Houston Astronomical Society
Championing the art and science of Astronomy

GuideStar

April, 2016

April, 2016

Volume 35, #4

At the April 1 Meeting

April Presentation

The All New and Improved Burke-Baker Planetarium

Presented by: James Wooten, Planetarium Astronomer, Houston Museum of Natural Science

Summary: As you may know, the Burke-Baker Planetarium closed on December 18, 2015 and reopened on March 11. Come hear about all the improvements we made to make our theater among the best in the world.

May Presentation

HAS is happy to announce that **Stephen Hawking** has accepted an invitation to speak at the May meeting. This is an exciting event and we hope to see you all there. **Please turn to page 3 in the Guidestar for details.**

The Houston Astronomical Society is a member of the Astronomical League.

The *GuideStar* is the winner of the 2012 Astronomical League Mabel Sterns Newsletter award.

Highlights:

HAS Web Page:

http://www.AstronomyHouston.org

See the *GuideStar's* Monthly Calendar of Events to confirm dates and times of all events for the month, and check the Web Page for any last minute changes.

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

Novice meeting: ·····**7:00 p.m.**

Presentation for April"
See page 9

General meeting: ·····**8:00 p.m**

See last page for directions

and more information.

The Houston Astronomical Society

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.

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Dr. Lawrence Pinsky	University of Houston
Dr. Lawrence Armendarez	University of St. Thomas

Annual Dues and Membership Information

Regular	$36
Associate	$6
Sustaining	$50
Student	$12
Honorary	n/c

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.

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GuideStar deadline for the May issue is April 18th

Other Meetings...

Johnson Space Center Astronomical Society meets in the the Lunar and Planetary Institute on the 2nd Friday of each month. Web site: www.jscas.net

Fort Bend Astronomy Club meets the third Friday of the month at 8:00 p.m. at the Houston Community College Southwest Campus in Stafford, Texas http://www.fbac.org/club_meetings.htm. Novice meeting begins at 7:00 p.m., regular meeting begins at 8:00 p.m. Website: http://www.fbac.org

North Houston Astronomy Club 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-mailbill.leach@nhmccd.edu. Web site: www.astronomyclub.org

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 web site: www.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.

May Presentation Details: APRIL FOOLS !!!

(From page 1)

President's Message

by Rene Gedaly

You're reading this column in the *GuideStar*, so it seems fitting to lead with news about its changing of the guard.

The *GuideStar* has a new editor

Bill Pellerin, editor and publisher of the HAS *GuideStar* for two decades and some, has turned over the reins to new editor ***Bob Wiesner***. So many of us over the years have looked forward to finding out about club doings and reading informative articles in the *GuideStar* each month. Bill has done an exemplary job keeping us informed and educated. In fact, he's done such a good job we honored him last board meeting with the **President's Exemplary Service Award**. After the award, Bill introduced us to his successor Bob Wiesner who's also a great guy. We're looking forward to him continuing a longstanding HAS tradition.

Thank you, Bill. Welcome, Bob.

Ed Fraini: VP Facilitator

One of the advantages of membership in HAS is that its members bring with them some great skills. One of these members is ***VP Ed Fraini***, and I'm not talking about the skills he puts to use at the dark site or the observing chops he's honing as he makes his way to AL Master Observer status. No, I'm talking about the skills he brings from his day job, professional leadership development.

Disruptive leadership is what Ed calls our style. Disruptive in the very best sense, he's quick to add. Yes, we've been changing but it's been in a reasoned, methodical, albeit occasionally bumpy way. We won't always be in this mode. Promise. In fact, things are starting to gel. Just take a look at our Vision statement. It sounds simple but it will inform every action the committees, directors, and officers take.

> *To promote learning about the universe through programs that foster awareness of the art and science of astronomy*

Don't get dropped. Renew your membership by Mar 31

The dues grace period is almost up and the membership database will soon be purged (yikes). On April 1st; no fooling. We're an active organization and tight knit; we'd miss you if you left.

