

GuideStar



July, 2015

Volume 34, #7

At the July 10 Meeting

Note: Second Friday!!!

The membership voted to move the July meeting to the 10th to avoid a conflict with the Independence Day holiday

Straddling the Line: Confessions of an Astronomer-Writer

Dr. C. Renée James—Sam Houston State Univ.

How does science news get from scientists to you? And why does it matter whether trained scientists are the ones writing the news? Author of two books and numerous articles for *Astronomy* and *Sky and Telescope*, Dr. James explains the ugly truth about science journalism. Along the way she reveals the reasons behind her journey from astronomer to popular science writer, and how you, too, can help stem the tide of ignorance about the science you love.



Dr. James has been distracted by shiny objects in the Universe for as long as she can remember. Trained as a stellar spectroscopist at the astronomy department of the University of Texas at Austin, she later abandoned determining the chemical abundances of metal-poor stars in favor of exploring astronomy and the history of science with the enthusiasm of a kid playing in the mud after a good rain. She was awarded the Popular Science Writing Award by a division of the American Astronomical Society. Meanwhile, she's been teaching introductory astronomy for non-science majors at Sam Houston State University since 1999.

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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 Flanagan — "Solstices, Equinoxes, and Seasons"

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

See last page for directions and more information.



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

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:

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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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

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.

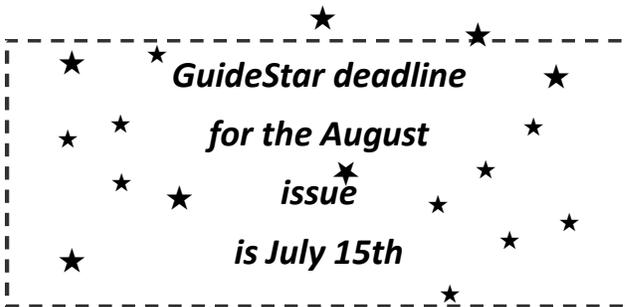
Novice meeting begins at 7:00 p.m., regular meeting begins at 8:00 p.m. Website:

<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-mail bill.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



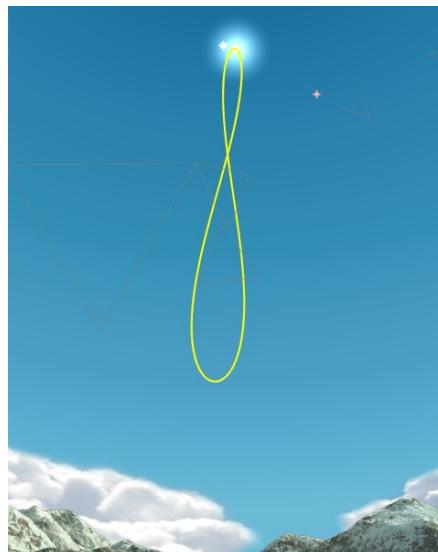
Novice Presentation—July 10, 2015

Solstices, Equinoxes, and Seasons

By **Debbie Moran**

For July, come enjoy a talk by Bill Flanagan on Solstices, Equinoxes and Seasons. We are just past the summer solstice (June 21). This date represents the northernmost excursion of the Sun in the sky. It's the longest day, but is it the earliest sunrise or the latest sunset? It is amazing how that 23.4 degree tilt affects everything on Earth and in the heavens.

In August, we welcome Clayton Jeter who will reveal the mysteries behind collimating or aligning the optics of the very popular Schmidt-Cassegrain telescope. If you own a Schmidt-Cass or are considering buying one for its compact shape and excellent optics, don't miss this talk.



Animation of the Analemma with the Sun near the Summer Solstice point.

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President's Message

by Rene Gedaly, President

Getting around Greater Houston has never been easy. Increasingly I find myself wishing I could cut my commute time and travel only to the fun stuff, activities like hearing a talk on astronomy, helping with a school star party, or getting to the dark site, scope in tow.



Steve Fast, Michael Rapp and Stephen Jones at a recent HAS meeting

That's why I'm particularly excited that a few of the directors are taking a look at the possibility of meeting remotely, primarily to conduct board business that can't wait for the next face-to-face meeting. Being able to meet online is mature technology to be sure, think

WebEx or Skype. Being able to do so at minimal cost for a good-sized nonprofit is an opportunity begging to be explored.

I've asked *Mike Edstrom*, who presented the idea, to chair the study team to find out if it could work for us. *Bill Pellerin* and *Scott Mitchell* will provide their perspectives and round out the group. We'll have to see what they come up with first, but I'm hoping more of us HAS members will want to join a committee as a result of their findings. With the possibility of committee meetings held online, we can reserve drive time for the fun stuff—getting to a star party, an HAS presentation, or an outreach event.

So what do you want to be when you grow up?

Some of the leadership team have begun to ask themselves that very question about HAS. We are board nerds so whenever we have an existential question, we look to the bylaws. *To wit:*

Article III: The corporation is formed for educational and scientific purposes for individuals and groups, of all races, creeds and ethnic backgrounds without regard to sex, for the primary purposes of (1) developing and implementing programs designed to foster awareness in individuals and in the community with regard to astronomical developments and achievements as well as promoting the science of astronomy, and (2) making available to individuals and the community educational resources concerning astronomy.

The message to the community is pretty straightforward. HAS was formed to spread the word about astronomy and provide the resources to learn about it firsthand. It's astronomy for all. We can

credit the founders of the society with the foresight to make our purpose at once so particular while also so encompassing.

Even so, a lot has changed in both astronomy and in society since HAS was incorporated in 1978. We are different individuals and our concept of community has broadened. Article III of the bylaws allows for that. It is up to us, however, to create the vision needed to serve the individuals, groups, and communities we are growing up to be.

Cloudy nights won't interfere with the Pluto flyby on July 14

It's months like these past ones that remind us why we add "armchair astronomy" to our list of interests. If you're into planetary and space science, though, the times have been anything but disappointing. Rosetta's Philae lander woke up, twice as of this writing. Stunning images of the bright spots on heavily cratered Ceres arrive regularly from NASA's Dawn probe. And then there's the New Horizons Pluto Encounter. On its first mission to Pluto and the Kuiper Belt, NASA's New Horizons space probe will make its closest approach to Pluto on July 14. It's going to be a media riot and a lot of fun. I know I'll be watching for *Bill Kowalczyk's* space news summaries.

