

GuideStar



May, 2011
Volume 29, #5

At the May 6 meeting...

The Sun and Space Weather

Stephen Bradshaw

We're living close, in astronomical terms, to a mid-life star that we call the Sun. While the Sun may look like it's quietly going about its business of fusing hydrogen to helium, it's not. It is events on the Sun that create what we call 'space weather'.



The Sun is now becoming more active — more sunspots, more flares, more coronal mass ejections, the solar wind. Do we care? Yes.. We care quite a bit because space weather can affect earth in very significant ways. Aurora, telecommunications, power transmission, the global positioning system, among others.

At this meeting, Dr. Bradshaw, from Rice University will teach us the basics of the Sun and its relationship to space weather.



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.

Schedule of meeting activities:

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

Novice meeting: 7:00 p.m.
"The End of the World" — Bill Leach, former HAS president

General meeting: 8:00 p.m

See last page for directions and more information.

The Houston Astronomical Society

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

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Audit Scott Mitchell H:281-293-7818
 Education Richard Nugent H:713-524-1993
 Field Tr./Obsg Siobhan Saragusa H:713-376-5873
 Novice Justin McCollum H:409-212-2795
 Observatory Bob Rogers H:281-460-1573
 Program Brian Cudnik H:832-912-1244
 Publicity John Missavage C:281-795-4443
 Telescope John Haynes H:802-363-8123
 Welcoming Katy Keene
 katykeene@comcast.net

Ad-Hoc Committee Chairpersons

Texas Star Pty Steve Goldberg H:713-721-5077

Advisors

Dr. Reginald DuFour, Rice Univ.
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Dues and Membership Information

Annual Dues: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.

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Special Interest Group Listing

Any member who wants specific information on a SIG listed below may call the listed individual. Anyone who wants to offer to coach another member on his or her special interest is invited to have a listing in this section.

Advanced Bill Leach 281-893-4057

2011 Star Party Dates

- Pending

Other Meetings...

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

Fort Bend Astronomy Club meets the third Friday of the month at 8:00 p.m. at the First Colony conference Center. Novice meeting begins at 7:00, regular meeting begins at 8:00. Web site: <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

Observations... of the editor

by Bill Pellerin, GuideStar Editor

Texas Star Party begins May 29!!

It's showtime! Time to get yourself into gear and get ready for the 2011 Texas Star Party. There have been significant fires in and near Fort Davis, Tx, but none at the Prude Ranch (home of the TSP), Limpia Crossing (home of many of our amateur astronomer friends), or the McDonald Observatory (nearby).

In fact, the people of Fort Davis want the Texas Star Party to be the big success that it always is. The TSP attendees will be spending money in Fort Davis, and doing so will be good for the economy. There were some homes that were burned during the fire, and fires remain active in the region. I've been following this story by looking at, and listening to:

www.marfapublicradio.org

If you're subscribed to the HAS list server you have been receiving updates on this. If you don't yet subscribe, go to www.astronomyhouston.org. Look for the 'List Server' link at the right of the page, and follow the instructions to sign up.

I'm working on a presentation for the TSP on "CCD Photometry". I'll show participants how they can perform high-accuracy photometric measurements on variable stars, or other objects, with a simple telescope and camera setup.

It's going to be a great week under dark, West Texas skies. I hope to see you there.

Neil deGrasse Tyson at the University of Houston

I went to the University of Houston on April 13 to see Neil deGrasse Tyson give a talk. Dr. Tyson is the Director of the Hayden Planetarium in New York City and he is the host of the 'Nova Science Now' program on PBS. The talk was to begin at 7:00 p.m. and I got to the campus about 6:20 or so. The line to get into the Cullen Auditorium was way down the block. Yikes!. Since I had made the effort to come to the lecture, I got in line, thinking that it was unlikely that I'd get in. As it turned out, I *did* get in and it was a great lecture. You can see it online here:

<http://www.uh.edu/news-events/stories/2011articles/April2011/041411TysonTalk.php>

The auditorium was full, and I don't know if everyone who was in line got in. If you watch the presentation, be sure to watch the question and answer period at the end. Dr. Tyson answers question about why Houston didn't get a space shuttle and about the politicizing of science. (His reply, "The good thing about science is

that it's true whether or not you believe it.")

