

# GuideStar



March, 2015

Volume 34, #3

## At the March 6 Meeting

### **Adrift: Does America Have a Future in Space?**

**Eric Berger — Science Writer of the Houston Chronicle**



Over the course of 2014 science writer Eric Berger looked at NASA’s building of a big new rocket, the collapse of the Constellation program, Congressional infighting for funds, shifting priorities of successive White House administrations, the promise of private space companies and, ultimately, the fate of Houston as Space City. This presentation is about what he found.

**Bio:** Eric Berger is the science writer for the Houston Chronicle. For his coverage of Hurricane Ike the Chronicle was a Pulitzer Prize finalist in 2009. He would like to see humans on Mars in his lifetime.

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



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

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#### 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.**

Bill Spizzirri — “The Milky Way Galaxy”

**General meeting: ..... 8:00 p.m**

Eric Berger ”Adrift: Does America Have a Future in Space”

**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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### 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:** 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. You can also join (or renew at the organization web site, [www.astronomyhouston.org](http://www.astronomyhouston.org)).

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## ***Other Meetings...***

**Johnson Space Center Astronomical Society** meets in the Lunar and Planetary Institute on the 2nd Friday of each month. Web site: [www.jscas.net](http://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](http://www.fbac.org/club_meetings.htm).

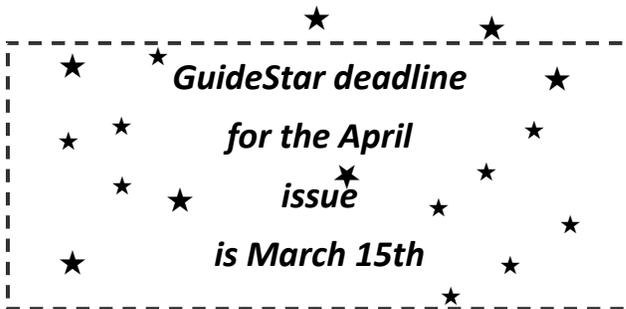
Novice meeting begins at 7:00 p.m., regular meeting begins at 8:00 p.m. Website:

<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-mail [bill.leach@nhmccd.edu](mailto:bill.leach@nhmccd.edu). Web site:

[www.astronomyclub.org](http://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



### ***Novice Presentation—March 6, 2015***

## ***The Milky Way Galaxy — Our Home***

***By Debbie Moran***

**B**ill Spizzirri will be the speaker in March with a talk about the Milky Way galaxy. Come hear about our home galaxy, what it is and what are its parts, how it relates to other galaxies and how our place in it affects our view of the night sky. (Image at right is an artist's conception of the Milky Way. From Wikimedia Commons, released to the public domain.)

**In April**, loaner telescope chairman Allen Wilkerson will give us the ins and outs of the popular GoTo telescopes which use computers to automatically find objects in the sky. (CAUTION: learn the night sky first! Otherwise you will be as clueless as those who completely depend on GPS to navigate on the ground.) We will return to the subject of maps and navigation in May for newer members.



# President's Message

by Rene Gedaly, President

We do like to talk.

No doubt you've noticed the smorgasbord of ways the Society is using to keep in touch. The new Facebook group, the website forums, private messages from within the website, Netslyder—our opt-in email list, the Tapatalk app for mobile phones... You're reading this communication from within the *GuideStar*. Or is it from the website text article? It's all good, and we all have our preferences. Mine is the forums, but I use most of the others. Bet you do, too.

## Can you hear me now?

It's amazing how quickly this happened. Though driven by recent member demand, you won't be surprised to learn that months of preparation behind the scenes went into getting us here. Many of these initiatives were tried before, years before. The time wasn't right. Now it is and we've got the membership and the resources to keep HAS relevant and responsive.

## Web Technology team answers

Those resources include Mark Ferraz. Mark is chair of the new ad hoc Web Technology team and has officially been handed the reins as webmaster from Jeffery McLaughlin. Jeffery hasn't left; he's available to help when called though he's enjoying a well-deserved break after migrating the entire website to a commercial hosting service in early February not to mention training his successor to help him. Jeffery, you took us kicking and screaming into the modern age. Thank you. Hopefully we'll see you around at the dark site more often now.

In the meantime, Mark took over the wish list of technology enhancement requests prioritized last January and hasn't come up for air yet. Perhaps most visible recently is his work to take all the pieces of our communication methods, they're listed in the 2<sup>nd</sup> paragraph, and either make them work better or make them more accessible. Much more of Mark's effort has been internal to the workings of the Society,

creating tools that help the committees create web data and content or manage it better. Other enhancements are in the works, but there are a few we can all use right now that you won't want to miss.



**Recorded Presentations.** This section has gotten a facelift and is a much more informative listing, too. Check it out here: <https://www.astronomyhouston.org/recorded-presentations>.

**Online Observatory Log Report.** If you're prone to forgetting to fill out a pad log before leaving the dark site, you can create one

online, while at the site or at home. Log into the website and select the *Create Observatory Log Report* link from the Member Features menu.

**Observatory Booking Calendar.** Members who have taken the observatory training course are able to use any of the three telescopes mounted in the observatory building. Check the new observatory booking calendar to see if the date you want to use one of the observatory telescopes is available: <http://www.astronomyhouston.org/about/has-observatory>.

## Be sure to check the Upcoming Events calendar

And speaking of calendars, be sure to check the Upcoming Events menu on the website. Click the *See All Events* button to view the events in calendar form. Events are also announced via the email list, often in greater detail and with frequent follow up reports. You can subscribe to it here: <http://www.astronomyhouston.org/about/e-mail-list>. An events calendar also appears each month in the *GuideStar*.

## Keep Looking Up

..Rene Gedaly

President



## Observations... of the editor

by Bill Pellerin, *GuideStar Editor*

### ***This GuideStar***

I'm pleased to receive a new interview article for this issue from our friend Clayton Jeter. Clayton has contributed many of his excellent interview articles to the *GuideStar*. I have already received a new one that will appear in the April issue — it's one you'll enjoy.

### ***The McDonald Observatory Board of Visitors Meeting.***

Last weekend, as I write this, I was in Austin for the winter Board of Visitors meeting for the McDonald Observatory. The meeting is held yearly the UT campus and all members of the organization and their guests are invited. The BoV is an organization that supports the UT astronomy program, the astronomers, staff, and students that comprise the program with monetary contributions and with contributions of helping publicize the UT astronomy program.