Keep Looking Up

..Rene Gedaly

President

July/August

Calendar



Date	Time	Event
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July

1	9:20 p.m.	Full Moon
6	5:00 a.m.	Pluto at opposition
8	3:24 p.m.	Last Quarter Moon
10	7:00 p.m.	HAS Novice Meeting, U of H
	8:00 p.m.	HAS General Meeting, U of H
11		Prime Night Star Party, Columbus
15	8:24 p.m.	New Moon
21	7:00 p.m.	HAS Board Meeting, Houston Arboretum
23	11:04 p.m.	First Quarter Moon
25	3:00 a.m.	Ceres at opposition
31	5:43 a.m.	Full Moon

August

6	9:03 p.m.	Last Quarter Moon
7	7:00 p.m.	HAS Novice Meeting, U of H
	8:00 p.m.	HAS General Meeting, U of H
8		Novice Night Star Party, Columbus
13	1:00 a.m.	Perseid meteors
14	9:53 a.m.	New Moon
15		Prime Night Star Party, Columbus
22	2:31 p.m.	First Quarter Moon
29	1:35 p.m.	Full 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 Houston Arboretum at 7:00 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-HASO (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.

<i>Text Message</i>	<i>Alerts about...</i>
OUTREACH	Public Outreach Events
STARPARTY	Members Only Star Parties (HAS observing site)
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>.



Observations... of the editor

by Bill Pellerin, GuideStar Editor

June 17—Neil deGrasse Tyson

On June 17, I spent the evening listening to Neil deGrasse Tyson talk to the sold-out crowd at Jones Hall about science and the movies. His presentation was about what movies got right (science-wise) and what they got wrong. Dr. Tyson said that he enjoyed all the movies that he saw and evaluated but couldn't help himself from picking out some glaring errors.

Wizard of Oz — the Scarecrow attempts to prove he has a brain by reciting the Pythagorean Theorem (which, if you've forgotten, relates the lengths of the sides of a right triangle to each other). Unfortunately, the Scarecrow gets it wrong.

Gravity — while an excellent piece of cinema, the movie allows Sandra Bullock to move among various spacecraft while orbiting the Earth. The problem is that these craft are in wildly different orbits and not close to each other. He also has an issue with Ms Bullock's character — she's a medical doctor who is doing work on the Hubble Telescope. Perhaps not the right skill set. In addition, her hair fails to respond to zero gravity.

Several movies — a man and a woman who are romantically involved (with each other) each notice that the other person's hands are cold. This idea violates the rules of thermodynamics which make it difficult, at best, to determine if another person's hands are cold if *your* hands are cold.

Interstellar — mostly got the science right. Kip Thorne (astrophysicist) was an advisor for the film and he wrote a follow up book *The Science of Interstellar*.

Neil deGrasse Tyson spoke for about two hours and didn't take questions at the end of his talk. This is unfortunate, because I have seen him give presentations at the University of Houston (free to the public) at which he answered several interesting questions with interesting answers after he finished his presentation.

I was pleased to see a presentation by an astrophysicist sold out, but less pleased that the tickets to the event were rather expensive. I got tickets for the balcony to save money, and I figured we could see and hear Dr. Tyson from there with no problems. This proved to be true.

I bought my tickets in November, 2014, so the tickets were in high demand. By the week of the event, tickets were being sold at over 4 times the face value.

Survived the Storm

The recent weather event, with the unfortunate (for me) name of 'Bill' has come and gone. I hope you, your family, and your property survived the storm with no significant problems. I had

reported to an out-of-town friend that the storm was the equivalent of a moderate rain shower at my house, and nothing to get excited about.

Those of us who are named 'Bill', and there are several in the HAS, have had to deal with the 'Mr. Bill' phenomenon from *Saturday Night Live*. We've all heard (in a squeaky voice) "Oh Nooooo, Mr. Bill" too many times.

Fortunately, I suppose, the younger generation has not heard of 'Mr. Bill' so the fallout from the *Saturday Night Live* program is abating. It can't happen soon enough. The other good news is that there won't be another storm named 'Bill' in a very long time.

Arboretum Star Party

June 20th was the Houston Arboretum Star Party. HAS attendees were treated to a very nice barbeque dinner. Bill Flanagan coordinated the event. It was cloudy, but we set up our telescopes in the meadow anyway and visited with the guests who attended the event. It would have been more fun if we could have shared the sky, but we enjoyed supporting the membership drive of the Houston Arboretum. Here's hoping that we have better weather at the next event, not yet scheduled.

Until next time...

clear skies and new moons!

..Bill

Fear No Asteroid: An Interview With Astronomer Judit Györgyey-Ries

By Tomasz Nowakowski



Should humanity be afraid that someday a huge asteroid would fulfill one of the apocalyptic scenarios envisaged for Earth, where a space rock smashes into our planet causing a global disaster? Judit Györgyey-Ries, an experienced astronomer at the University of Texas' McDonald Observatory, is working to calm these fears with a scientific approach to the matter



An artist's illustration of asteroid Apophis near Earth. Image Credit: Dan Durda – FIAAA

In an interview with *SpaceFlight Insider* partner *astrowatch.net*, she discussed potential asteroid threats, her current research and misinterpretation of her words by tabloid newspapers.

Astrowatch.net: Some of the tabloid newspapers like *The Mirror* got you wrong citing

you that the asteroid 2012 TC4 will hit the Earth in October 2017, what exactly have they misunderstood?

Judit Györgyey-Ries: According to the calculation of the JPL NEO [Jet Propulsion Laboratory, Near-Earth Object] office, there is zero chance that the asteroid will hit in 2017. There will be a very close encounter on Oct. 12, 2017 [Universal Time date], when the distance between the center of the Earth and the asteroid is only 0.0009624 AU, that is 8,946 miles [14,398 km]. It is close, but still a miss. According to the Minor Planet Center, the encounter is not that tight; it will be 0.0017 AU, which is 158,024 miles [254,316 km], about three quarter the way to the Moon. Also they latched onto the larger limit of the size estimate, which would of course make the consequences of an impact more severe.

Astrowatch.net: So there's really a very slim chance of this asteroid hitting the Earth,?

Györgyey-Ries: Yes, but the possible collisions are between 2020 and 2026. Whether it happens at all or when will it happen depends on the exact circumstances of the flyby in 2017.