We hold seminars at UH for those new to astronomy and for those with more experience. You can find an observing opportunity almost every week now—they're publicized on the ever expanding website events calendar. Our dark-sky site hosts educational programs for members, guests, and scouts. And don't forget all that's available to you members who live online. You have access to recorded presentations, member photo galleries, discount magazine subscription rates and reduced rate software. And, this is a biggie, only members have access to the private HAS Facebook group. What a freewheeling space that is. Don't miss out. Renew today.

HAS Women Meet 'n Greet

It's a get together for HAS Women Sunday April 17th beginning at 2 pm. Where? Centrally located at Amelia Goldberg's home. Join us for a little food & drink and a lot of just plain getting to know one another. Details and RSVP on the events calendar.

Not a member yet? Send an email and ask to join: info@astronomyhouston.org.

Site Orientation Now Online!

Thanks to all who made this happen. Thank you even though you're now requiring us to pass an online test to prove we learned what ***John Haynes*** intended we should when he gave site orientation in person at UH. With progress comes the added convenience of online orientation, but also yearly testing. That's right; all site users need to pass the test to get the new year's site code. Uh, that reminds me… Mike, I think I need to take the test.

*As special thank you to **Mark Ferraz** and the **Web Technology team**. Folks, it takes a lot of hard work to make it easy for the rest of us.*

Keep Looking Up

..Rene Gedaly

President

April / May

Calendar

Date	Time	Event
April		
1	7:00 p.m.	HAS Novice Meeting, U of H
	8:00 p.m.	HAS General Meeting, U of H
2		Prime Night, Columbus
7	6:24 a.m.	New Moon
13	10:15 p.m.	First Quarter Moon
18	9:00 a.m.	Mercury at greatest elongation east
22	12:24 a.m.	Full Moon
	1:00 a.m.	Lyrid meteors
26	3:00 p.m.	Asteroid 3 Juno at opposition
29	10:39 a.m.	Last Quarter Moon
30	7:30 p.m.	Novice Lab, Columbus
May		
6	2:30 p.m.	New Moon
	7:00 p.m.	HAS Novice Meeting, U of H
	8:00 p.m.	HAS General Meeting, U of H
7		Prime Night, Columbus
9		Transit of Mercury!
13	12:02 p.m.	First Quarter Moon
21	4:14 p.m.	Full Moon
22	6:00 a.m.	Mars at opposition
24	6:30 p.m.	HAS Board Meeting, Trini Mendenhall Community Center
29	7:12 a.m.	Last Quarter Moon

Send calendar events to Doug McCormick - skygazer10@sbcglobal.net

For the latest information on club events, go to http://www.astronomyhouston.org/

HAS Board Meeting

HAS Board meetings are scheduled regularly (see the calendar, above). 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.

Follow the *GuideStar* on Twitter at:

GuideStar_HAS

Join Facebook and look for:

Houston Astronomical Society

Starline

Call 832-go4-HAS0 (**832-464-4270**) for the latest information on the meeting and other information about activities within the HAS.

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 as follows:

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

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

Text Message	***Alerts about...***
OUTREACH	Public Outreach Events
STARPARTY	Members Only Star Parties (HAS observ-
URBAN	Urban Observing Events
MEETINGS	HAS Meetings

You may also enroll your phone numbers or individual e-mail addresses via the website:

Here's a shortened link to get you there: http://goo.gl/evrGsR

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

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.

A New GuideStar Editor

By Bill Pellerin

It has been a pleasure and an honor to be your *GuideStar* editor. This assignment has allowed me to meet, work with, and get to know as friends many Houston Astronomical Society members and officers. Putting the publication together each month has been fun, and I've had the opportunity to research various subjects for articles and get a first look at content provided to me by various presidents, observatory chairs, program chairs, and many other writers (including Don Selle, our treasurer).

Clayton Jeter has been a major contributor to this newsletter, and I thank him for his interview articles (over 100) over the years. I look forward to reading more interviews from him in the future.

In 2012, HAS president Gordon Houston, with help from Bill Flanagan nominated the *GuideStar* for the Astronomical League's *Mabel Sterns Newsletter Award.* The *GuideStar* was recognized by that award, and I'm very grateful to have received it on behalf of the HAS.

Most rewarding, however, was being able to be of service to the members of the HAS.

Now, a new editor has taken on the *GuideStar.* This editor is Bob Wiesner. Bob and I met and went over how the publication is put together, and last night (3/15/16) Bob and I attended the HAS board meeting so that he could be formally introduced to the leadership team.