While in Austin we are updated on the status of the HETDEX (Hobby-Eberly Telescope Dark Energy Experiment), the status of the GMT (Giant Magellan Telescope), and other projects. In addition, students and UT professors do presentations on subjects of interest to the attendees.

This year, Bill Cochran (see page 14), did a presentation on where we are in extrasolar planets (exoplanets) discoveries. Based on the Kepler data, Bill now asserts that all stars in the sky have planets. Think about that.... 100 billion stars in the Milky Way and 100 billion other galaxies. Even if the average number of planets per star is one, the universe would be populated by  $10^{22}$  planets. All those planets and we have no evidence of a technological civilization having existed or existing now (except for ours). It boggles the mind.

Have you heard of the (Enrico) Fermi Paradox. Here's the idea. With the universe being 13.7 billion years old there has been plenty of time for a technological civilization to arise and populate the habitable planets in the universe. Fermi asks, "Where are they?"

There were also other presentations, including one by Bill Powers, the president of UT. He has done a lot of work to get authorization to fund the GMT with \$50 million. He said that these kinds of investments are essential, not optional if the US and UT (with its partners, including A&M, see page 13). He mentioned the lost opportunity for the United States to be in a leadership position with the Superconducting Supercollider which was in the process

of being built when it was cancelled in 1993 by an act of congress.

My Shallow Sky object this month is based on a presentation at the BoV meeting. This presentation was by Dr. Natalie Gosnell, the Harlan J. Smith Postdoctoral Fellow. The title of this excellent presentation was "The Story of Strange Binaries: Blue Straggler Stars in Old Open Clusters". Two other presentations were about the formation of heavy elements in the early universe.

It is the result of attending these meetings and working with UT staff (especially Sandi Preston, Assistant Director, Education and Outreach for the McDonald Observatory) to make available content for club newsletters. The *GuideStar* has published several items from the McDonald Observatory. Other newsletter editors are receiving content as well.

***Until next time...***

***clear skies and new moons!***

*..Bill*

# Observatory Corner

By Mike Edstrom, Observatory Director



It is time for the gate combination change I will be changing the combination on February 28, 2015 please contact me via e-mail at [medst22531@msn.com](mailto:medst22531@msn.com) to get your new gate code.

We have introduced an "Online site log" on the HAS website. If you should leave the site and discover you have forgotten to fill out a site log you can do it online. Simply log onto the HAS website and go to the "About the society" tab on the top of the page. Then click on the "Our Observatory" page and on the right hand side of the page you will find "Create Observatory Log Report", fill out the report and submit it and you are done, thanks to Mark Ferraz for putting this on the website.

We will soon be putting the site orientation program on the website. In doing so we are going to ask everyone who already has taken the course to take a refresher course. When you complete the course and pass the 10 or so question quiz the data base will automatically be updated and there will no longer be a question as to whether the data base is correct and we will be able to e-mail any changes in access to the site. I will be sending out an announcement on the netslyder when the online course is available, thank you for your assistance in getting our data base corrected.

We will be presenting a proposal to the HAS Board of Directors to add another 12 Private Observatory sites on the West side of the big observatory soon. Anyone interested in a Private Observatory site needs let me know so I can put you on a "Waiting" list for new sites.

We are coming into peek observing time of the year with the first cool front now is the time to take advantage of HAS's most valued asset the Dark Site. Please remember to fill out your observing log and put it in the center box on the observing field or on the HAS website.

As you visit the Dark Site we invite you to make suggestions as to improvements you would like to see please put the on the log sheets.

As a safety reminder please read the sign posted on the side of the metal building at the Dark Site which has directions to the hospital and contact information for the sheriff's department it also has the address to the site in case of a medical emergency.

## And the Work Goes On

I need to remind everyone that we need to start filling out Log Reports at the site so I can give this information to the Fondren Foundation. The property is on a 99 year lease and part of the Lease agreement is that HAS needs to report every year to the Fondren Foundation that the property is being used. The Log Reports are located in the box in the middle of the field. Just open the cover, fill out the

report and then slide it into the slot that is in the inside of the cover and then close the box. It is very important that everyone fill out a Log Report so that we are showing that the Observing site is being used. Your help on this is very much appreciated.

If you have a Randalls card, and have not done so, please have it coded for the Houston Astronomical Society. Our number is #6618. The Society gets 1% of the gross sales that member spends at Randalls. Randalls totals up the amount spent each quarter and will send us a check if the amount goes over \$2,500, otherwise the total roles over to the next quarter of zeros out at the end of the calendar year. So please link your Randalls card to the Houston Astronomical Society so that the society can benefit from this Randalls program. This is very easy to do, just go to the Courtesy Booth and tell the person there what you want to do.

*Mike Edstrom*

Observatory Chairman

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## Just Looking

A GuideStar Interview by Clayton L. Jeter

### Steve Gottlieb—Visual Observer



You talk about a visual observer! This month's interview is with Steve Gottlieb...an ultra-dedicated amateur observer. You'll read below in his bio about observing and analyzing almost the entire NGC object list...and making corrections! He's written for *Astronomy*, *Sky and Telescope* and the list goes on and on. I'd like you all to meet Mr Gottlieb. Here's Steve...

#### The Steve Gottlieb bio...

I live in the small town (1 square mile) of Albany, CA, just north of Berkeley. We moved here when I my daughter entered kindergarten (she's now an assistant math professor at San Jose State) because of the school district's good reputation and I ended up loving the neighborhood and teaching calculus at the high school just 3 blocks from home. I retired a few years back after teaching for 37 years.

I've had the astronomy bug since elementary school in Los Angeles and used to beg my parents to take me up to Griffith Park Observatory and later to buy me a telescope (they were hesitant as they figured it was a passing

phase). I organized a little astronomy club with the kids on my block when I was 10 years old in 1959. The focus of the club was newspaper clippings I had collected of the early U.S. and Russian space launches as well as lectures I planned to give on the solar system and stars. I think that lasted two meetings before the kids I had corralled ran back to the schoolyard to play over-the-line baseball.

Time passed, other interests flourished and faded until I discovered a 60mm refractor in 1976 languishing in my girlfriend's parents' garage. After a year setting it up in an open field in Lafayette and "discovering" many of the showpieces in Sagittarius, Scorpius, Cygnus, etc. without any guides or charts (and really no idea what they were), I started a subscription to *Astronomy* magazine and bought a copy of *Edmund's Mag 5 Atlas*.



The small refractor was upgraded to a 6-inch reflector on an equatorial-fork mount and I was on my way systematically observing the Messiers and other showpieces in 1977. A year later I was seduced by a shiny orange C-8 with better optics and tracking, joined the San Francisco Amateur Astronomers and made it up a star party at Mt. Tamalpais where I met Bill Cherrington and had my first astonishing view of M51 through a large dobsonian.