Astrowatch.net: Is there any other potential impactor that we should be aware of in the coming years?

Györgyey-Ries: There are some you can worry about, but the probabilities are very low. You can check all the known possible impactors on the NEO JPL website.

It is not easy to interpret the numbers, but if you choose an object and click on the cumulative impact probability, it will tell you how to interpret it as a



Judit Györgyey-Ries at the McDonald Observatory. Photo Credit: Judit Györgyey-Ries

percent: 1 in XXXX or, even more enlightening, it gives you the 'will not hit' probability.

All the risks are quite small except for 2010 RF12, but it is estimated to be about 23 ft. [7 m], so it will disintegrate in the upper atmosphere without bothering anybody.

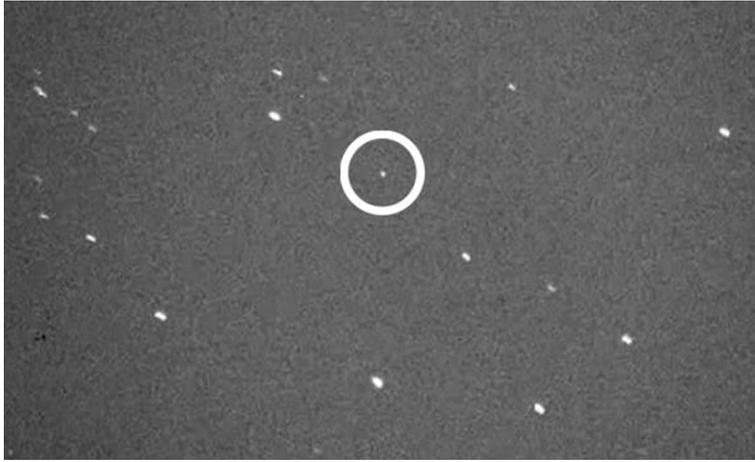
However, the orbit of smaller asteroids are more strongly influenced by non-gravitational effects, so we cannot just say we got them all, some of them needs monitoring. These are the Virtual Impactors and PHAs, or Potentially Hazardous Asteroids. There is no such thing as a perfect observation, or a perfect model, so there are always uncertainties in the orbital solution.

Virtual Impactors are named so, because their data allows for orbits that

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put it on collision course with the Earth. For most PHAs, there is no such orbit at the present, but as their orbit evolves, they



Asteroid 2012 TC4 on Oct. 10, 2012. Credit: Gianluca Masi/Virtual Telescope Project

could eventually collide with Earth. Interesting to note that not all Virtual Impactors are considered Potentially Hazardous, as it has to have a certain size to cause damage.

Earth is being bombarded every day by dust or sand size particles. But we have an atmosphere, which protects us. Objects up to about 82 ft. [25 m] in size burn up, and even the 164 to 262 ft. [50 to 80 m] objects disintegrate before reaching Earth, although they can create a damaging airburst.

Astrowatch.net: How is McDonald Observatory helping to detect possible asteroid threats?

Györgyey-Ries: Knowing what might come is the first line of defense, and I am getting the positions of objects, which might be previously unknown asteroids. McDonald Observatory started a NEO confirmation program in 1995 using the 30 inch [0.76 m] telescope, when the surveys concentrated on the large, bright objects. I joined them around 1997. Eventually, the other team members left.

Since 2012, I am using the 83 inch [2.1 m] telescope to be able to keep up [with] the fainter, newer discoveries. I am just one of the astronomers who regularly observe these newly discovered objects, and our observations are combined by the Minor Planet Center to refine the orbits.

I am not searching for new asteroids. What I am doing is observing the objects the Minor Planet Center (MPC) could not connect to any known asteroids. Those get posted on the MPC website, where I get the approximate ephemerides.

It is important to observe them as soon as possible after posting, because those positions are based on an approximate orbit, which might have little to do with the actual orbit. The longer you wait with the next observation, the larger the uncertainty, so you can lose it. But if I or somebody else gets an observation, they immediately send it back to the MPC and they include those new observations to update the orbit.

Most of the time the new objects are main belt asteroids, some are NEOs, and some are 'rediscoveries' of asteroids, which were assigned provisional designations, but have not been observed for a while, so the 'official' orbit was far off from the real one. With just a couple of observations, they could not connect the orbits, but as more and more observations come in, the program can detect that the two orbits are similar, and if the combined solution gives a better orbit than the two



Objects from space impact Earth all the time, as Barringer Crater in Arizona shows. Photo Credit: Scott Johnson / SpaceFlight Insider

individual ones, you can be sure that it is the same body.

Astrowatch.net: What research do you currently focus on?

Györgyey-Ries: I am pretty much alone

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Just Looking

A GuideStar Interview by Clayton L. Jeter

Deborah Byrd—Texas Star Party Founder



Deborah Byrd is a name that is mostly associated with the annual Texas Star Party, being that it was her brainstorm that got it jump-started several decades ago. But wait...there's more! Deborah is still very active in the astronomy community in many ways.

You're going to really enjoy this month's read about her and her passion for astronomy. Here's Deborah...

The Deborah Byrd bio...

Deborah Byrd was an English major who discovered she had a passion for astronomy. She created the *Star Date* radio series for the University of Texas McDonald Observatory in 1976. Around that same time, she became the first woman president of the Austin Astronomical Society and she founded the Texas Star Party. She worked with McDonald Observatory for 15 years before leaving to establish the *EarthSky* radio series in 1991. In 1994, she established EarthSky.org.



Deborah in the observer's cage of the Palomar 200-inch

She ended the *EarthSky* radio series in 2013, and today, Byrd serves as Editor-in-Chief of EarthSky.org and blogs frequently about astrophysics, the night sky and other topics related to Earth, space and the human world. "Being an *EarthSky* editor is like hosting a big global party for cool nature-lovers," she says.

She has won a galaxy of awards from the broadcasting and science communities, including having an asteroid named 3505 Byrd in her honor.

A science communicator and educator since 1976, Byrd believes in science as a force for good in the world and a vital tool for the 21st century.

The Deborah Byrd interview...

Clayton: It's really wonderful to have you here along with our readers for a long, long overdue interview. Let's get started...

How did you first become interested in astronomy? Were your parents involved?