I believe that Bob has the skill and dedication required to assure that you get an exciting new issue every month.

Our president, Rene Gedaly gave me an 'Exemplary Service Award' certificate at the board meeting, for which I am very grateful.

I'm not going away, though. I have agreed to:

- Continue to supply 'Shallow Sky' observing pages to the *GuideStar*
- Re-edit and make some of these observing articles available via the Astronomical League web site. Begin looking for those to appear soon at astroleague.org.

Thank you all for your support and encouragement, and please continue to provide Bob with that support going forward.

A Few Words from the New GuideStar Editor

By Bob Wiesner

I want to thank Bill for putting this publication together each month for the length of time he did it. I got plenty of information and enjoyment reading it in the past. I hope to be able to continue to provide the same level of quality for all the members in the future. Needless to say, I'm a little intimidated. But, I'm also very excited about the possibilities.

Just a few extra words:

Observatory Corner —

Don't forget to take your test so you can get the gate combination next month. I took it and passed the first time so it can't be that difficult.

Besides I learned some things. I can now talk to my neighbors about the Bortle classification of the skies above our houses; and I learned of some new product and supply suggestions as to where to buy red color overlays necessary to eliminate my white light emissions at the dark site—very essential for everybody. So, check it out.

***Telescope*—Science Channel program about JWT**

I recently watched a documentary on the Science Channel called Telescope. It was about the development of the James Webb Telescope that is due to be launched into space in October 2018.

The show explains that in 1948, before anybody had ever launched anything into space, Lyman Spitzer, a professor at Yale proposed to put a telescope into space.

In 1990, the Hubble Telescope fulfilled that vision. After a dramatic fix that needed to be completed due to a faulty mirror, the Hubble began to reveal objects beyond astronomers most optimistic projections. It discovered more than 10,000 new galaxies that we didn't, up until that time, know even existed.

The James Webb Telescope is 100 times more powerful than the Hubble and will be perched at a point a million miles away from the earth (between Earth and Mars orbits). Imagine what this telescope will reveal. And this is just one of many telescopes being built at this time.

What an exciting time it is to be involved in Astronomy. And what a good time it is to be involved with the Houston Astronomical Society where we can learn about and discuss these types of developments.

Observatory Corner

By Mike Edstrom, Observatory Director

After the Observatory Committee meeting on March 5th great progress was made on the frame for the floor of the new bunkhouse at the Dark Site. Next step will be installing the rebar and pouring the concrete.

Please keep in mind that the gate code will be changed on April 2nd. In order to get the new code you will need to follow these instructions: you need to go to the website www.astronomyhouston.org, sign in, click on the "About the Society" tab at the top of the first page then click on the "Our Observatory" tab and follow the directions below. I will no longer be handing out gate code cards at the meetings. We will also no longer have orientation classes at the monthly meetings. This allows all members to attend the Novice sessions at the monthly meetings, it also gives you a refresher course in Dark Site usage.

On the "Our Observatory" page, you will get this additional content, given the following conditions:

- You have been a member for more than 60 days (2 months) and are a paid member for the current year.

Don't yet have your site certification for the current year.

Observatory and Site Access

The HAS Dark Site is available to all members in good standing who have:

1. Paid their current year's dues.
2. Have been a member for a minimum of 2 months.
3. Completed the online **site orientation course.**

The HAS observatory building is available to individuals who have been a member at least six months, who are in good standing, and who have completed the **observatory training course.** The training course, run by John Haynes, runs from afternoon through evening and is held on a new-moon weekend, please contact John Haynes for more details. You'll need to bring a sack lunch and a notebook.

Contact observatory director Mike Edstrom for more information.

To book observatory telescopes and/or weekend trailer slot, contact Steve Goldberg.

