIRECTORY

#### **DIRECTORS AT LARGE**

JESSICA KINGSLEY gnjkingsley@att.net

BILL KOWALCZYK bill.kowalczyk.has@gmail.com

JUSTIN MCCOLLUM mccollumjj@gmail.com

DEBBIE MORAN debbiemoran@earthlink.net H:713.774.0924 C:713.562.7670

BRAM WEISMAN bram@weisman.us

#### OFFICERS

PRESIDENT RENE GEDALY president@astronomyhouston.org

VICE PRESIDENT ED FRANI vp@astronomyhouston.org

SECRETARY MARK HOLDSWORTH secretary@astronomyhouston.org

TREASURER DON SELLE treasurer@astronomyhouston.org

#### COMMITTEE CHAIRPERSONS

AUDIT SCOTT MITCHELL audit@astronomyhouston.org

EDUCATION & OUTREACH DEBBIE MORAN & JOE KHALAF education@astronomyhouston.org outreach@astronomyhouston.org FIELD TR./OBSG STEPHEN JONES FTO@astronomyhouston.org

MEMBERSHIP JESSICA KINGSLEY & BILL KOWALCZYK membership@astronomyhouston.org

NOVICE DEBBIE MORAN novice@astronomyhouston.org H:713-774-0924 C:713-562-7670

OBSERVATORY MIKE EDSTROM observatory@ astronomyhouston.org P: 832-689-4584

PROGRAM JUSTIN MCCOLLUM program@astronomyhouston.org

PUBLICITY BRAM WEISMAN publicity@astronomyhouston.org

TELESCOPE ALLEN WILKERSON telescope@astronomyhouston.org P: 832- 265-4773

#### AD-HOC COMMITTEE CHAIRPERSONS

AL COORDINATOR DOUG MCCORMICK astroleague@astronomyhouston.org

AUDIO/VISUAL MICHAEL RAPP AV@astronomyhouston.org

GUIDESTAR BOB WIESNER guidestar@astronomyhouston.org

TEXAS 45 COORDINATOR RENE GEDALY texas45@astronomyhouston.org TEXAS STAR PARTY STEVE GOLDBERG tsp@astronomyhouston.org H: 713 385 4072

OBSERVATORY & TRAILER SPOT BOOKING STEVE GOLDBERG HASbooking@astronomyhouston.org

VIDEOGRAPHY ROB MOREHEAD vrt@astronomyhouston.org

WEB TECHNOLOGY MARK FERRAZ webmaster@astronomyhouston.org

URBAN OBSERVING STEVE MUNSEY urbanobserving@astronomyhouston.org

#### **ADVISORS**

DR. REGINALD DUFOUR Rice University

DR. LAWRENCE PINSKY University of Houston

DR. LAWRENCE ARMENDAREZ University of St. Thomas

#### 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.

### PRESIDENT'S LETTER BY RENE GEDALY



I often use this space to keep you informed of HAS events and the members who make them eventful. It's a pleasure for me to write and I hope you enjoy reading it. We're all members, all contributors, to this amazing club.

#### SUMMERTIME, HAStronomy TIME

It's summertime and our personal calendars are more fluid with family vacations and impromptu doings. Hopefully we can still make time for astronomy and our friends at HAS. As usual we'll have our monthly speakers, featured on the GuideStar front page. And like Katz's Deli, the HAS Observatory never closes. Work continues on the new bunkhouse, and when it's done, many of us will be able to observe late, sack out in comfort, and travel home in daylight. On behalf of crew chief Bill Kowalczyk, the Observatory Committee, and the Women's SIG, let me invite you to be part of its construction. The next work party is Saturday morning June 4th.

As for club business, summertime is fallow time for the committees, a time to regroup and check plans against the balance of the year. Still, it's a favorite time for observing despite the short nights. Is there anything more splendid, or more relaxing, than to view the summer Milky Way from a lounge chair? But maybe you're in the mood for just a bit more of a hunt. SATURN AT OPPOSITION JUNE 2/3

# Fully illuminated by the sun at opposition and visible all

night, Saturn's rings will be especially bright due to the Seeliger Effect. Unlike the Gegenschein, the effect will be obvious to see, especially as you continue to observe Saturn's rings throughout the summer.