The 4% Universe

I'm reading a book called *The 4% Universe: Dark Matter, Dark Energy, and the Race to Discover the Rest of Reality* by Richard Panek. The book is about how only 4% of the universe is the stuff we can see — stars, planets, comets, nebulae, etc., and the other 96% is dark matter and dark energy. It is a book of scientific history and covers some of the ground covered in *The Day We Found the Universe* by Marcia Bartusiak. In *4% Universe*, there's the story of how we measure distances to far-away galaxies and how Vera Ruben discovered this 'stuff' we call dark matter. It's a well-told story that you'll enjoy. If you know some of the science it will help, but if you don't you'll still like the story. I highly recommend this book.

Astronomical League

I have been submitting an article a month to the Astronomical League, for the web site. Check these out at www.astroleague.org.

Also, I've submitted my 'Observing Stellar Evolution' AL program. It has to be approved by the board of the league, but I'm looking forward to sharing this program with you. It's amazing to me that we can see most of the stages in the lifetimes of stars.

Until next time...

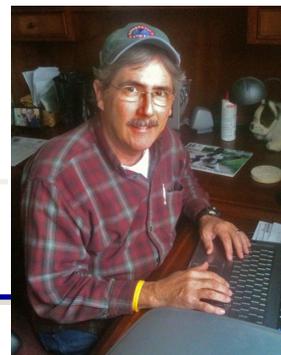
clear skies and new moons!

..Bill

Just Looking

A GuideStar Interview by Clayton L. Jeter

Diane and John Klebenow



It's so fun to meet new folks in this hobby we call, "astronomy". What's even more fun is to meet astronomers on the field at a star party or while visiting an astronomy club in another city. About a year ago I did just that while speaking for the Brazosport Astronomy Club/ Planetarium in Clute, Texas. The talk was about the Schmidt Cassegrain. Afterwards I chatted with many of the membership including Diane and John Klebenow. Turns out that this husband and wife team are both presidents of this club! You heard me right, both.



Klebenow's...

I decided several weeks ago to get in contact with this dynamic-duo and grab an interview. After reading their separate bio's and learning about their astronomy, you're really going to love this couples love for the hobby. Enjoy their interview like I have; here's the

The Diane and John Klebenow bio...

Diana's story --

My earliest interest in astronomy, or rather in space, was born when I was lying on the living room floor at my childhood home in Odessa, Texas, watching the first moon landing – live! It was so cool, to think that perhaps someday, I could go there. So I directed my education toward being an astronaut, all the way through grad school. I knew I was too short to be an astronaut, but I hoped to be involved in the Space program. About the time I finished my graduate work, the Space Program was put on hold so there were no jobs. I have to say I was very disappointed, but went to work in industry and followed the different missions as I could. The big Space Program successes were my success, and I grieved when there were failures. I wasn't so much into the numbers of the missions or names of the astronauts, but I was (and am) very interested in their goals and accomplishments.

The first memory I have of looking through a telescope was with John in about 1992.

I remember seeing Hale-Bopp when it was still very far away, through big binoculars that an amateur astronomer shared with us during a public event at George Observatory in Brazos Bend State Park. We discussed getting a telescope, but did not follow up at the time.

In 2001, I was on a temporary job assignment in England for 10 months. I enjoyed the assignment and was glad to get home – my flight left on 10/10/01 from London Gatwick airport. I was so glad to be home, since John was working his job here in Texas. My family was safe. But I was very surprised that John had a full blown hobby – he had gotten a telescope and was going out every evening to look at the sky. He would find something and open the door to yell "Hey, come look what I found in the sky!" I would drop what I was doing and go look. What really clinched the deal for me was Saturn – amazing, they weren't lying about the rings in all those text books. From then on, I was out there with him on many nights.