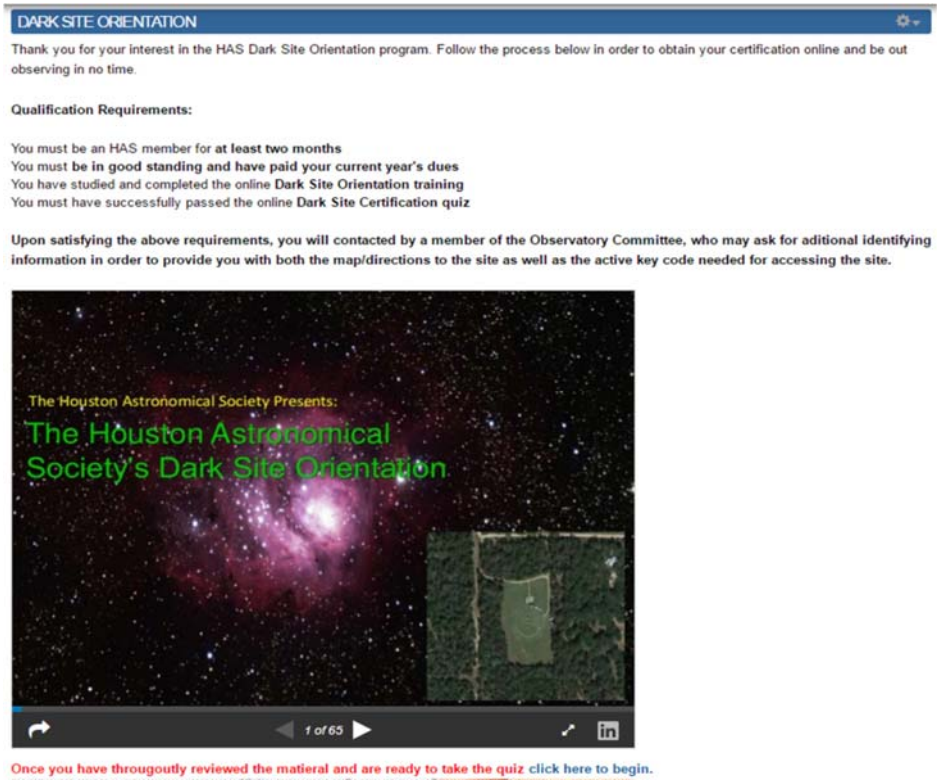
ATTENTION ALL MEMBERS: please review the HAS Internet Usage Policy Rule for the Columbus Dark Sky Site.

DARK SITE ORIENTATION MEMBERS LINK

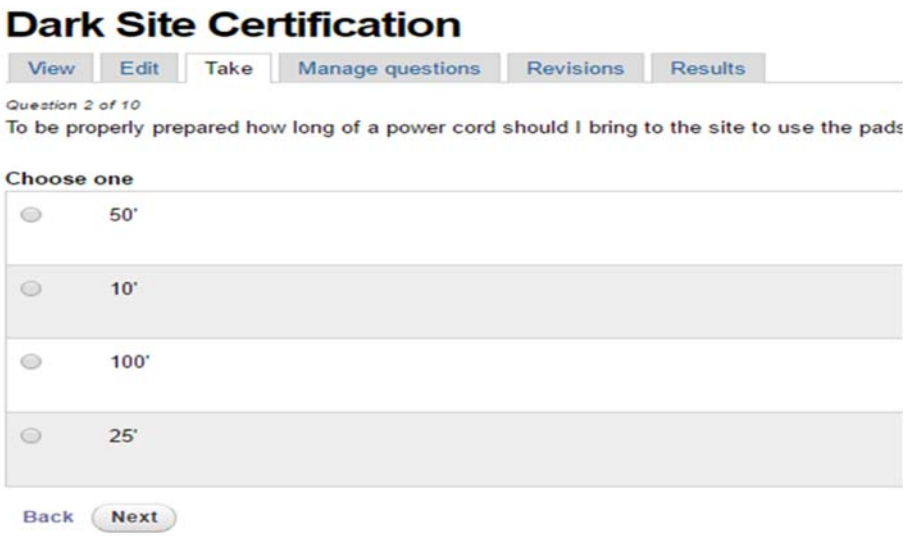
Dark Site Orientation can now be completed online. Please click below to begin...