Soon afterwards I discovered Fremont Peak and was down there as often as possible (a long drive from my home in El Cerrito) from 1979 to 1983 when some of the regulars started complaining about light pollution (yes, even then) at the Peak and I was invited to join a group meeting at Bob Kestner's property (an optician who worked on the Hubble corrective optics) in the Sierra foothills at Fiddletown. By that point I was hooked on views through larger scopes and had purchased a 13.1" Odyssey I in late 1981 and by the end of 1984 had replaced it with a 17.5-inch monster.

In the early to mid-1980's it wasn't easy obtaining information, images, and astronomical journal articles (nearly impossible in the pre-internet stone-age) so I thoroughly enjoyed heading over to the UC Berkeley Astronomy library (both on the first floor of Campbell Hall and the graduate library across the street) and comparing my observations at Fremont Peak or Fiddletown with the professional catalogues (UGC, CGCG, MCG, etc) and examining the actual Palomar Observatory Sky Survey prints, which I used to pour over intently using a 10x magnifier, taking notes and making sketches of galaxy fields! I purchased several of the actual 11x14 contact prints from the Cal Tech bookstore in Pasadena which contained the fields of the Virgo Cluster, Perseus Cluster, Hercules Clus-

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ter etc. and these were by far the best finder charts available for tackling those galaxy clusters.

At the same time, I started to run across numerous errors and conflicting data in the professional and amateur literature, particularly with the fainter NGC objects and began corresponding with a couple of professional astronomers including cataloguer Harold Corwin at the University of Texas. As snail-mail evolved into e-mail and better communication with several amateurs/pros with a similar interest in historical visual astronomy, this turned into the NGC/IC Project (<http://www.ngcic.org/>) that recently completed a historically correct revision of the entire NGC and IC.

While visually checking a number of problem identities, I decided to dive head-on into the project and tackle the entire NGC as most of the discoveries were made by William Herschel and his son John using an 18.7-inch speculum-metal mirror (similar size though less light grasp than my 18-inch Starmaster). As of this date, I've tracked down and taken notes on 6900 NGC's (many of these observed multiple times) with about 600 to go, mostly in the southern hemisphere. My visual notes on all these objects are available on this site. I'm hoping a few more trips to the southern hemisphere will finish up most of those remaining 600.

While I was helping to sort out the NGC, I worked on correcting the databases in several computerized DSC's (digital setting circles) for Lumicon and Celestron. Later I put together the list of objects and wrote the descriptions for Orion's popular "Deep Map 600" folding star chart.

Starting in the 1980's I began contributing observing articles to Deep Sky magazine and later to a couple of observing web sites geared towards advanced amateurs, such as "Adventures in Deep Space". In 1999 I began writing regular observing articles for *Sky & Telescope* magazine on topics such as observing Hickson Groups, the Pisces-Perseus Supercluster, HII Regions in M101, the Corona Borealis Galaxy Cluster, Vorontsov-Velyaminov interacting galaxies as well as several articles for *Astronomy* magazine on observing Supernova Remnants, Wolf-Rayet Nebulae and more. I have an article in the February issue of *Sky & Tel* and another in May on Karachentseva Triplets.

Over the years I've never been enticed to get involved with imaging or ATM – for me it's always been about the aesthetics at the eyepiece in a large scope, the connection with nature and the mysteries of the universe and just relaxing and hanging out with buddies under a velvet-black night sky.

### ***The Steve Gottlieb interview...***

**Clayton:** It's really awesome Steve to have you here with us this month for a great read. Thanks for taking the time. Let's get to it...

It seems you have seen a tremendous change in amateur astronomy since 1959. How about the top 5 changes that you have witnessed that's helped the observer since that era (late 1950's).

**Steve:** Here are a few major changes that I've experienced. This is from my perspective as a hardcore visual observer.

**Communication among amateurs.** The internet changed all communication very quickly. My main source of information about astronomy in the 1970's was the two main astronomy magazines, as well as local amateurs in the San Francisco bay area. I joined the San Francisco Amateur Astronomers in the 1970's and was quickly exposed to large Dobsonian scopes, made by John himself and others. I also started to communicate (by snail-mail, of course) with other amateurs across the country as well as a couple of professionals, but communication was very slow of course. Once email and the internet started becoming mainstream in the mid to late 1980's, that was a game-changer as advanced amateurs could now easily communicate on a quick, regular basis and information exploded.

**Large amateur scopes.** When I started off, the scopes that dominated star parties were mainly small refractors, modest reflectors and Schmidt-Cassegrains. Of course, living on the west coast, I did see John Dobson's eye-opening 24-inch sidewalk telescope made from simple parts. But the revolution had not yet started. What pushed it along was a series of articles on grinding and polishing a large thin mirror in *Telescope Making* by SF Bay area amateur Bob Kestner (later a professional optician on the Hubble COBE corrective optics). Bob's observatory and personal scope that influenced many amateurs, as well as Bill Cherrington, another Dobson protégé.

**Availability of astronomical data.** Getting started the only sources of information about astronomical objects was,

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of course, through books and magazines. There was no easy access to professional literature, unless you lived near an observatory or university library. Fortunately, I was near UC Berkeley and spent many afternoons at the astronomy library and scanning journals looking for information about the objects I was observing and pouring over the POSS prints to verify my observations. Eventually, Astronomical Data Center CD's became available that contained most of the major astronomical catalogues from the 1960's and '70's, which made finding data much easier. But even that development was just a first step in terms of the explosion of information that easily accessible today to any amateur on the internet.

**Electronics on amateur telescopes.** I learned the sky through star-hopping and a paper star atlas (Becvar's "Atlas Coeli 1950.0) on dozens of nights. Computerized goto mounts with large databases were a game-changer. I was involved with compiling the databases for some of the early models by Tangent Instruments and Lumicon and immediately adopted digital setting circles when they became available. Major development such as computer controlled mounts, large software databases, digitized sky surveys, use of laptops and tablets to run scopes. It's been an amazing change, though I still recommend that beginners keep things simple and just enjoy the night sky with a paper atlas and simple star-hopping.