#### THE SOLAR SYSTEM

View Jupiter and Mars in the evening, Mercury, Uranus, and Neptune in the morning, and Saturn all night long. Venus is lost in the solar glare and won't reappear until early July after sunset. Ceres and Pluto are also worth a try. OMEGA CENTAURI

This globular cluster, the largest in the Milky Way, is on everyone's bucket list and we're lucky enough to be able to see it well from the dark site. Starting June 1st in full darkness, look due south one fist's width up from the horizon (about 13°). The bigger the scope the better the view but even with binoculars you can see its splendor. You've still got a good shot through June 7th before the moon gets in the way and then again beginning June 24th though it's setting fast.

## FROM THE EDITOR BY BOB WIESNER

#### TARGETS IN THE SUMMER SKY

The winter sky may be the most recognizable with such easy and spectacular targets as Orion, the Orion Nebula, Sirius, the Pleiades, the Hyades – and on and on... But the summer sky is rich with the Milky Way, the Summer Triangle, the beautiful constellation of Scorpius, my favorite double star (because of the name) Zubenelganubi in Libra.

The President's Message has some good tips. Check for special astronomical events in the bi-monthly calendar on page 2. And always read the Shallow Sky of the Month for some good information on interesting targets.

#### DARK ENERGY

The McDonald Observatory and Hobby Eberly Telescope (HET) is gearing up to start an ambitious project to research the so-called Dark Energy.



As UT Astronomer Karl Gebhardt explains, "The phrase "dark energy" is indicative of our misunderstanding of how the universe expands over time. Dark energy may not be dark and it may not be energy – it's the phrase we use to explain our ignorance."

To me, the term dark energy is a reminder of the terms "aether" and "phlogiston" that were once used by scientists to explain past ignorance. This will be an exciting time in astronomy and physics in general. The scientists and engineers working on this project have developed a suite of 150 spectrographs that they will mount to the HET. The 150 spectrographs will be able to take roughly 1,900 spectra per minute. The target is to take over one million spectra in the course of 2 years. These spectra will provide data needed to see in more detail the nature of our universe. Perhaps the knowledge will eventually spawn a completely new understanding. Watch for future articles in the newsletter on this fascinating subject.

#### **ARTICLES IN THE REFLECTOR**

As part of your membership to HAS, you should be receiving the Reflector. A periodical published by the Astronomical League. The June edition is out now with some very good articles. One in particular I read entitled "Advanced Binocular Double Star Program: Tuning your Bino for Peak Performance. I'm nowhere near working on advanced double star observing with binoculars. However, the article was interesting in that it summarized how the author tweaked, ie reengineered his binoculars for better stabilization in order to reduce shake, to combat dew which is apparently a particularly challenging issue when using binoculars and improve performance by adding light baffles. It was a good reminder that much of this hobby is about working on the instruments you use to make your observations. Much of the enjoyment in Astronomy can come from learning about and enhancing your instrument(s) in addition to pointing them at the sky. Be on the lookout for future programs scheduled at HAS meetings that address this type of subject. If you haven't yet, learning more about telescopes and the instruments used with them is a way to build depth into your astronomical knowledge.

## **OBSERVATORY CORNER** BY: MIKE EDSTROM

## AND THE WORK HAS BEGUN!!



Thanks to all that came out on Saturday May 21st the exterior walls and the one interior wall of the females and families bunkhouse are up. We will meet again soon. Keep an eye on the netslyder for date and time.

#### SUMMER TIME IS HERE

Well at least it feels like summer, the temperature is rising and so is the humidity. That means several things, mosquitoes, bugs and fire ants among other things. Please be prepared and cautious when at the Dark Site and bring plenty of water or your favorite sports drink to keep hydrated!!

Summer constellations are up and waiting for you at the Columbus Dark Site, hope to see you there soon.

If you find any issues while at the site, please be sure to e-mail me so we can take care of them.

## NOVICE PRESENTATION BY DEBBIE MORAN

In June with both Mars and Saturn near opposition at the time, Scott Mitchell, a master sketcher will give a presentation called "The Art of Observing." Even if you never plan to pick up a pencil, learning how the observer sketches at the eyepiece will train you to see detail in your observations. Scott is always an entertaining speaker. You won't want to miss this one!

## **MEMBER PROJECTS**

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.