START YOUR TRAINING

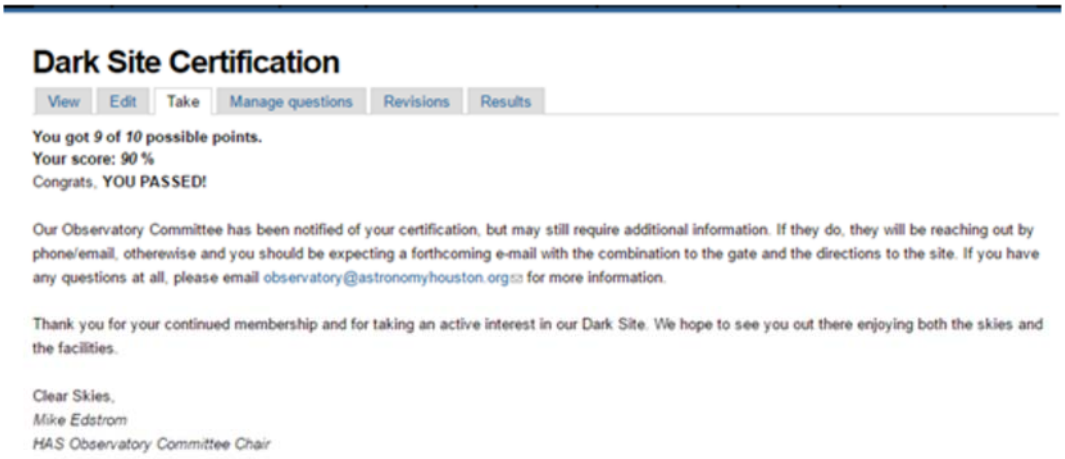
Then you will go to the training page. It's here you will be presented the orientation materials for your review and study, after which you may follow the link at the bottom of the page to proceed to the certification quiz.



This is the Quiz, only 10 random questions right now, but we expect that to grow with time. You only get 3 tries at this. Thenyou will need to contact Mike Edstrom at observatory@astronomyhouston.org. You will proceed through each question, like so:



Complete each question. Upon finishing, you will either pass or fail. If you fail, you will be directed back to the orientation materials for further study. When you pass, you will see this:



Dark Site Certification

View | Edit | Take | Manage questions | Revisions | Results

You got *9* of *10* possible points.
Your score: *90* %
Congrats, **YOU PASSED!**

Our Observatory Committee has been notified of your certification, but may still require additional information. If they do, they will be reaching out by phone/email, otherwise and you should be expecting a forthcoming e-mail with the combination to the gate and the directions to the site. If you have any questions at all, please email observatory@astronomyhouston.org for more information.

Thank you for your continued membership and for taking an active interest in our Dark Site. We hope to see you out there enjoying both the skies and the facilities.

Clear Skies,
Mike Edstrom
HAS Observatory Committee Chair

When you see the screen above, the following things automatically happen behind the scenes:

- The outcome of your test is verified by the system along with your active member status.
- Emails are sent out to me including the member's username, full name, primary phone, and email address

Once I update the "Site Orientation" check box on your membership page you will receive a link to the gate code and Dark Site directions.

Mike Edstrom

Observatory Chairman
medst22531@msn.com

Novice Presentation— April 1, 2016

Observing Jupiter

By Debbie Moran

In April, Jupiter will be a little past opposition which occurs on March 22nd and very well placed for observation in the evening sky. I will give a talk called Observing Jupiter and will quickly cover a bit about the layout of the spring sky as well.

May is open, but if Bram Weisman is available, he will demonstrate the latest collimation techniques for Newtonian telescopes. Since Newtonians are excellent starter scopes, this talk is highly recommended and will certainly be scheduled soon in any event. Dobsonian mounted Newtonians are quick to set up and give you a lot of bang for your buck. The one sticking point is they must be collimated more often than any other design, but this task is not so difficult with the tools that make it simple and a little know-how.

Newly discovered planet in the Hyades cluster could shed light on planetary evolution

From: UT McDonald Observatory, published on mcdonaldobservatory.org/news/releases

University of Texas at Austin astronomer Andrew Mann and colleagues have discovered a planet in a nearby star cluster which could help astronomers better understand how planets form and evolve. The discovery of planet K2-25b used both the Kepler space telescope and the university's McDonald Observatory, and is published in a recent issue of the *Astrophysical Journal*.