**Nebula filters.** Before Daystar and Lumicon started marketing nebula filters for amateurs around 1980, emission nebulae such as the Veil, the Rosette, the California Nebula and the Horsehead Nebula were considered exotic objects, beyond the grasp of most amateurs who didn't have access to a very dark site. I started using a Daystar 300 filter, Lumicon UHC and OIII the minute they became available and it made an immediate impact on my observing. Some objects like the Veil Nebula are now considered deepsky showpiece due to filters and the Horsehead was no longer an impossible target. I started identifying stellar planetaries by the hundreds by blinking with a UHC or OIII filter in the 1980's and many of these were probably visual firsts.

**Clayton:** You mentioned above those exciting times during the space race. Got a favorite mission? How about your favorite astronaut?

**Steve:** I kept a scrapbook of newspaper clippings with all the early space missions, but it wasn't the personalities that grabbed my imagination, but just the human endeavor of exploration beyond the earth. It was science fiction that had come to life and fun to dream about the planets and stars when you were in elementary school.

**Clayton:** I'm guessing you have great eyesight. Just how good do you think? Can you see color in objects?

**Steve:** I may have had excellent eyesight starting off, but at my age

that's certainly not the case now. I don't find my naked-eye vision anything special. But certainly experience at the eyepiece goes a long way to make up for declining vision as we age. Sky conditions, using relatively high magnification for deep sky objects, using an observing hood, good optics and baffling, dark adaptation, averted vision and letting an object drift through the field to facilitate detection – all of these things are factors that are most important for me.

**Clayton:** Do you, or have you sketched what you're observing?

**Steve:** I've never considered myself a sketcher or tried to cultivate that skill. On the other hand, I often make what I consider "diagrams" at the eyepiece, which might show suspected objects in the eyepiece field, interesting star patterns, uncatalogued double stars, features within deep sky objects (HII knots in galaxies, spiral features, dust lanes/patches, etc.).

The diagrams help when I'm writing up my detailed observing notes at home. For example, if I found a brighter knot in a galaxy, I'll look up images or online databases to verify there is an object where I placed it, and then try to determine if it is identified in NED or SIMBAD.

**Clayton:** How's your Starmaster Dob? Who made its mirror and how are the optics? Also, the above photo seems to show a "Star Structure" Dob. Right?

**Steve:** I primarily observed with an 18-inch class scope for 28 years from 1984 to 2012. The first version was a solid tube Coulter Odyssey II. Wow, that was a monster and really too heavy to even transport. I mainly kept it at a friend's observatory in the Sierra Nevada foothills and just wheeled it out of a storage room when I went there to observe. Of course, this Dobsonion was strictly a push-to, star-hopping scope and the mirror was – well, let's just say it was adequate for low power views of galaxies. But for that era, it was a lot of glass

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and a thrill to see spiral structure in galaxies.

A few years later, I replaced that scope with a Sky Designs truss-tube scope, which was truly portable, although by today standards it was pretty crude and heavy. Eventually that scope acquired digital setting circles and later an equatorial platform, but still I was not fully satisfied with the mirror (astigmatism and other issues).

A couple of observing friends had Starmasters (built by Rick Singmaster) around 2000 and I was very impressed with the quality of the scope, the drive and goto system and the optics. So, in 2003 I purchased an 18-inch Starmaster, which has a superb Carl Zambuto mirror. I used that scope countless nights for the next 10 years and had many blissful nights.

Over the years, though, as my observing interests drifted towards fainter and more exotic objects, I thought about finally moving up to a larger aperture. A few years back (2011), a friend purchased a 28-inch Starstructure (built by Mike Zammit in Florida). I thought the aluminum design, features, one-man set-up and mirror (Steve Kennedy) were all excellent, but I wanted to avoid being dependent on a trailer. So, the next year I ordered a 24-inch f/3.7 Starstructure (also with a Kennedy mirror) and I'm a very happy camper. I'm able to easily load, unload and set-up the scope without any help – and I'm a fairly short, slight build, 65-year old! I'm fairly certain this will be the last (large) scope I purchase.

**Clayton:** How do you log what you see...hardcopy or electronic? Got a favorite electronic star atlas program? Also, how do you search with all your old hardcopy observations? Or is every object now logged and transferred to an electronic database?

**Steve:** I take handwritten notes at a desk while I'm observing and then copy them to a database program at home. I don't use an astronomy-specific logging program but a general database called Panorama (<http://provue.com/>). I currently have observing notes on 13,468 objects in the database.

During my first decade or so of observing (in the late '70's through the mid to late '80's), all notes were stored in notebooks. When switched to keeping notes on a computer I went back and keyed in few thousand observations, which was a **major** effort. But it was well worth it, as I can now go back and quickly search my notes by any criteria and compare of all of my observations.

Depending on the object, I have numerous fields of data – aliases, object type, classification, RA and Dec, constellation, dimensions, position angle, V and B magnitude, surface brightness, central star magnitude, brightest star magnitude, NGC description, WH designation, JH designation, GC designation, Discovery date, Historical visual observations, astrophysical data, and of course my own visual observations!

As far as an electronic star atlas program, I've used Megastar (on a Mac) for many years along with the 10x digitized version of the Palomar Sky Survey (originally on 100 CD-ROMs). I've added many objects that it was missing as I've run across them.

**Clayton:** Do you have a home observatory? Or, where do you observe?

**Steve:** Nope, I live in a large urban area and do not have an observatory at a rural site. I usually make plans with other amateurs to meet up at various locations in northern California, depending on the season (the Sierras are not accessible in the winter). To drive to a reasonably dark site takes 90 minutes and roughly 2.5 hrs for a very good site. In the summer, I usually attend one or two large star parties in California including the Golden State Star Party and may observe other months at high elevation sites in the Sierras, the White Mountains (Grandview) or Lassen National Park.

**Clayton:** Here's a tough one. How would you like to see your own astronomy grow?

**Steve:** I've always enjoyed combining traveling and astronomy and hope to continue that even more now that I'm retired. I've been fortunate to have made 5 observing trips to Australia, 2 to Costa Rica and traveled to 4 solar eclipses (last successful one was November 2012 in Queensland). I've also been to west Texas a number of times, observing with Jimi Lowrey's 48-inch.

**Clayton:** Are you proactive in trying to save our night skies from our ever encroaching light pollution? What's your take on helping?

**Steve:** It is a sad situation to see the loss of our dark skies but encouraging to see efforts and success on the part of the IDA (<http://www.darksky.org/>) and the National Parks to reverse this trend. I admire anyone who is actively involved, but have not taken that step.

**Clayton:** It seems in recent years that the

(Continued on page 12)

(Continued from page 11)

younger people are not that interested in amateur astronomy, or any of the sciences. How can we turn this around?