Deborah: My parents always encouraged us to read. My dad was a writer and newspaper editor, and he read constantly, so my sis-

ter and I both picked up that habit. Starting as a very young teenager – and as recently as, well, this afternoon - I read a lot of science fiction! That was really my start in learning to love the stars.

I was an English major in college, but had to take some amount of science, too, to graduate. I put it off for a long time, but, finally, toward the end of my college career, I took a "physics for poets" class. And I just loved physics. It was like some new gear in my head started turning ... or literally like light bulbs going off in my mind. I didn't have the math background to keep going in physics, but there were many conceptual astronomy classes I could

take. I took as many as I could before graduating. So my adult interest in astronomy really began with conceptual astrophysics. I found I had a knack for picturing things in three dimensions, which is very, very helpful in understanding what the data are saying about objects we can't really see.

I was taking journalism classes at the time, too, and began writing magazine articles about astrophysics, and sold a few. Around that time, I went to McDonald Observatory's UT offices, and offered myself to them as a writer, and, of course, they said no thanks. But I kept coming back and eventually they let me write some brochures on research being conducted at McDonald. Then later I worked my way into a part-time job, writing for them, which after awhile be-

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came a full-time job that lasted for 15 years. Harlan Smith was my boss there, my mentor, and he was a wonderful and inspirational man.

During the first several years of that time, in the late 1970s – before I had children - I spent a lot of time in West Texas, using the small telescopes owned by McDonald for public nights, using binoculars, just looking at the sky with my eye – learning the constellations and major objects. I could really see the sky back then; my eyesight was so much better than it is now.

After I had the kids, I lived in the country outside Austin for a few years, and got a powerful appreciation for the way the sky changes throughout the year, for the moon as it goes through its phases, for the shifting of the sun's path. I guess you could say I got very "grounded" in my knowledge of the sky.

From 1978 on, I was also writing about stargazing for the daily radio series *Star Date*, and also as a monthly sky columnist first for *Sky & Telescope* and then *Astronomy*. I wrote both a northern and southern hemisphere column for *Astronomy*, and so I learned how the sky is the same – and different – from the two hemispheres. And that's how I got a whole-Earth perspective on the night sky, which is useful now since our website is visited by people from all over the world.

After my kids were old enough, we used to take long car trips to state and national parks, and we would do a little stargazing then. We tried to plan our trips for August, around the Perseid meteor shower, and we watched a lot of meteor showers together.

Clayton: It's obvious becoming involved in astronomy; it has changed a direction in your life? But where did all this lifelong passion come from?

Deborah: Well, yes, in one way I changed direction. I was always a writer, even as a child. Looking back, though, I can see how I might have always been headed toward a career writing about astronomy. It seems now, looking back on it, like a long progression of interests.

Overall, I think my passion for astronomy comes from a larger passion for nature as a whole. I'm really just a nature-lover. So probably I could have loved some other science – or some other amateur pursuit, say, bird-watching or some coastal science – just as much. I don't know why some people have a passion for nature and others don't. I did play outside a lot as a child. But loving nature, appreciating nature, is a huge part of me. Stargazing for me is largely about appreciating nature's beauty. And astrophysics is also a way of enjoying and appreciating nature. It's about appreciating the logic and order of things. And the space program, of course, is about exciting new frontiers.

So I don't know where the passion comes from, but I'm very

grateful to have lived a life where I can feel so much for the work I'm doing. I'm very lucky in that way.

Clayton: I'm sure one question we all want to know is how did you conceive the giant Texas Star Party that has been going and going for years? Do you still attend?

Deborah: I haven't been to a Texas Star Party in quite some time. I do still go out to West Texas pretty regularly, sometimes to Big Bend, and sometimes to the state park at Balmorhea, where there's a wonderful spring-fed swimming pool. But I'm not much for crowds.

Clayton: Tell me all about that first Texas Star Party.

Deborah: I was very lucky to be able to work for McDonald Observatory for so many years. They were very supportive of what I was doing there. At one point, before I had children, I applied for time on the smallest telescope on Mount Locke, the 30-inch telescope, just to stargaze. And they were generous in granting me a few nights in the bright of the moon. I really felt that experience was one other amateur astronomers would love to share, so the next year I applied for time on the 30-inch telescope again – and advertised the first Texas Star Party. I organized groups to come up to Mount Locke and use the telescope. That was really my whole idea ... to use the small telescopes at McDonald. And so I organized the first three Texas Star Parties. But of course people brought their own telescopes, and the real Texas Star Party began happening down in the campsites.

Clayton: Chatting about star parties...do you attend others?

Deborah: I gave an invited talk at Riverside one year, but that's the only other big star party I've gone to.

Clayton: I envy you sitting in the 200" Palomar observing cage. Have you actually used this scope? Are there other giant telescopes that you have observed

(Continued on page 11)

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through?

Deborah: Oh gosh no ... I've never used the Palomar 200" and I imagine that telescope would not be the greatest for looking through. The big telescopes are designed to gather a lot of light. That's what they do. They're just big light collectors. They're designed for astronomical research, for data-gathering with various instruments, not for stargazing. I got to visit that telescope, though, via professional astronomer friends who were observing there. It was a huge thrill and an honor to visit the telescope up close and to sit in the observing cage.

I've spent a lot of time sitting around late at night in the control rooms of big telescopes, with professional astronomers, working on my radio show or a magazine article or my website and talking to them about their research.

Clayton: Tell our readers about you and *EarthSky*.

Deborah: After doing the *Star Date* radio series for 15 years, I was becoming more and more interested in writing about the Earth. I didn't have the same passion for Earth science as for astronomy, but there are so many pressing issues related to the Earth. I felt a responsibility to write about them. It was time for me to leave McDonald Observatory, anyway, and get out on my own. So I started *EarthSky* and set it up as a private company. Later, we set up a non-profit, too, so today we have two companies. We began applying for grants and got NSF grants, and support from NASA, plus a lot of private foundation support. We had a great run on the radio for 22 years with *EarthSky*. It was hugely fun and a great honor to be so well received all that time.

We started the website, *EarthSky.org*, in 1994, and for a long time the website was secondary to the radio show. But we kept evolving it to be more. On the advice of Peter Zandan, who was involved on the business side of *EarthSky* for some years, I began to focus more and more on the website.

That was lucky because the radio show had become so difficult to support. Actually, I think it was always difficult, but I had gotten older and less willing to put in the 60-hour weeks. We ended the radio show in 2013.