The planet orbits a red dwarf star, a star smaller and dimmer than the Sun. Red dwarfs are the most abundant stars in our galaxy. The star is located in the Hyades star cluster, the closest open star cluster to Earth. Its stars are young, so their planets must be young, too.

"Open clusters are powerful tools as all the stars formed with the same age and composition," Mann said. Once many planets are found orbiting young cluster stars, "we can compare those to planets orbiting older stars elsewhere to see if they are different in some fundamental way — to see how planets change with time."

For instance, he said, if planets orbiting young stars are farther from their host stars than their older counterparts, it suggests that planets migrate over their lifetimes. They may form farther out and migrate inward. Many exoplanetary systems have large planets orbiting close to their stars, unlike our own solar system. This kind of research could test the theory of planetary migration.

After finding many more examples of planets orbiting young stars, "we can put numbers on this," Mann said. "This could even give us a glimpse into what our solar system looked like" in the past.

The planet in the Hyades is four times the size of Earth, or about the size of Neptune. Compared to almost all other planets found orbiting red dwarf stars, it's extremely large. "Almost all of those are less than twice the size of Earth," Mann said.

The planet's large size for its parent star suggests that the planet might have a puffy hydrogen and helium atmosphere. Radiation from the star could slowly strip away this atmosphere over time, he said.

"This could have major implications for our understanding of how planets evolve, including Earth-like planets, as we need to know how well a planet can hold an atmosphere given a certain set of conditions to tell how long it remains habitable."

Amateur astronomers Thomas Jacobs and Daryll LaCourse found this planet candidate in the freely available K2 data from the Kepler space telescope's extended mission. They contacted Mann, who followed up the tip by observing this red dwarf star with the new IGRINS instrument on the 2.7-meter Harlan J. Smith Telescope at McDonald Observatory.

"Young stars are hard to follow up without something like IGRINS," Mann said. Because it's a red dwarf, the star is cool and needed to be studied in infrared light with high spectral resolution. The instrument's high resolution allows astronomers to rule out the chance that the star has a stellar companion, rather than an orbiting planet. It also helps to confirm that the star is a member of the Hyades cluster, by measuring the star's velocity and making sure it matches that of the cluster.

Courtesy The University of Texas at Austin McDonald Observatory, publisher of StarDate magazine
http://stardate.org/magazine

Shallow Sky Object of the Month

Denebola— β Leo

By Bill Pellerin

Object: Denebola — β Leo
Class: Star
Constallation: Leo
Magnitude: 2.14
R.A.: 11 h, 49 m, 04 s
Dec: 14° 34’ 19”
Size/Spectral: 1.75 Solar Masses, Color: A3
Distance: 35.9 ly
Optics needed: Unaided eye

The name of this star may seem somewhat familiar. There’s another star in the sky named Deneb, in the constellation Cygnus (the swan). The name Deneb is from the Arabic word *dhaneb* which means ‘the tail’. The name Denebola is a combination of the Arabic words *Deneb Alased*, meaning the tail of the Lion, which, in fact it is. It lies at the eastern end of the constellation Leo the Lion.

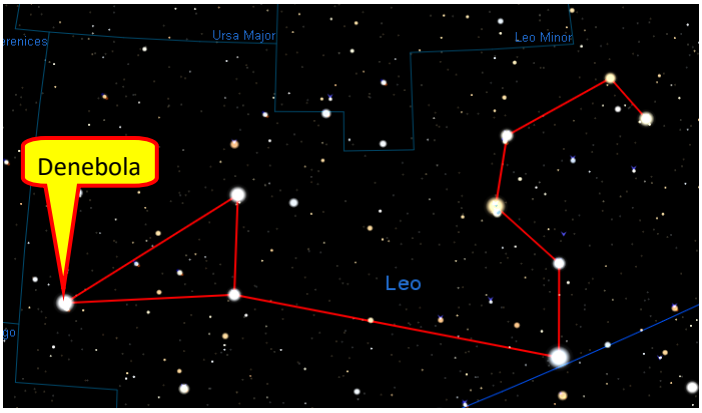
The Bayer designation of β might lead you to believe that this is the second brightest star in the constellation, but not so. Regulus (α Leo) is the brightest and Algeiba (γ Leo) is the second brightest. What’s up? When Johann Bayer assigned these designations to stars in the early 1600’s estimating magnitudes was not something that could be done precisely. Bayer also made assignments based on the rise time of the star and other criteria.