**Steve:** I don't know any other way than to introduce and emphasize astronomy more from grade school through high school. Unfortunately, astronomy is rarely taught as an independent course in high schools. Programs like Hands On Universe (<http://handsonuniverse.org/projects/>) and the Astronomical Society of the Pacific (<https://www.astrosociety.org/education/k12-educators/>) are trying to change that but amateurs are certainly an important part of this process.

**Clayton:** Do you have any helpful advice to pass on to observers just starting out in astronomy?

**Steve:** Join a club, whether a physical or a virtual one. Here in the San Francisco bay area we numerous astronomy clubs who have regular meetings, or you can participate in an online club. Find out about local star parties and talk to other amateurs. There's so much information available online now for the amateur, but nothing beats just talking to other enthusiasts and looking through their scopes.

**Clayton:** Is there an email address that you have that a Houston Astronomical Society member could contact you for an additional

question or two?

**Steve:** Yes, I can be reached at [astrogottlieb@gmail.com](mailto:astrogottlieb@gmail.com) or [steve\\_gottlieb@comcast.net](mailto:steve_gottlieb@comcast.net)

**Clayton:** Thanks Steve for taking the time to share your interest and thoughts within our HAS newsletter, the *GuideStar*. We wish you luck with all of your astronomy interests. Please come visit our society when in the Houston area, we'd love to see you.

**Steve:** Thanks for inviting me to participate in the interview. It was fun reminiscing about astronomy and thinking about all the changes that have transpired since the 1960's.

**Clayton:** Clear skies always...

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*Clayton is an avid SCT visual observer and a longtime member of the Houston Astronomical Society. Contact him at: [stonebloke@gmail.com](mailto:stonebloke@gmail.com)*

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## ***A&M Fulfills Funding Commitment to World's Largest Telescope***

### ***Regents Decision Caps \$50 Million Push***

*By Katy Stapp*

**T**exas A&M secured its position at astronomy's cutting edge in February when a unanimous vote at the A&M Board of Regents meeting approved the final half of its \$50 million commitment to fund the world's largest telescope.

Set to open science operations in 2022, the Giant Magellan Telescope is an observatory projected to have 10 times the resolution of the Hubble Space Telescope. Texas A&M and the University of Texas at Austin are two of 11 international partners who hope to start construction in the Chilean desert before summer.

A&M's recent commitment caps a funding drive begun largely by the efforts of the late George P. Mitchell, who donated close to \$28 million toward A&M's stake before he died in 2013.

Texas A&M and UT have now committed 5 percent of the total cost of the telescope's construction. A&M officially made a \$22 million contribution after February's meeting on top of the \$28.1 million that has already been raised, said Darren DePoy, physics professor and member of GMT's board of directors.

"We have already committed about \$28 million, mostly out of philanthropy from George Mitchell, and some other funds from various pieces of the university," DePoy said. "What we needed to do is go from \$28 million to about \$50 million or so. This extra \$22 million will push us in that direction."

UT declared \$50 million to the GMT in March 2014 after a University of Texas System Regents meeting gave the green light. Both A&M and UT hope to raise their commitments to 10 percent, or \$100 million.

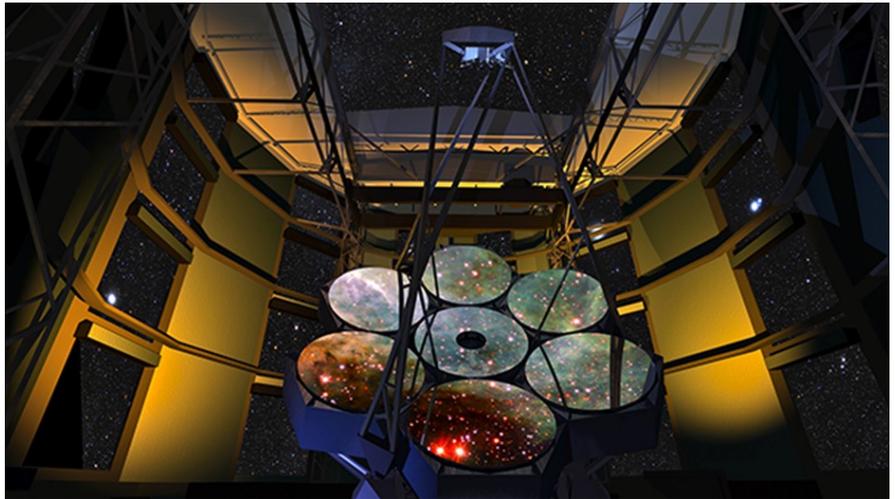
DePoy said the primary reason for contributing such a large portion to the cost of GMT's construction is that it will involve A&M in a state-of-the-art, internationally scaled project.

"The total amount of funds gives us enough of a share and stake in the project so that we can have representation on the science advisory committee and on the board," DePoy said. "It definitely puts us in the position of some prominence in this master astrophysics research facility, as well as to be on par with other partners like Har-

vard, Chicago, the Carnegie Institution for Science and the country of Australia."

DePoy said this \$22 million commitment will be spread out over a number of years until it is realized.

"What we do is give a certain amount of money every year until we reach that goal,



*Courtesy of GMTO Corporation*

and we will raise that money in various ways," DePoy said. "Part of it is that we will now get access to grant funding that we otherwise would not have been able to get, because of our participation in the GMT. Grants give a ton of money to the university and that will create a kind of revenue stream that will then go to pay for the telescope. We also have philanthropy money."

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

## Astronomers Discover Ancient Solar System with Five Earth-Sized Planets

### UT McDonald Observatory



A team of scientists including The University of Texas at Austin's Dr. William Cochran has discovered a solar system similar to our own dating back to the dawn of our Milky Way galaxy. They are reporting the find of five planets with sizes between Mercury and Venus orbiting the Sun-like star Kepler-444 in the current issue of *The Astrophysical Journal*.

"The discovery of this ancient planetary system shows that even the very old stars in our galaxy were accompanied by rich planetary systems," Cochran said. "This tells us that there are nearby planets that are far, far older than the planets in our own solar system."

This team, led by scientists from Britain's University of Birmingham, based their discovery on observations made by the NASA Kepler satellite over four years. Cochran is a co-investigator of the Kepler mission.

All of the planets are much closer to their star than Earth is to the Sun, and orbit Kepler-444 in less than 10 days. Thus, this system may be thought of as a miniature version of the inner planets of our solar system.

The star Kepler-444 is 11.2 billion years old, having formed when the universe was less than 20 percent of its current age. This makes the Kepler-444 system the oldest known of terrestrial-sized planets — 2.5 times older than our solar system.