The website isn't easy to support, either. Science education overall can be a tough business unless you're one of the big players, working with big investors. We've never gone that route, but, still, we've grown to be a very respectable second-tier website. We now survive mainly via ad revenues and sales from our store. We have one small grant, and recently we ran a very successful crowd-funding campaign. We are coming to rely and more and more on donations. Our website has about 3 million visitors a month, and plus we have great communities on Facebook, Twitter and Google+.

Running a science website is great fun! It's much more fun than doing the radio show, or writing for magazines, because people

talk back to you. Running the *EarthSky* website means we are part of a big global community, the *EarthSky* community. I have friends from all over the world via our website, and via our Facebook, Twitter and Google+ pages. These are people I talk with online frequently but have never meet.

It's a true meeting of minds and hearts among people who love and appreciate nature, the Earth and the night sky.

Clayton: I'd like to know a little about your telescope(s). Where do you observe? Visual, astrophotography, sketch, or whatever?

Deborah: I was never into the equipment side of astronomy, and nowadays I don't observe much. My eyesight isn't what it was when I was young. No matter how I try to get my eye doctor to alter my glasses prescription, I still just can't see as well as I used to. Plus I practice yoga regularly now, and I get up every day at 4 a.m. for that. I still get outside for the big events - meteor showers or eclipses. My back deck faces due east, and is up on a hill, so I can still watch the moon and planets with the unaided eye. But I'm not an active binocular or telescopic observer.

Clayton: How would you like to see your own astronomy grow?

Deborah: I'm extremely satisfied with my own astronomy and feel blessed because of it, beyond anything I ever imagined as a young person.

Clayton: Think you'd like to travel to the International Space Station? How long would be long-enough up there?

Deborah: I'm in my mid-60s now, and my days of wanting to travel to space personally have passed. And of course I get to travel to space regularly, by thinking about it so much.

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

(Continued on page 12)

(Continued from page 11)

Deborah: I would say that astronomy isn't just about telescopes. It's about the night sky. And there are many, many ways of enjoying the night sky and outer space, whether that's using the latest equipment or just sitting in a chair and looking up, or even just reading about astrophysics or following the space program. All of those things are very, very fun and interesting.

So my advice would be to enjoy it and experience it on any level you like. It's not a competition, and it doesn't have to be one thing or another.

Clayton: Is there an email address that you have that a Houston Astronomical Society member could contact you for an additional question or two?

Deborah: My email address is dbyrd@earthsky.org

Clayton: Thanks Deborah 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.

Deborah: Thank you for having me.

Clayton: Clear skies always...

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

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.

(Continued from page 8)

doing the NEO observations at McDonald Observatory. When I have time, I am observing asteroids to get light curves and calculate rotation periods. If I have a good enough light curve, I can estimate rough shapes.

Astrowatch.net: What do you think about NASA's Asteroid Redirect Mission as the planetary defense project?

Györgyey-Ries: I am not familiar with all the details, but I feel we need to study possible methods to modify asteroid orbits.

Astrowatch.net: What is the most effective way of protecting our planet from asteroid threats; do you know any proposed projects, concepts?

Györgyey-Ries: There is not one perfect solution. What we need to do will depend on when we spot the threat, how much time we have left, [and] how big is the asteroid. If we discover one on collision course early enough, we can probably tug it gently – that is using the gravitational attraction between the asteroid and a spacecraft to change the orbit. This is the gravitational tractor; I like this because it does not disrupt the asteroid.

Other methods are the kinetic impactors, when you hit the asteroids with one or more sufficiently massive bodies to push it off its original course. You can also use stand off nuclear detonation, or when all else fails – blow it up. As the debris spread, some of it will still hit the Earth, but some misses, so you reduce the damage. That is why we do the survey now, to give ourselves enough time to figure out how is best to proceed.

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

No Surprise!

Earth's Strongest Gravity Lies Atop The Highest Mountains

By Dr. Ethan Siegel



Put more mass beneath your feet and feel the downward acceleration due to gravity increase. Newton's law of universal gravitation may have been superseded by Einstein's, but it still describes the gravitational force and acceleration here on Earth to remarkable precision. The acceleration you experience is directly proportional to the amount of mass you "see," but inversely proportional to the distance from you to that mass squared.

The denser the mass beneath your feet, the stronger the gravitational force, and when you are closer to such a

mass, the force is even greater. At higher elevations or even higher altitudes, you'd expect your gravitational force to drop as you move farther from Earth's center. You'd probably also expect that downward acceleration to be greater if you stood atop a large mountain than if you flew tens of thousands of feet above a flat ocean, with nothing but ultra-light air and liquid water beneath you for all those miles. In fact this is true, but not just due to the mountain's extra mass!

Earth is built like a layer-cake, with the less dense atmosphere, ocean, and crust floating atop the denser mantle, which in turn floats atop the outer and inner cores of our planet. An iceberg's buoyancy is enough to lift only about one tenth of it above the sea, with the other nine tenths below the surface. Similarly, each and every mountain range has a corresponding "invisible mountain" that dips deep into the mantle. Beneath the ocean floor, Earth's crust might be only three to six miles thick, but it can exceed 40 miles in thickness around major mountain ranges like the Himalayas and the Andes. It's where one of Earth's tectonic plates subducts beneath another that we see

the largest gravitational anomalies: another confirmation of the theory of continental drift.

A combination of instruments aboard NASA's Gravity Recovery and Climate Experiment (GRACE) satellites, including the SuperSTAR accelerometer, the K-band ranging system and the onboard GPS receiver, have enabled the construction of the most accurate map of Earth's gravitational field ever: to accelerations of nanometers per second squared. While the mountaintops may be farther from Earth's center than any other point, the extra mass of the mountains and their roots – minus the mass of the displaced mantle – accounts for the true gravitational accelerations we actually see. It's only by the grace of these satellites that we can measure

this to such accuracy and confirm what was first conjectured in the 1800s: that the full layer-cake structure of Earth must be accounted for to explain the gravity we experience on our world!