His star atlas was titled *Uranometria* and the name derives from “Uranos”, a Greek word for ‘sky’ and “metria” (measurement).

Observations reveal that this star has a disk of dust surrounding the star. Are there extrasolar planets here? Maybe. This disk has been confirmed by images by the Herschel Space Telescope. Another effect of the surrounding material is that the spectra of the system show radiation in the infrared, mostly from this dust disk being heated by the star.

This star is considerably hotter than our Sun. At its surface (the photosphere) the temperature is estimated to be 8500 K (Kelvin) compared to our Sun’s temperature of 5800 K. Since color and temperature of stars are related (hotter stars are bluer than cooler stars) this star is ‘whiter’ than the Sun which is a G2V star.

Hotter stars have a shorter lifetime than cooler stars.

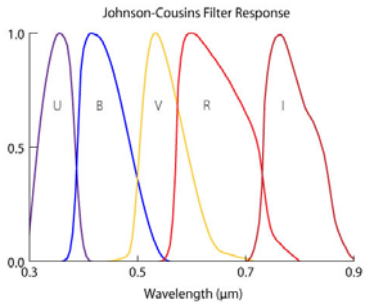


Finder chart above. Star chart generated by TheSkyX © Software Bisque, Inc. All rights reserved.

www.bisque.com

Denebola is a young star having been on the main sequence for 400 million years. Most of any star’s life is on the main sequence after a relatively quick birth process. The end of the life of stars is rather rapid as well.

Another interesting thing about this star is that it is variable, but only ever so slightly, about .07 magnitude, far too small to detect visually but not too small to detect photometrically. This variability in magnitude is at visual wavelengths, meaning that it would be in the visual part of the spectrum. A ‘V’ filter on a telescope is used to make an imager (CCD) respond to light in a way similar to the way the eye responds to light. Interestingly enough, the eye is the most sensitive to green light and a ‘V’ filter looks green.



The figure shows the response functions for the filters of the Johnson-Cousins UBVRI photometry system. Credit: The Astrophysics Spectator web page

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 objects, 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 $E = mc^2$.

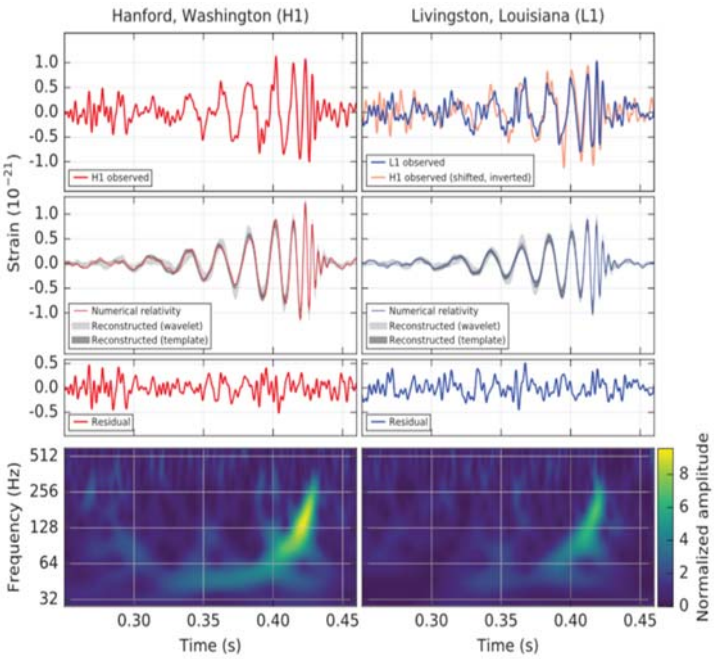


Image credit: Observation of Gravitational Waves from a Binary Black Hole Merger B. P. Abbott et al., (LIGO Scientific Collaboration and Virgo Collaboration), Physical Review Letters 116, 061102 (2016). This figure shows the data (top panels) at the Washington and Louisiana LIGO stations, the predicted signal from Einstein's theory (middle panels), and the inferred signals (bottom panels). The signals matched perfectly in both detectors.