"The excellent facilities of The University of Texas McDonald Observatory were absolutely critical for helping us to understand the composition and age of the central star of this planetary system," Cochran said. "This is just one example of the important complementary role that ground-based data from McDonald Observatory have played in the interpretation of results from several spacecraft missions."

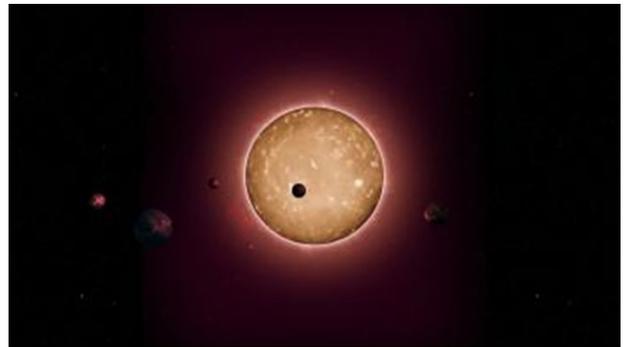
The team carried out the research using asteroseismology — listening to the natural resonances of the host star which are caused by sound trapped within it. These oscillations lead to miniscule changes, or pulses, in its brightness



*Bill Cochran is a Senior Research Scientist with The University of Texas at Austin McDonald Observatory. He is also Co-Investigator of NASA's Kepler mission to search for Earth-like planets in the Milky Way galaxy. Credit: McDonald Obs./UT-Austin*

which allow the researchers to measure its diameter, mass, and age. The planets were then detected from the dimming that occurs when the planets passed in front of the star (an event called a transit). This fractional fading in the intensity of the light received from the star enables scientists to accurately measure the sizes of the planets relative to the size of the star.

"There are far-reaching implications for this discovery," said Dr. Tiago Campante of The



*Kepler-444 hosts five Earth-sized planets in compact orbits. The planets were detected from the dimming that occurs when they transit the face of their parent star, as shown in this artist's concept. Credit: Tiago Campante/Peter Divine*

University of Birmingham, lead author of the study. "We now know that Earth-sized planets have formed throughout most of the universe's 13.8-billion-year history, which could provide scope for the existence of ancient life in [our] galaxy."

Remarkably, by the time Earth formed, the planets in the Kepler-444 system were already older than our planet is today. This discovery may now help scientists to pinpoint the beginning of what may be dubbed the "era of planet formation."

According to team member Professor William Chaplin of The University of Birmingham,

*(Continued on page 15)*

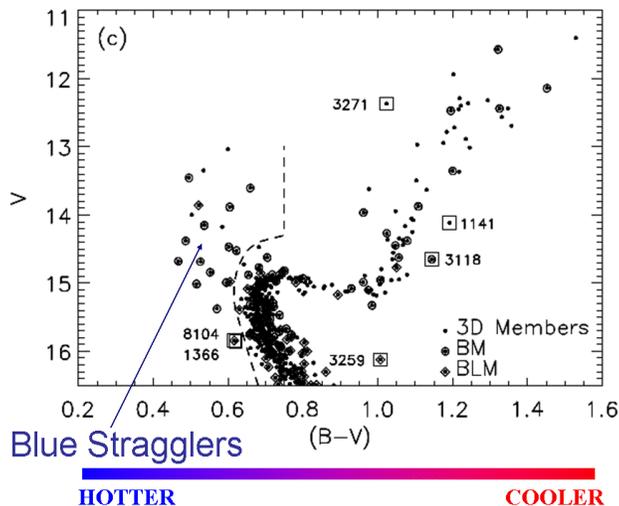
(Continued from page 18)

measuring the B (blue) and V (visual, green) magnitude of the stars. Interestingly, knowing only these two values will reveal the color of the star. The diagram's horizontal axis is calibrated in the B-V value. Below is a H-R diagram of the stars in the NGC188 cluster. The horizontal axis is the temperature (color) and the vertical axis is the magnitude. Making these measurements would be an interesting and challenging exercise for the amateur. Online telescopes, such as the iTelescope system can make B and V images of the cluster.

If you examine the diagram closely, you see that at about 15th magnitude and .7 B-V, there's what's called a turnoff point. This is the place where stars (that are not stragglers) are leaving the main sequence (mid-life) and moving to the right in the diagram, on their way to becoming red giants. You can also see a smattering of stars labeled as 'blue stragglers' which *should* have turned off the main sequence, but haven't.

Note that movement on the H-R diagram does not represent movement on the sky, it simply means that there is a change in the color or the luminosity (or both) of the star(s).

To the right is a photograph of NGC188 with the 'blue straggler' stars circled. North is up in the image. Can you identify these stars visually? Extra credit for making this observation.



(Continued from page 14)

“The first discoveries of exoplanets around other Sun-like stars in our galaxy have fuelled efforts to find other worlds like Earth and other terrestrial planets outside our solar system. We are now getting first glimpses of the variety of galactic environments conducive to the formation of these small worlds. As a result, the path towards a more complete understanding of early planet formation in the galaxy is now unfolding before us.” Chaplin has been leading the team studying solar-type stars using asteroseismology for the Kepler mission.



*This image shows the open star cluster NGC 188, with its extra bright 'blue straggler' stars circled. These blue stragglers are vampire-like stars that steal material from partner stars to make themselves ultra-bright and young-looking, astronomers say. Credit: K. Garmany, F. Haas NOAO/AURA*

# The Heavyweight Champion of the Cosmos



By Dr. Ethan Siegel

As crazy as it once seemed, we once assumed that the Earth was the largest thing in all the universe. 2,500 years ago, the Greek philosopher Anaxagoras was ridiculed for suggesting that the Sun might be even larger than the Peloponnesus peninsula, about 16% of modern-day Greece. Today, we know that planets are dwarfed by stars, which themselves are bound together by the billions or even trillions into galaxies.

But gravitationally bound structures extend far beyond galaxies, which themselves can bind together into massive clusters across the cosmos. While dark energy may be driving most galaxy clusters apart from one another, preventing our local group from falling into the Virgo Cluster, for example, on occasion, huge galaxy clusters can merge, forming the largest gravitationally bound structures in the universe.