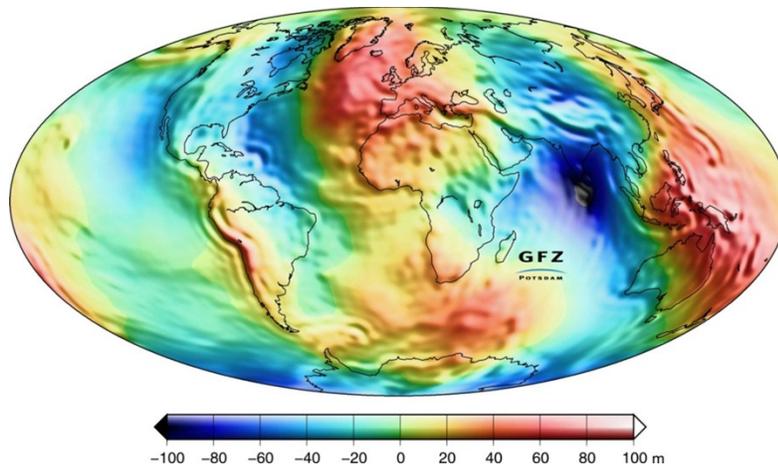


Image credit: NASA / GRACE mission / Christoph Reigber, et al. (2005): An Earth gravity field model complete to degree and order 150 from GRACE: EIGEN-GRACE02S, Journal of Geodynamics 39(1), 1–10. Reds indicate greater gravitational anomalies; blues are smaller ones.

Observatory Corner

By Mike Edstrom, Observatory Director

Thanks to a donation to the observatory committee we now have a 10'x5' utility trailer for use moving equipment and materials at the site. We also had to replace a lawn tractor so we can efficiently keep the site in usable condition.

Progress is being made on the new private observatories 2 are under construction and the field electric lines have been run. There are still 5 plots available please contact me at medst22531@msn.com with any questions.

We are coming into the hotter time of the year it is the time so be sure to drink plenty of fluids when you come and 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 if you



should forget we have them available on the website for your convenience just look on the Observatory page fill it in and submit it electronically.

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

medst22531@msn.com

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UT Astronomy

Start of Construction for Giant Magellan Telescope



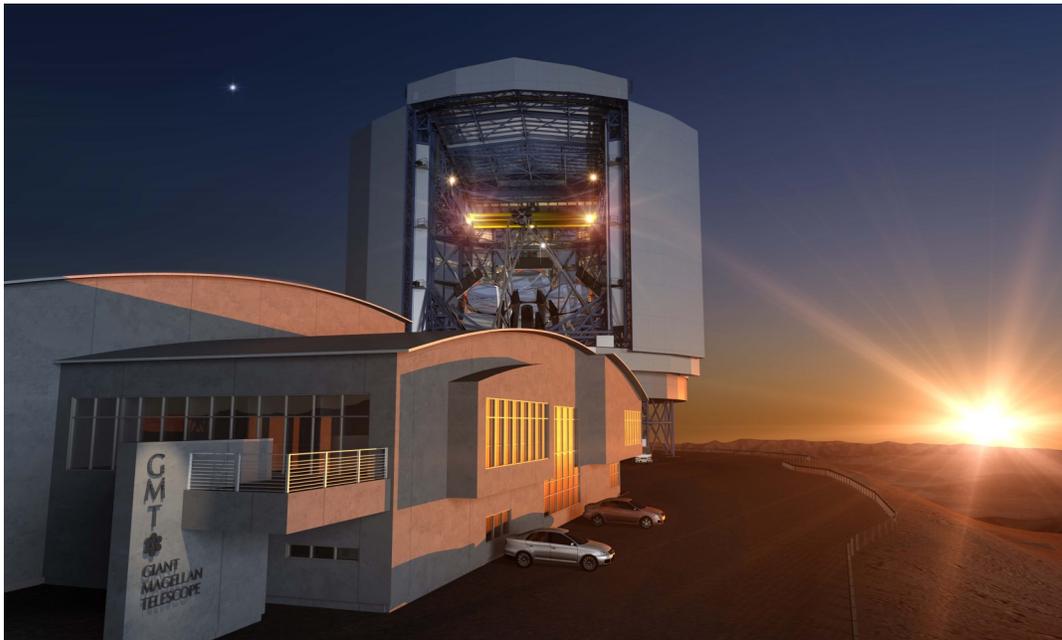
3 June 2015

AUSTIN — The Giant Magellan Telescope (GMT) has announced a major milestone today with 11 international partners including The University of Texas at Austin unanimously approving its construction, securing the future of the project with more than \$500 million to begin work on the world's most powerful optical telescope. The decision initiates final design and fabrication of the GMT, which is poised to become the largest optical telescope in existence.

"We are excited to work with 10 other world-class partners to develop a telescope that will address the most important issues in astronomy today," said Dean of Natural Sciences Dr. Linda Hicke. A global

area of the current largest optical telescopes in existence. The GMT will enable astronomers to look deeper into space and further back in time than ever before, producing images up to 10 times sharper than those produced by the Hubble Space Telescope. It is expected to see first light in 2021 and be fully operational by 2024.

A ground-based telescope planned for construction at the Las Campanas Observatory in northern Chile, the GMT will give scientists a powerful new tool to better



understand how stars and galaxies formed shortly after the Big Bang, to measure the masses of black holes billions of light years from Earth, and to discover planets orbiting other stars in the Milky Way galaxy. It will reveal the faintest objects ever seen in space, including extremely distant and ancient galaxies, whose light

scientific collaboration, the GMT has institutional partners in Australia, Brazil, Korea, the United States, and in host nation Chile.

GMT is integral to the future of astronomy at The University of Texas at Austin. "The Giant Magellan Telescope will transform our research and education programs in astronomy, and will complement our facilities at McDonald Observatory in West Texas," said McDonald Observatory director Dr. Taft Armandroff.

The 25-meter telescope aims to be the first of the new generation of extremely large telescopes, with more than six times the collecting

has been travelling to Earth since shortly after the Big Bang, 13.8 billion years ago.

"The decision by our partner institutions and the Board of Directors to start construction is a crucial milestone on our journey to making these amazing discoveries through state-of-the-art science, technology, and engineering," said Dr. Wendy Freedman of the University of

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Chicago, chair of the Giant Magellan Telescope Organization (GMTO) Board of Directors.

The construction approval means work will begin on the telescope's core structure and the scientific instruments that lie at the heart of the \$1 billion project.

"The University of Texas at Austin plans to help develop the telescope's high-technology instrumentation," Armandroff said.

Early preparation for construction has included groundwork at the mountain-top site at Las Campanas and various stages of fabrication of four of the telescope's seven 8.4-meter (27-foot) primary mirror segments.