# THE GUIDESTAR IS THE WINNER OF THE 2012 ASTRONOMICAL LEAGUE MABEL STERNS NEWSLETTER AWARD

#### SHALLOW SKY OBJECT OF THE MONTH

ELTANIN — GAMMA DRA BY BILL PELLERIN

OBJECT: Eltanin, Gamma Dra, 33 Dra CLASS: Star CONSTALLATION: Draco (the dragon or serpent) MAGNITUDE: 2.24 R.A.: 17 h, 56 m, 36 s DEC: 51° 29' 20" SIZE/SPECTRAL: K5 DISTANCE: 150 ly OPTICS NEEDED: Unaided eye

In the rather dim constellation of Draco, this star is the brightest at magnitude 2.24. Beta Dra (Rastaban), which should be brighter is 2.9 magnitude, and Alpha Dra (Thuban), which should be brighter than either of these two shines at 3.6 magnitude. So much for Bayer designations being in order of magnitude.

Thuban has the distinction of having been the 'Polaris' (pole star) around 3942 BC, so it's likely that the designation of it as the Alpha star is because of its position, not its brightness.

The star lies about 14.5 degrees north and a little west (333 degree position angle) of the star Vega, which shines at 0.0 magnitude and is easy to find in the summer sky. Find Eltanin by drawing a line from Altair to Vega and on to Eltanin.

At 1.7 solar masses, this star is a low mass star. Although the dividing line between low and high mass stars is not easily pinned down, there is general agreement that stars above 8 solar masses deserve to be recognized as high mass stars.

This is an 'evolved' star, as the astronomers who study stellar evolution would say. When they say such a thing they mean that the star has moved off the main sequence (it is past mid-life), to one of the giant phases to become a red giant or an AGB (Asymptotic Giant Branch) star. Its size has swelled to about 50 times the size of our sun and has a temperature at its photosphere of about 4000 K (Kelvin). (Our Sun has a temperature at the photosphere of about 6000 K.)



Finder chart above. Star charts generated by TheSkyX © Software Bisque, Inc. All rights reserved. www.bisque.com

It's color, K, gives away some secrets. In the scale of OBAFGKM, this star is near the red end of the spectrum and its color should be easy to see when compared to nearby stars. (Photographs show this color distinctly.)

The fate of this star is the same as the fate of our Sun — to become a giant star (twice—once on the red giant branch and once on the Asymptotic Giant Branch) before throwing off its outer layers to become a planetary nebula.

This star along with its neighbor, Rastaban, form the eyes of Draco the dragon.

What's the brightest star in the sky? Trick question — the \Sun is the brightest star. The next brightest star is Sirius, the dog star in Canis Major. Because Eltanin is moving toward us, in only 1.5 million years, it will outshine Sirius. At that time, it'll be about half the distance from us that it is now. This assumes that the absolute magnitudes of the two stars doesn't change in that period.

# SCIENTISTS EXPECT 'UNEXPECTED' FROM LARGEST GROUND-BASED TELESCOPE

## FROM THE MCDONALD OBSERVATORY - GEORGE PUTIC

The mirror of the Hubble Space Telescope that gave the world stunning pictures of deep space is about 4.5 square meters.

Compare that with the primary mirror of the James Webb Space Telescope, which will be 25 square meters - and which is creating big expectations for even higher-quality results when it is deployed in 2018.

But both will be dwarfed by the Giant Magellan Telescope, which is under construction in Chile's Atacama Desert. Its mirror array covers about 368 square meters.

By looking at different parts of the visible and infrared spectrums, the two new telescopes will complement each other, Magellan Telescope director Patrick McCarthy said.

### **'COMPLETE PICTURE'**

"The two working together, I think, will give us a complete picture, whether we are looking at planets around nearby stars, black holes in the centers of other galaxies, or back to that early universe that we call the First Light, when we see the first stars in the first galaxies," McCarthy said.



FILE - NASA's Hubble Space Telescope unveiled in stunning detail a small section of the expanding remains of a massive star that exploded about 8,000 years ago.

To isolate it from vibrations, the 1,200-ton telescope will rest on an oil flotation bearing system, completely free of any friction. A range of cameras and spectrographs will record and dissect the received light, looking for signatures of atoms and molecules. And the light coming from billions of kilometers away may be impossibly faint.

"The photons come in once every 15 to 20 minutes, so it takes a long time to collect that light," McCarthy said. "In our case, we think we'll get a few photons a minute, but you need hundreds to get a good signal, so it just takes patience."

#### WHAT TO EXPECT

But with a telescope sensitive enough to detect a birthday candle on the moon, nobody knows what to expect.

"The most important is the unexpected," McCarthy said. "The new discoveries, the unanticipated breakthroughs. That's always been the story of astronomy. When you build a new capability, young people find things that either no one expected, or they prove that their elders were wrong."