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 radio telescopes 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**. Visit spaceplace.nasa.gov to explore space and earth science.*

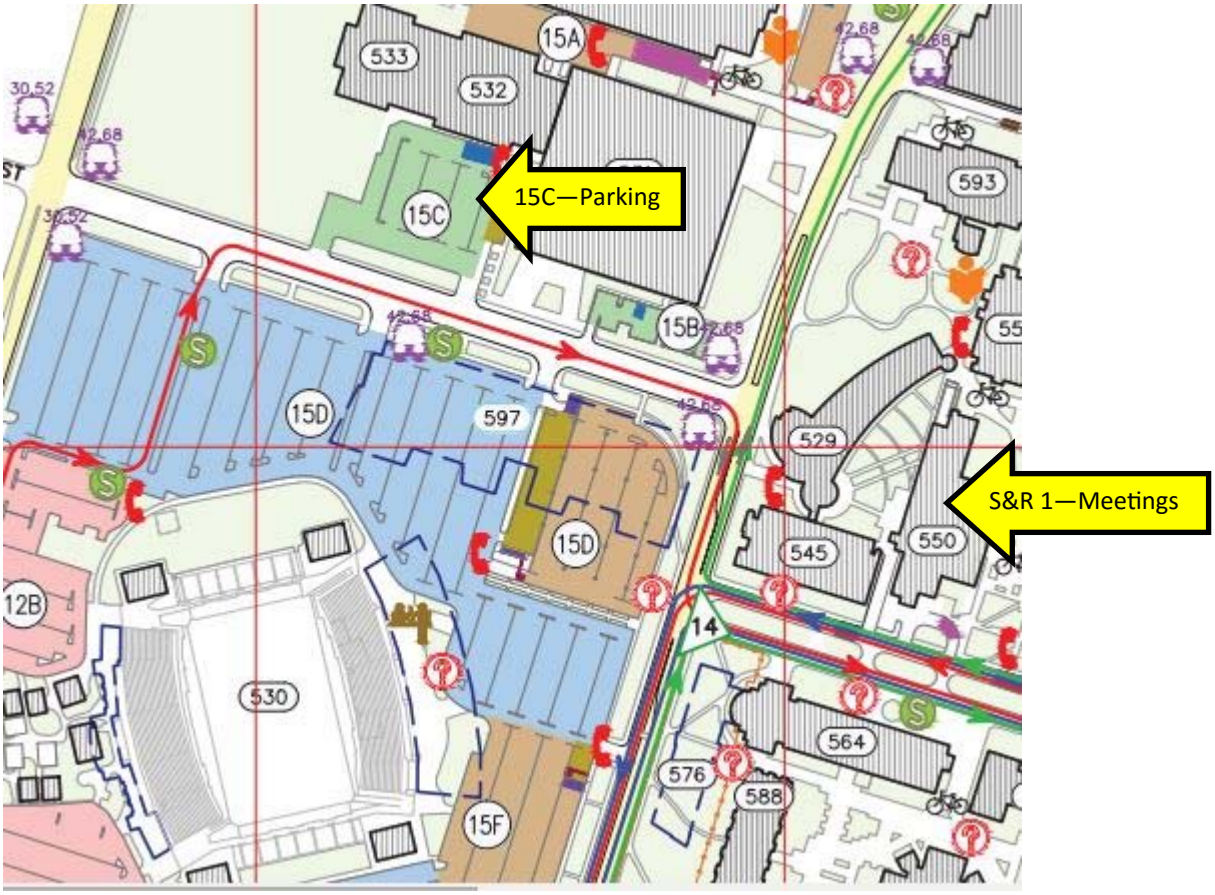
Parking at the University of Houston Main Campus

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.



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 writing guidelines.

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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.

Houston Astronomical Society

Meeting on Friday, April 1, 2016

7:00 Novice Meeting, room 116 Science & Research 1 Bldg

8:00 General Meeting, room 117 Science & Research 1 Bldg

University of Houston

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 Hofheinz 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 Hofheinz Pavilion
- Science and Research is across the street (2nd building back)

Parking:

There is Free Parking**. See Parking map and detailed information on parking on the preceding page.**