In early 2002, we joined the Brazosport Astronomy Club at the Brazosport Planetarium. It really impressed us that the Planetarium worked so closely with the club – no membership dues, since there is no fee to rent the space for our meetings. The last several Astronaut classes have had star identification training at Brazosport Planetarium – back to my love of space. When the president of the club stepped down, John was elected president. The first big surprise to me was that he said he would not do it without me as co-president; the second surprise was that the club agreed! So I refer to John as the Techie, while I am the Talkie (and note taker)...public speaking and taking

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notes on observations are easy for me and the technical aspects are John's forte, so we make a great team. We have worked with the club to build our public outreach programs – this year will be our 7th annual spring Astronomy Day event, we joined Night Sky Network in 2005, and each school year we give 7 – 10 school star party events. The club goes all out to sponsor two large public events each year at the Planetarium and we take information about the Planetarium programs to all of the schools when we have a star party. We enjoy supporting the Planetarium and sharing an active interest in Astronomy with the public.

Last year, John and I finished building our observatory at a secret location in the Hill Country of central Texas. He designed the building and I acted as go-fer and painter. We are looking forward to many hours of beautiful sky watching. It is very calm, quiet, and the beauty of creation astonishes me each time I look closely. Besides, it is fun to look at the stars with my Sweetie!

John's story --

I was a mere 5 months old when JFK announced the goal of going to the moon. My earliest memory of space/astronomy was watching one of the Apollo missions on TV in elementary school. We didn't spend much time on the subject. There wasn't much emphasis on science in early grade school back then.

My father, a heavy smoker, would have his last smoke of the evening out under the stars, in the driveway of our rural Illinois home. I often wondered what he was thinking as he looked up at the heavens. In early 1976 Dad got me out of bed one morning, well before dawn. As he sat smoking the day's first cigarette, he had seen something strange in the sky, and wanted me to see it, too. We stood watching the ghostly apparition the better part of an hour, never determining what it was. Years later, I realized it was Comet West, one of the greatest comets of our time.

As the next decade unfolded, I watched the successes, and failures, of the space program. Just as people vividly remember where they were when they heard the news of JFK's assassination, I remember what I was doing, and how overwhelmed I was, on hearing of each of the shuttle tragedies. Yet, with all of the history, the discoveries and scientific advancement made during those years, nothing inspired my desire for discovery more than that rickety little cardboard – tube reflector, aimed at the moon. Alas, it would be 2001 before I would get my first serious telescope.

I didn't think that astronomy as a hobby would be so consuming, but in the next years, it was. Some nights, I would stay out late observing, and get only a few hours sleep before getting up at 3am to drive to the plant in Pasadena and put in a 12 hour shift.

After a few months with that first serious telescope, an 8" reflector, I was ready for something bigger. Armed with a 12.5" Dob, I was ready to take on the universe. Those mild nights under a canopy of stars, with just the 12.5, and ourselves, a star chart and red flashlight, are both exciting and calming at once. And sharing this kind of experience with 100 school kids is very satisfying. We hope they find new inspiration.

Since the early days of our astronomy hobby, I am so in awe of the beauty of our universe, I put an inscription in some freshly poured concrete sidewalk in our backyard – PSALM 147:4. Just so people will ask.

The Diane and John Klebenow interview...

Clayton: It is wonderful for both of you to sit through this interview process for our H.A.S. readers here in the *GuideStar* newsletter. Many folks tell me that they just don't have the time. Thanks for being so thoughtful.

Can you tell me Diane about your passion for astronomy and where you're going in this hobby of yours?

Diane: Right now I am enjoying the beauty of the night sky. In the future I would like to spend time getting into imaging and studying star spectra.

Clayton: Tell our readers a little about your club's membership and activities. Many of our H.A.S. members have never heard of your club.

John: Our club has actually been around a long time, it's membership waxing and waning, and had even dissolved a couple of times. The club currently has a core of about 12 members. We've never charged dues – we don't want to turn away anyone. No dues, yet we're able to accomplish everything we want. Our members come from all walks of life; students, teachers, industry professionals. Our focus is outreach – we have star-gazes for local elementary and middle schools throughout the year.

Clayton: You told us that you really love Saturn... what other planets or deep sky objects do you like?

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Diane: Jupiter is a very close second, but all of the planets intrigue me. For deep sky objects, it is hard to beat Orion's Nebula for complexity & sheer size.

Clayton: Are you a visual observer only? Tell us about your observatory. Is it a dome? What instrument is mounted inside?