Take the "El Gordo" galaxy cluster, catalogued as ACT-CL J0102-



*X-rays are shown in pink from Chandra; the overall matter density is shown in blue, from lensing derived from the Hubble space telescope. 10 billion light-years distant, El Gordo is the most massive galaxy cluster ever found. Image credit: NASA, ESA, J. Jee (UC Davis), J. Hughes (Rutgers U.), F. Menanteau (Rutgers U. and UIUC), C. Sifon (Leiden Observatory), R. Mandelbun (Carnegie Mellon U.), L. Barrientos (Universidad Catolica de Chile), and K. Ng (UC Davis).*

4915. It's the largest known galaxy cluster in the distant universe. A galaxy like the Milky Way might contain a few hundred billion stars and up to just over a trillion ( $10^{12}$ ) solar masses worth of matter, the El Gordo cluster has an estimated mass of  $3 \times 10^{15}$  solar masses, or 3,000 times as much as our own galaxy! The way we've figured this out is fascinating. By seeing how the shapes of background galaxies are distorted into more elliptical-than-average shapes along a particular set of axes, we can reconstruct

how much mass is present in the cluster: a phenomenon known as weak gravitational lensing.

That reconstruction is shown in blue, but doesn't match up with where the X-rays are, which are shown in pink! This is because, when galaxy clusters collide, the neutral gas inside heats up to emit X-rays, but the individual galaxies (mostly) and dark matter (completely) pass through one another, resulting in a displacement of the cluster's mass from its center. This has been observed before in objects like the Bullet Cluster, but El Gordo is much younger and farther away. At 10 billion light-years distant, the light reaching us now was emitted more than 7 billion years ago, when the universe was less than half its present age.

It's a good thing, too, because about 6 billion years ago, the universe began accelerating, meaning that El Gordo just might be the largest cosmic heavyweight of all. There's still more universe left to explore, but for right now, this is the heavyweight champion of the distant universe!

Learn more about "El Gordo" here:

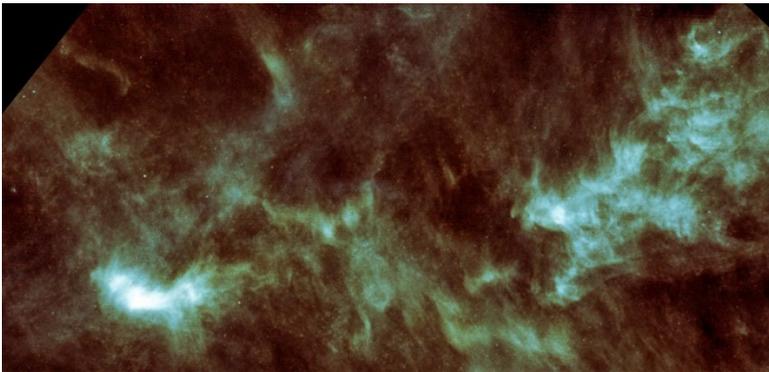
<http://www.nasa.gov/press/2014/april/nasa-hubble-team-finds-monster-el-gordo-galaxy-cluster-bigger-than-thought/>

El Gordo is certainly huge, but what about really tiny galaxies? Kids can learn about satellite galaxies at NASA's Space Place <http://spaceplace.nasa.gov/satellite-galaxies/>.

## Embryos of Stars

From Harvard CfA News, <https://www.cfa.harvard.edu/news/>

Stars like the Sun begin their lives as cold, dense cores of dust and gas that gradually collapse under the influence of gravity until nuclear fusion is ignited. Exactly how the critical collapse process occurs in these embryos, however, is poorly understood, with several competing ideas having been advanced. Material might just freely fall to the center, although in more likely scenarios the infall is inhibited by pressure from



*A far-infrared image of the cold pre-stellar cloud L1544 (the cloud is at the lower left, with other clouds of gas and dust nearby). The cloud is about 450 light-years from Earth in the nearest large region of star formation. New studies of the gas motions in the core show that the stellar embryo is slowly collapsing in a manner that agrees well with some models and excludes others. Image: ESA/Herschel/SPIRE*

warm gas, turbulent motions, magnetic fields, or even perhaps by some combination of them. It might be possible to distinguish between these alternative collapse hypotheses by examining how the core's density varies with radius, but it turns out that (at least for spherical clouds) the predicted density distributions all look about the same. The predicted distributions of velocity for the infalling gas, however, are quite different.

The dust in these cores makes them completely opaque in the optical, and so studying their behaviors requires techniques at other wavelengths. One of the most exciting developments in astronomy over the past decade has been the development of far-infrared and millimeter wavelength tools for the tasks of identifying pre-stellar cores as such, and determining their properties. CfA (Center for Astrophysics) astronomer Eric Keto and two colleagues used observations of emission lines from water and carbon monoxide at both wavelength regimes to measure the velocity distribution of the gas in a pre-stellar, dense core. Each of these gas molecules traces a slightly different density of gas (the typical value in these clouds is about one hundred thousand particles per cubic centimeter).

The data clearly prefer the scenario in which the gas temperature is nearly constant throughout the cloud with just enough total mass present for gravity to drive slow contraction. Actually, the paper's authors were the first to advocate and describe just such a possibility, and these observa-

tions of this particular core bring a satisfying confirmation that no magnetic fields or turbulence is present or needed. The new results highlight the dramatic modern successes in unraveling the earliest stages of stellar birth, and the power of new technology. More cores now need to be measured in order to determine if these particular conclusions have general validity.

### Reference(s):

"The Dynamics of Collapsing Cores and Star Formation," Eric Keto, Paola Caselli, and Jonathan Rawlings, MNRAS 446, 3731, 2015.

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## Shallow Sky Object of the Month

# Blue Straggler Stars in NGC 188

By Bill Pellerin, GuideStar Editor

**Object:** Blue Straggler Stars in NGC188  
**Class:** Young stars in an old cluster  
**Magnitude:** 8.10 (cluster)  
**R.A.:** 00 h, 47 m, 28 s  
**Dec:** 85 degrees, 15 minutes, 18 seconds  
**Distance:** 5400 ly  
**Constellation:** Cepheus  
**Spectral:** Various  
**Optics needed:** Small telescope

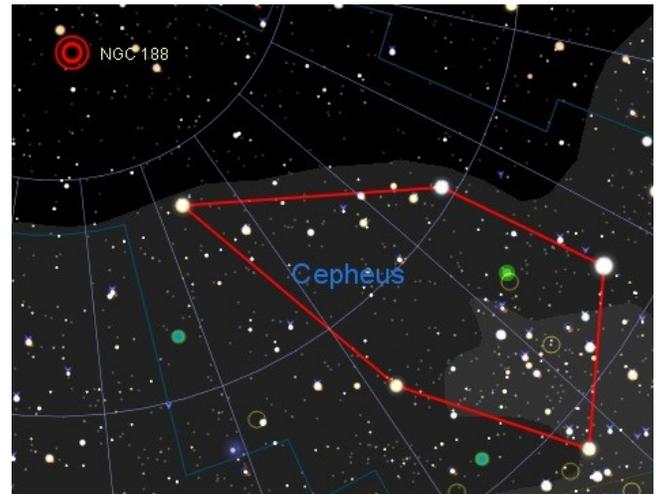
### Why this object is interesting:

Astronomers study stars in open and globular clusters because the stars have the same age and they are the same distance from us. The variable in star clusters is the mass of the star, and the mass of the star determines how the star will live out its lifetime, how long this lifetime will be, and how the star will end its life (often a white dwarf for a low mass star and a supernova for a high mass star).