Each mirror segment weighs 17 tons and takes one year to cast and cool, followed by more than three years of surface generation and meticulous polishing at the Richard F. Caris Mirror Lab of the Steward Observatory of the University of Arizona in Tucson, Ariz. Taken together, the total light-collecting area of the mirrors will be 25.4-meters (82 feet).

The Giant Magellan Telescope Organization (GMTO) manages the GMT project on behalf of its international partners: Astronomy Aus-

tralia Ltd., The Australian National University, Carnegie Institution for Science, Fundação de Amparo à Pesquisa do Estado de São Paulo, Harvard University, Korea Astronomy and Space Science Institute, Smithsonian Institution, Texas A&M University, The University of Arizona, The University of Chicago, and The University of Texas at Austin. Funding for the project comes from the partner institutions, governments, and private donors.

Connect with the Giant Magellan Telescope Organization on social media: gplus.to/gmtelescope, twitter.com/GMTelescope, facebook.com/GMTelescope, and visit <http://www.gmto.org>.

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



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community!

Progress on the Hobby-Eberly Telescope

By Matt Shetrone, Research Scientist, McDonald Observatory



May 25 — This was a big week for us. The Corrector optics and the Focal Plane Assembly arrived this week. Instead of the normal, mostly text report, I thought I would just post a few pictures showing their arrival.



The Wide Field Corrector on its test stand in Arizona just before being loaded into the transport box.



The WFC in the transport box coming slowly up the mountain. It had a police escort and traveled 45 mph all the way from Arizona!



The experts from Crane Services lift the WFC over to the mouth of the loading bay. Then our expert sky track driver moves it the rest of the way.



The Focal Plane Assembly, which will hold all of the guide probes and science fibers, arrives at the HET and is moved into the loading bay and then into the dome.

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

Supernova Ozymandias

By: *Phil Plait, Bad Astronomy*, http://www.slate.com/blogs/bad_astronomy.html

Over 6000 light years from Earth, a massive star was dying.

Its core was hot chaos. The star had been fusing hydrogen into helium for millions of years before running out of fuel. Then it started fusing helium into carbon, but then ran out of this fuel in just a million years. Carbon fusion initiated, churning it into neon for a millennium, then neon into magnesium for a single year. It fused the resulting oxygen into silicon, running out in just a few months. Just the day before — a single day, after all those eons! — it began fusing silicon into iron.

And it was doomed. Iron fusion is unsustainable. In a single instant the core collapsed, unleashing a fury of energy and subatomic particles that slammed into the material above.

The star exploded. And it looks like this:



This is destruction on a scale our brains cannot truly grasp. Octillions of tons of matter were blasted outward at a significant fraction of the speed of light, and it briefly outshone every single star in the Milky Way galaxy combined. Traveling for six millennia, that wave of light finally washed over the Earth in the year 1054. A thousand years later, we now see the debris from the explosion as a glowing filamentary mass we call the Crab Nebula.

I am enamored of this picture. It was taken using the 2.2-meter MPG/ESO telescope in Chile, equipped with a camera called the Wide Field Imager. Usually, images of the Crab show it in loving detail, the tendrils and wisps of gas excruciatingly clear.

But I've observed the Crab countless times using binoculars and my own telescopes over the years, and it appears as just a faint patch of light amidst a thousand stars. This image is the best of both worlds, showing lovely detail but still putting the object in context.

The field of view of this image is a half degree, about the same size as the full Moon on the sky. The Crab is the result of one of the single most violent events the Universe has to offer, and this happened relatively close to Earth; the Milky Way is 100,000 light years across, and the Crab is a small fraction of that distance away.

And yet, there it is, reduced in stature, almost subdued, a tribute not so much to the star-destroying power of a supernova but to the mind-crushing vastness of space.

Astronomy is more than just a science. It provides a fascinating glimpse into the contrasts of nature. Even the mightiest events since the beginning of time itself succumb to simple distance.

*This content distributed by the
AAVSO Writer's Bureau*

Shallow Sky Object of the Month

100 Her—A Matching Double Star

By Bill Pellerin, GuideStar Editor

Object: 100 Her, SAO 85753, STF2280
Class: Double Star
Magnitude: 5.8, 5.8, combined 5.79
R.A.: 18 h, 07 m, 50 s
Dec: 26 degrees, 05 minutes, 51 seconds
Distance: 230 ly
Constellation: Hercules
Spectral: Matching A3V stars
Optics needed: Small Telescope

Why this object is interesting:

One of the challenges of double stars is figuring out what catalog they're in, what their catalog number is, and what catalog numbers are represented on my map (paper or computer). *SkyTools* lists eleven catalog designations for this star. TheSky recognizes 100 Her by at least three designations. You should be able to find it by one of the designations given here, and if that fails, you can find it by its RA and DEC.