John: I've just started to dabble in imaging, but still find visual observing very satisfying. The Crown Mountain Observatory is about 90% complete. It houses a 12" LX200 under an 8' dome. The structure is of conventional construction – 8' ceiling and a normal size door- so there is no crouching down to get inside! The interior has a 50's diner motif!

Clayton: What's it like observing together? Do you guys fight over the eyepiece vistas?

Diane: We usually use the 12.5" dobs. I can set it up, but John does most of the "finding." I think we get equal eyepiece time!

John: She's getting better at star hopping and she's a great note taker. I usually find the target and choose the best eyepiece, but it's all about sharing the view!

Clayton: Tell us about your club's planetarium. It looks expensive!

John: The planetarium is a great asset for the club –we have our monthly meeting there after the third Tuesday public show. We think the Spitz starball is priceless. Even though its technology is decades old, its accuracy makes it the planetarium of choice for training new astronaut classes in star identification.

Clayton: Do you feel that public outreach is working? I see very few young folks at star parties these days.

Diane: For our star parties, we usually have 8 – 10 club members with scopes, binoculars, and demonstration materials, and in one of our recent school star parties we had about 375 students, teachers and parents. Based on the responses we have been getting, we believe the star parties are working very well. More schools are asking for star parties in the area, so we have a waiting list!

Clayton: Do you guys have an amateur observing mentor?

Diane: John is my observing mentor, & the Planetarium Director, Judi James is an inspiring educator, as well as a club member.

John: We have several members who have been amateur astronomers much longer than we have. We also have a member we call Mr. Gadget who keeps us apprised of all the latest gizmos.

Clayton: Have you a favorite star party that you attend regularly? Are there others?

Diane: Twice a year, we host our own National Astronomy Day public events – those are our favorites.

Clayton: How do you envision amateur astronomy in the next 25 years?

Diane: I believe people will always look at the sky and wonder; the

biggest battle for amateur astronomers will be the loss of dark sky. Then there are smart phones, video games, etc. that compete for the attention of young people. Our goal is to interest kids, one at a time, in astronomy.

John: Well, it's taken quantum leaps in the last couple of decades. I hope that the cost to get into the hobby will continue to fall. I think a lot of parents shudder when they hear about the cost of some of these telescopes. Getting more people involved should be the most important goal.

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

Diane: Find an astronomy club close to where you live & ask the members a lot of questions. Amateur astronomers are very helpful!

John: Don't start off on the cheap! I know of several instances where someone has gotten a department store cheap telescope and was completely discouraged. It would be better to get a good pair of binoculars to start observing the night sky.

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

Diane & John: dnjstars@yahoo.com works for both of us.

Clayton: Thanks Diane and John 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 up here in the Houston area, we'd love to see you.

Clear skies always!

Diane: It has been nice chatting with you! Keep looking up.

John: Any time you are in the Brazosport area, check out the Brazosport Planetarium – give us a shout.

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

Observatory Corner

By Bob Rogers, Observatory Chairman

Hello everyone.

On the weekend of April 2-3, I had 13 HAS members show up to help take down the north fence along County Road 215. Mike Edstrom and I went to Weimar to get some parts for the riding mower and to pick up the fixings for hamburgers and by the time we got back, all the barbed wire had been pulled and Dana had gotten the tractor and everyone was busy pulling out the old fence posts and T-poles from the fence line. With that part of the job done, on the following Wednesday, Colorado County came out with their bulldozer and removed all the brush, brought in 4 loads of dirt and leveled out the property line with the road. Ken Miller plans to come out on the 18th – 19th with his



tractor and post hole digger and install the H-braces. The next step will be installing the rest of the poles and T-poles and running all the barbed wire to complete the fence line. We may wait until this fall (cooler weather) to recess the entrance/exit gates. I want to thank Mike Edstrom for cooking the hamburgers for everyone. We will be



cooking hamburgers again for the volunteers who can come out to help finish installing the post and running the rest of the barbed wire. Watch the HAS list server for the announcement.