The \$1 billion joint project of the U.S., Australia, Brazil, South Korea and Chile is expected to open for the first observations by 2022 and be fully operational by 2026.

COURTESY OF THE UNIVERSITY OF TEXAS AT AUSTIN **MCDONALD** OBSERVATORY, PUBLISHER OF STARDATE MAGAZINE STARDATE.ORG/MAGAZINE

## NOAA'S JOINT POLAR SATELLITE SYSTEM (JPSS) TO REVOLUTIONIZE EARTH-WATCHING BY ETHAN SIEGEL



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!

If you want to collect data with a variety of instruments over an entire planet as quickly as possible, there are two trade-offs you have to consider: how far away you are from the world in question, and what orientation and direction you choose to orbit it. For a single satellite, the best of all worlds comes from a low-Earth polar orbit, which does all of the following:

- orbits the Earth very quickly: once every 101 minutes,
- is close enough at 824 km high to take incredibly high-resolution imagery,
- has five separate instruments each probing various weather and climate phenomena,
- and is capable of obtaining full-planet coverage every 12 hours.

The type of data this new satellite – the Joint Polar Satellite System-1 (JPSS-1) -- will take will be essential to extreme weather prediction and in early warning systems, which could have severely mitigated the impact of natural disasters like Hurricane Katrina. Each of the five instruments on board are fundamentally different and complementary to one another. They are: 1. The Cross-track Infrared Sounder (CrIS), which will measure the 3D structure of the atmosphere, water vapor and temperature in over 1,000 infrared spectral channels. This instrument is vital for weather forecasting up to seven days in advance of major weather events.

2. The Advanced Technology Microwave Sounder (ATMS), which assists CrIS by adding 22 microwave channels to improve temperature and moisture readings down to 1 Kelvin accuracy for tropospheric layers.

3. The Visible Infrared Imaging Radiometer Suite (VIIRS) instrument, which takes visible and infrared pictures at a resolution of just 400 meters (1312 feet), enables us to track not just weather patterns but fires, sea temperatures, nighttime light pollution as well as ocean-color observations.

4. The Ozone Mapping and Profiler Suite (OMPS), which measures how the ozone concentration varies with altitude and in time over every location on Earth's surface. This instrument is a vital tool for understanding how effectively ultraviolet light penetrates the atmosphere.

5. Finally, the Clouds and the Earth's Radiant System (CERES) will help understand the effect of clouds on Earth's energy balance, presently one of the largest sources of uncertainty in climate modeling. The JPSS-1 satellite is a sophisticated weather monitoring tool, and paves the way for its' sister satellites JPSS-2, 3 and 4. It promises to not only provide early and detailed warnings for disasters like hurricanes, volcanoes and storms, but for longerterm effects like droughts and climate changes. Emergency responders, airline pilots, cargo ships, farmers and coastal residents all rely on NOAA and the National Weather Service for informative shortand-long-term data. The JPSS constellation of satellites will extend and enhance our monitoring capabilities far into the future.



Images credit: an artist's concept of the JPSS-2 Satellite for NOAA and NASA by Orbital ATK (top); complete temperature map of the world from NOAA's National Weather Service (bottom).



## FOR SALE | RV-6 DYNASCOPE PORTABLE 6-INCH REFLECTOR

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Excellent condition. Powerful enough to view into the moon, to see "Belts of Jupiter, Markings on Mars, Saturn's rings, Fine surface details on the Moon, double stars, galactic nebulae, major star clusters and many other wonders.

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**LOCATION** 4 miles south of the intersection Highway 290 west and Highway 36 south in Brenham.

**CONTACT** Kay Palacios | alacios@yahoo.com | 832-978-5201

#### HOUSTON ASTRONOMICAL SOCIETY

P.O. Box 800564 Houston, TX 77280-0564

#### 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.

#### **GUIDESTAR INFORMATION**

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.

Editing & Production: Bob Wiesner | 713-240-7059 GuideStar@astronomyhouston.org 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! MEETING ON FRIDAY | MAY 6, 2016

7:00 Novice Meeting, room 116 Science & Research 1 Bldg 8:00 General Meeting, room 117 Science & Research 1 Bldg University of Houston

#### **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:

(3 consecutive months)

Size	One time	One quarter
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')

## PARKING AT THE UNIVERSITY OF HOUSTON MAIN CAMPUS

#### **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.