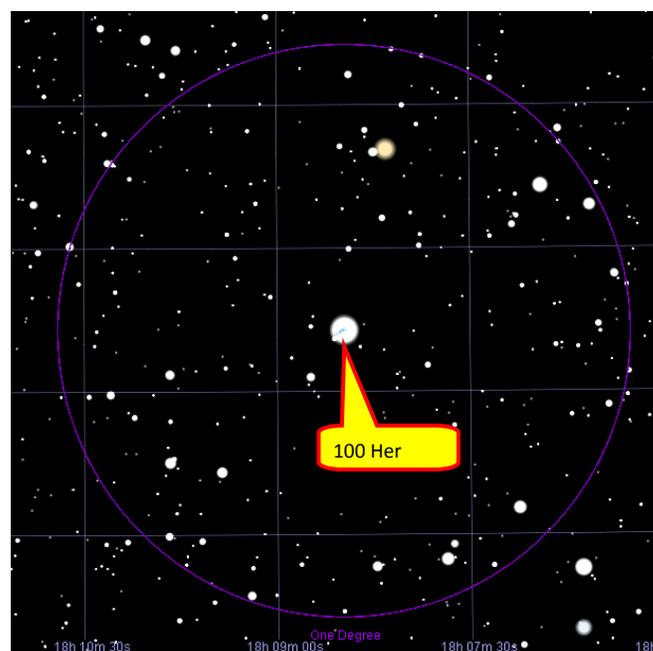
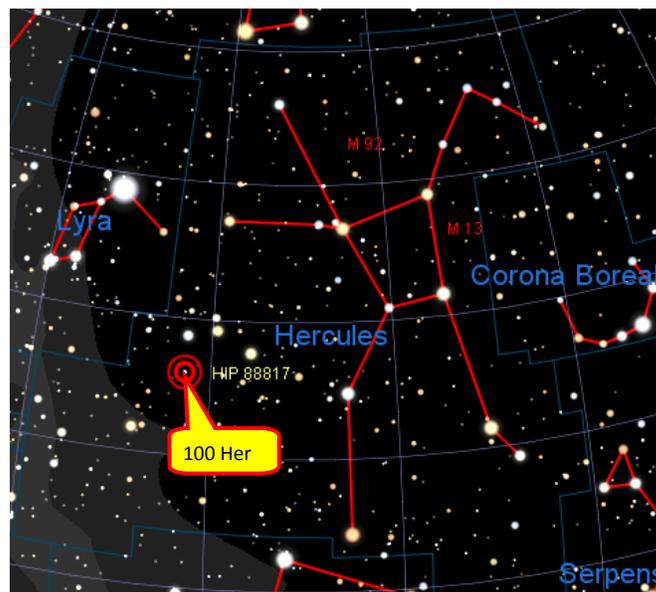
The STF (think 'Struve the Father') designation is interesting because it identifies this star as being in the Friedrich Georg Wilhelm (von) Struve (1793-1864) catalog. The catalogs for FGW Struve are written with a Sigma and then a catalog number (example $\Sigma 2280$) or with the STF designation. Those cataloged by his son, Otto Wilhelm Struve (1819-1905), have the letter O preceding the Sigma character (example $O\Sigma 18$) or use STT preceding the catalog number.

The grandson of Otto Wilhelm Struve, also named Otto (1897-1963), was the first Director of the UT McDonald Observatory (1932-1947).

What you'll see when you look at this double star is a pair of stars (nearly) perfectly matched in brightness and color. When I see a pair like this I think of headlights approaching on a long dark road.

The color designation indicates that each of these stars is white, with a 'surface' temperature between 7500 and 10,000 degrees Kelvin. They are low mass stars and a spectral analysis would show a strong hydrogen absorption line (mean that there's a lot of hydrogen in the outer layers of the star).

The August, 2007 *GuideStar* has another double star in Hercules, 95 Her.



Finder and detail charts — north is up. Circle on detail chart is 1 degree on the sky.

Star charts generated by TheSkyX © Software Bisque, Inc. All rights reserved.

www.bisque.com

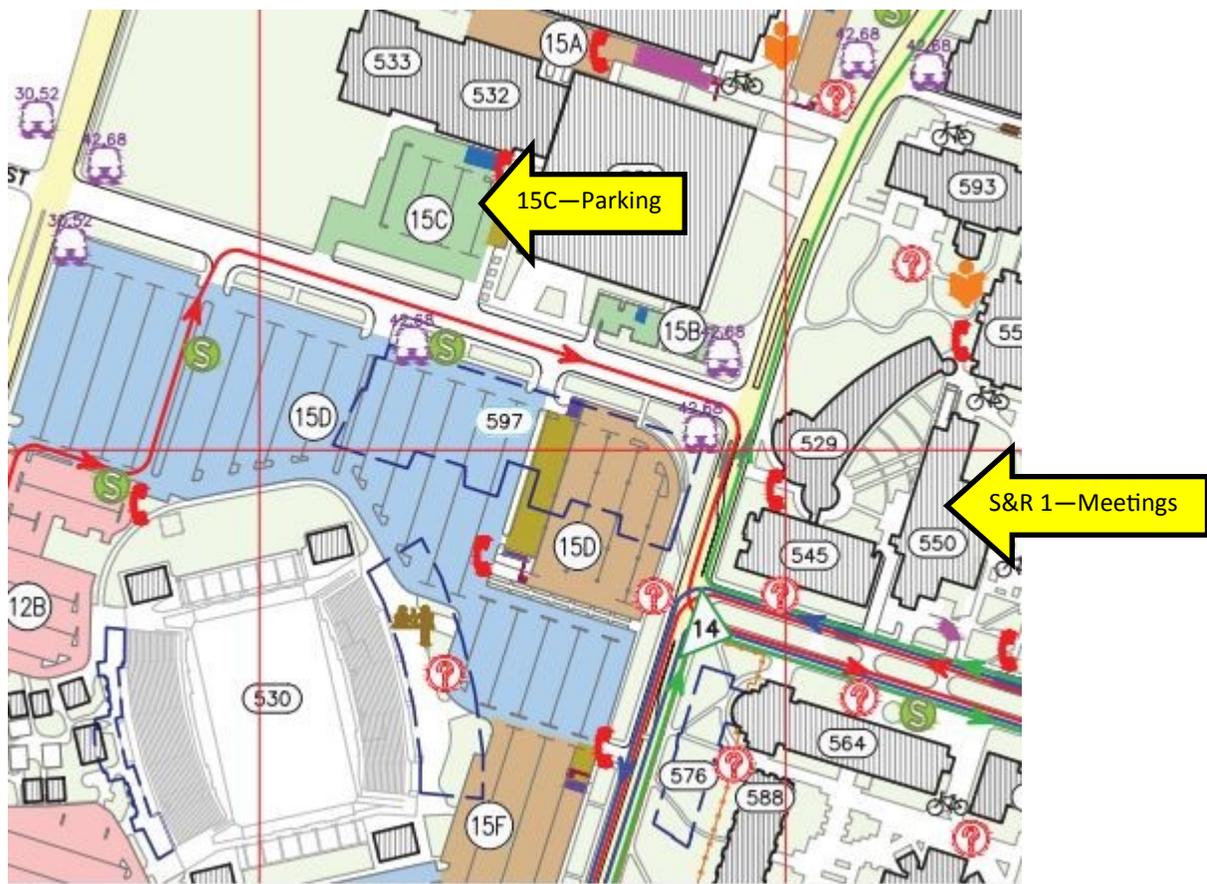
Parking at the University of Houston Main Campus

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, 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.

Editing & Production: Bill Pellerin,
713-880-8061

Email: GuideStar@astronomyhouston.org

Advertising: Advertisers may inquire concerning ad rates and availability of space.

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, July 10, 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
- 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.**