I want to thank the following volunteers for all their help –

Scott Mitchell, Terry Angelic, Don Selle, Mike Edstrom, Dana Lindstrom, Doug McCormick (who came out while not feeling good), Paul McCallum, Rodger Jones, Ralph Walker, John Lane, Mike Rao, Andrew Rao and Marty Levine. It was much appreciated. Also, thanks to Colorado County for all their help with the fence line. What a great bunch



of people. They made the rest of our work much easier to do.

A reminder that we are taking donations to help with some of the cost of the fence replacement. If you can donate, it would be appreciated and all donations are tax deductible.



Donations can be made to:

HAS
PO Box 20332
Houston, TX 77225-0332

In the note section, please put –
“Observatory donation”

Remember that we are the only club that has an observing site everyone can go to observe away from city lights. It cost money every year to keep the site maintained for your use and pleasure.

I do 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 re-

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Hubble sees Baby Stars Eating Sandwiches and Blowing Bubbles

By Phil Plait, [Bad Astronomy](#)

When a human is a baby, it has a mass of a few kilos and eats milk.

When a star is a baby, it has a mass of *an octillion tons* and eats sandwiches a trillion kilometers across.



Don't believe me? Well good, because I'm being a little metaphorical. But still, this newly released Hubble image backs me up.

Isn't that gorgeous? You can get a bigger version, or a huge 3873 x

3943 pixel image at the link below. But what is it?

<http://www.spacetelescope.org/static/archives/images/large/potw1109a.jpg>

It's a view of M43, a part of the vast Orion nebula complex, separated a bit from the more famous Orion Nebula. Like its big brother, stars are forming here... and I can show you how I know.

Just below and to the right of the bright star near the top of the image, you can see a star that has an odd shape. When zoomed in, as shown here, it looks a bit like an old style Cylon head, or a walrus. This shape is common, and is sometimes described as a sandwich shape. But it's really a cocoon!



When a star forms, it begins as a cloud of gas and dust that rotates and collapses into a spinning disk. That thin disk is far more dense than the surrounding material, and blocks our view of it. Seen from the side, it's like

a thin line cutting across the cloud. And that's exactly what we're seeing here. In the center of that oddly-shaped object, a star — and perhaps a system of planets — is busily forming.

Eventually, the heat and light from the star will eat away (see? eating!) at the disk, and when the star settles down its solar wind will blow the rest away. After a few hundred million years you'd have no idea the disk was ever there... except for its pedigree in the planetary system, with all the planets orbiting in the same plane as the star's rotation, a remnant of the spin of the disk itself.

Not everything is so easily explained. When I first saw this object (shown here) in the original image above I was a bit baffled, but looking at the high-res version made it clear. Young stars may still be surrounded by those dense disks, but they can also blow long jets of matter from their poles. This material can be moving at hundreds of kilometers per second, and it slams into the surrounding gas and dust.

The jet slows, puffs out, and can create long tear-drop shaped formations like this one. It's clearly coming from this star; you can even see a tiny line coming from the star itself pointed at the bubble; that's almost certainly the jet very near the star.



Oddly, though, there's only one bubble. In

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Kids Outreach & Star Parties, April/May 2011

Event: Houston Arboretum Star party

Date: Saturday, 5/14/2011

Time: 7:00 PM - 10:00 PM

Location: 4501 Woodway Drive, Houston, TX 77016

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my mind that can mean one of three things: 1) There is only one jet coming from a single pole of the star, which seems unlikely; 2) there is only dense material on one side of the star so we only see one of the jets hitting that material; or 3) I'm totally wrong about what this object is*.

The image, incidentally, is a combination of visible light (shown in blue) and near infrared (red). The whole image is only 3 arcminutes across, meaning you could block it out in the sky with a grain of sand held at arm's length. Imagine! All those stars, all that violence, yet it can be silhouetted by a small crystal found by the billions on Earth's beaches.

That should give you a sense of how far away this view is; the stars are well over a thousand light years away. But given how loud and messy *these* particular babies are, that sounds like a comfortable distance to me.