Because astronomers know how stars age they can use this information to determine the age of the cluster. Stars of different mass will leave mid-life (the main sequence in the HR diagram) at different, but well known times. Let's say that an astronomer sees that some stars in the cluster are exiting mid life and entering the red giant phase. Knowing the mass of such a star, the astronomer can determine the age of the star. Since all stars in the cluster were created at the same time, the age of the star and the age of the cluster are the same.

What if, then, the astronomer sees some cluster stars that *should* have left mid life (based on their mass), but haven't? What's the explanation for this?

These stars are called 'blue stragglers' because they're bluer (hotter and more massive) than should exist in the cluster and they're late to leave the mid-life party. The explanation for these stars is that they were not created with their current mass. They are actually the product of the merger of two or more stars in the cluster. Allan Sandage (student of Edwin Hubble) discovered these 'blue straggler' stars, from observations he made of M3 in 1953.



Finder chart, north is up.

Star charts generated by TheSkyX © Software Bisque, Inc. All rights reserved. [www.bisque.com](http://www.bisque.com)

These mergers can happen because of star collisions, forming the higher mass 'blue straggler' star, they can happen if a star pair spirals inward to form a more massive star, or they can form because a pair of stars consists of a red giant star paired with another star. As the red giant expands, the exterior of the red giant star goes beyond the Roche Lobe of the star pair and material from the red giant flows to the other star in the system.

The Roche Lobe is simply the point at which material from one of the stars will be captured by the other star. While a red giant star is no longer shining by burning (fusing) hydrogen, the star does still have a hydrogen shell at the outer layer of the star. This material is what is transferred to the other star (that ultimately becomes the 'blue straggler'). The red giant, after sacrificing much of its material to the newly minted 'blue straggler' star, becomes a white dwarf. In fact, remnant white dwarf stars have been found to accompany new 'blue straggler' stars, supporting the mass transfer theory.

Observationally, will you see blue stars when you look at the cluster? Probably not. More advanced observers might be able to detect the 'blue stragglers' photometrically. The color of a star can be determined by

(Continued on page 15)

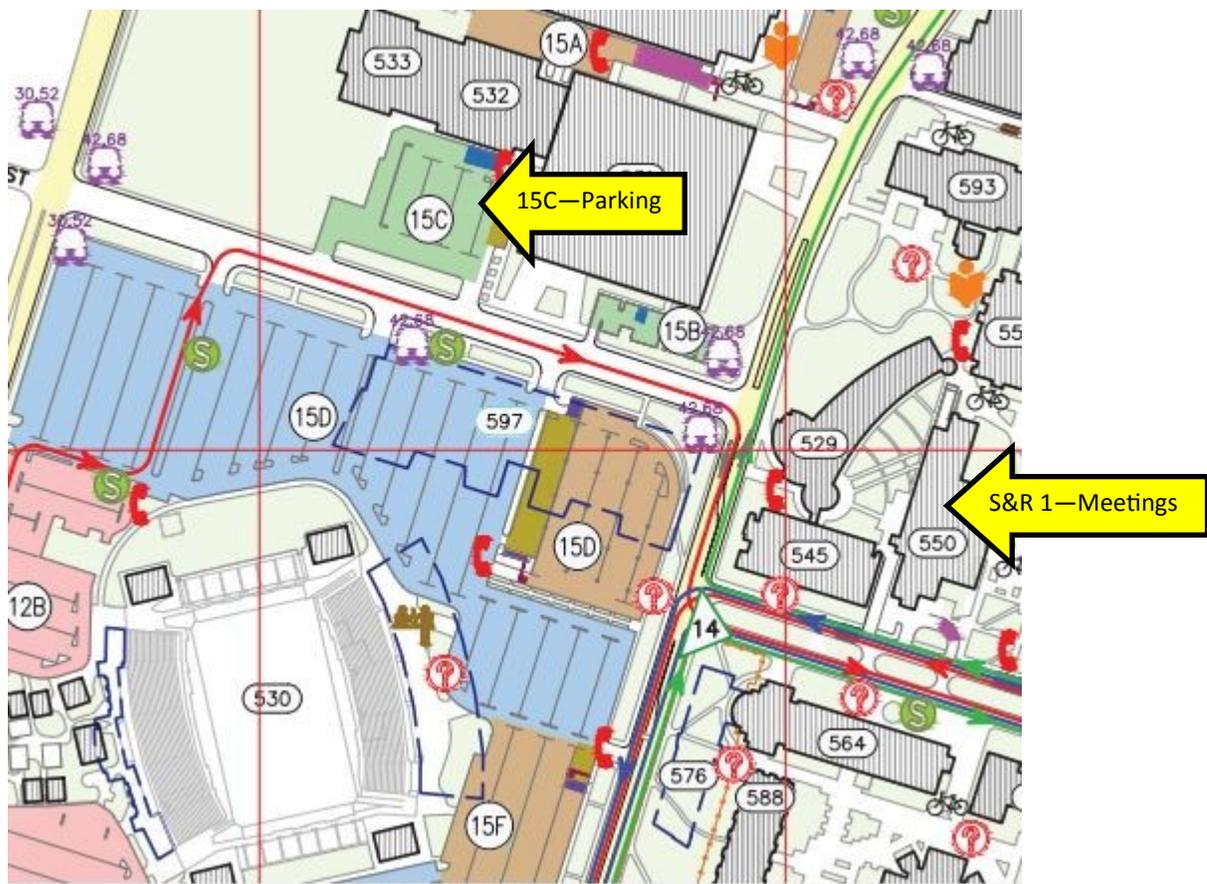
## ***Parking at the University of Houston Main Campus***

### ***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**

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## **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, MS-Word format via email [GuideStar@astronomyhouston.org](mailto: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.

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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.***

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## ***Houston Astronomical Society***

### **Meeting on Friday, March 6, 2015**

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

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