Image credit: ESA/Hubble & NASA

** That last part is clearly ridiculous, of course! But I have to at least seem modest and honest*

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

Read more from Phil Plait at:

<http://blogs.discovermagazine.com/badastronomy/>

And, enjoy his books:

*Bad Astronomy
Death from the Skies!*

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port 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** fills 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 members spend at Randalls. Randalls totals up the amount spent each quarter and will send us a check if the amount goes over \$2,500.00, otherwise the total rolls over to the next quarter or 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. Our number is #6618. This is very easy to do, just go to the Courtesy Booth and tell the person there what you want to do.

If you have any suggestions or thoughts for the site, let me know.

Thanks,

Bob Rogers

*Observatory Chairman
281-460-1573
siteworkerbob@hotmail.com*

Cosmic Recount

by Dr. Tony Phillips

News flash: The Census Bureau has found a way to save time and money. Just count the biggest people. For every NBA star like Shaquille O'Neal or Yao Ming, there are about a million ordinary citizens far below the rim. So count the Shaqs, multiply by a million, and the census is done.

Could the Bureau really get away with a scheme like that? Not likely. Yet this is just what astronomers have been doing for decades.

Astronomers are census-takers, too. They often have to estimate the number and type of stars in a distant galaxy. The problem is, when you look into the distant reaches of the cosmos, the only stars you can see are the biggest and brightest. There's no alternative. To figure out the total population, you count the supermassive Shaqs and multiply by some correction factor to estimate the number of little guys.

The correction factor astronomers use comes from a function called the "IMF"—short for "initial mass function." The initial mass function tells us the relative number of stars of different masses. For example, for every 20-solar-mass giant born in an interstellar cloud, there ought to be about 100 ordinary sun-like stars. This kind of ratio allows astronomers to conduct a census of all stars even when they can see only the behemoths.

Now for the *real* news flash: **The initial mass function astronomers have been using for years might be wrong.**

NASA's Galaxy Evolution Explorer, an ultraviolet space telescope dedicated to the study of galaxies, has found proof that small stars are more numerous than previously believed.

"Some of the standard assumptions that we've had—that the brightest stars tell you about the whole population—don't seem to work, at least not in a constant way," says Gerhard R. Meurer who led the study as a research scientist at Johns Hopkins University, Baltimore, Md. (Meurer is now at the University of Western Australia.)

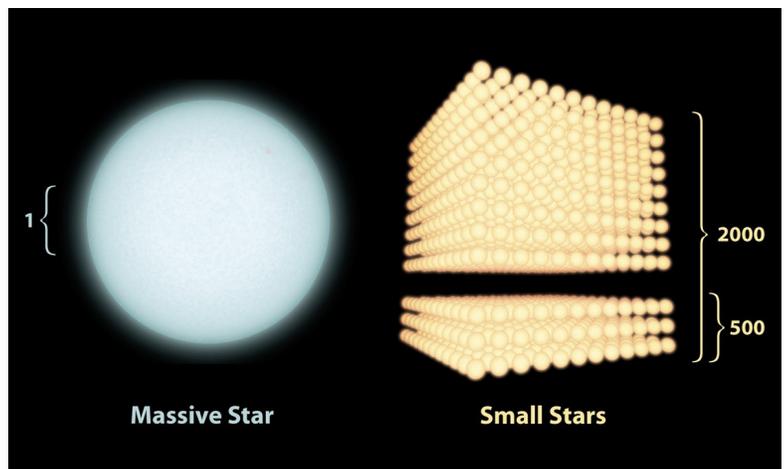
Meurer says that the discrepancy could be as high as a factor of four. In other words, the total mass of small stars in some galaxies could be four times greater than astronomers thought. Take that, Shaq!

The study relied on data from Galaxy Evolution Explorer to sense UV radiation from the smaller stars in distant galaxies, and data from

NASA Space Place

telescopes at the Cerro Tololo Inter-American Observatory to sense the "H-alpha" (red light) signature of larger stars. Results apply mainly to galaxies where stars are newly forming, cautions Meurer.

"I think this is one of the more important results to come out of the Galaxy



Astronomers have recently found that some galaxies have as many as 2000 small stars for every 1 massive star. They used to think all galaxies had only about 500 small stars for every 1 massive star.

Evolution Explorer mission," he says. Indeed, astronomers might never count stars the same way again.

Find out about some of the other important discoveries of the Galaxy Evolution Explorer at <http://www.galex.caltech.edu/>. For an easy-to-understand answer for kids to "How many solar systems are in our galaxy?" go to The Space Place at: <http://tiny.cc/I2KMa>

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Building an Astronomer's Stool

Complete with Sketch Desk and Red Lighting

By Jim Wessell

Part 3 of 7

This month we will cover the seat attachment site, and the construction of the armrests and footrest.

A place for everything, and everything in its place

Since I elected to use a boat seat as the basis for my astronomer's stool, I feel it's important to discuss the design of the attachment site in detail. This is the 2nd of the two very important spots on the stool that needs to be particularly well made, and failure to do so could have injurious repercussions. We didn't take the seat apart to confirm, but we suspect that the internal screw threads where the retaining screws attach are made of plastic, and likely susceptible to either deforming under pressure, or completely ripping out if enough torque stress were to be applied. Needless to say, we intended this part of the construction to be a 'one and done shot' with no re-dos. We were fortunate that this turned out to be the case in our build out. I don't know if boat seats are uniform in their location of screws on the underside of the chair, but I will say that the screws that came with the chair were not satisfactory for our purpose of creating an astronomer's stool, as they were too short. The original screws were intended to penetrate and hold onto the thin metal "Lazy Susan" either on a johnboat type seat, or at the top of a fixed pedestal. In our case, the screws need to be long enough to hold the chair onto a piece of plywood (I used 3/4" plywood). For the reader's information, the screws needed are going to vary dependent on the manufacturer's design of the boat seat (actually the internal screw housing [depth] inside the side), and your choice of plywood thickness, so plan accordingly.



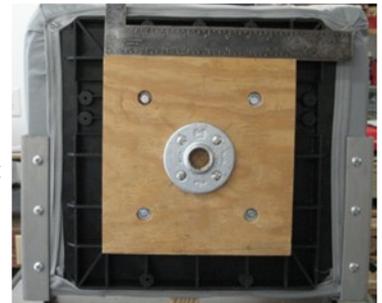
Here is an image of the plastic underside of the boat seat to give you an idea of a starting place for my build out:

If you will compare the previous picture with the following one, you will see that we measured and cut the plywood square to exactly fit (mine was 9" x 9.5") onto a set of plastic 'ribs' on the underside of the seat. This was

planned, and we thought that it would provide the maximum amount of stability (wood against the hard plastic) while minimizing the weight of the plywood. One of the post construction comments addresses this point in greater detail, later. The sizing of this particular piece of plywood is really dependent on the underside of the seat that you decide on. Obviously, we measured and drilled the holes to match the placement of the seat's retaining screws. Here I changed from the original machine to hex head screws, and they were countersunk. In the picture below, you can also see the original pencil marks that were used

to determine the exact center of the four screws, which in turn, is the center of support for the seat. The 3/4" pipe floor flange was attached using T-nuts preinstalled on the back side of the plywood before mounting it to the seat bottom. Use of T-nuts prevents having to cut out spaces in the plastic bottom to accept standard nuts and washers.

The following picture shows the integrated unit, with the pipe going into the seat attachment site on the piece of plywood.



The second major use of this plywood square on the underside of the seat is as a place to attach desired armrests, since the



boat seat did not come with them originally. In order to fabricate a reasonable set of armrests, we first needed to determine the optimum width for the supports

(where my elbows would naturally rest in the lateral plane) and what height would be comfortable. We made this

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measurement by me simulating armrests on a scrap piece of plywood (it was wider than any conceivable width I might choose) and changing its height by stacking 2" x 4"s underneath it (all resting in my lap), then measuring both the height and the width from the attached 3/4" plywood, via a side view. This or a similar measuring effort will reflect a personal preference for the eventual armrest positions that the reader needs to figure out for himself. Post construction, the width of the armrest supports for my chair are 19".

I originally bought a pair of 1" x 1/8" metal flats which were bent by hammering in a vise to the desired shape for the armrest supports (see below). After loosely attaching the top wooden piece to the metal support and resting my arms' weight on them, we found that the supports were very susceptible to outward flexing with a minimal amount of



weight or pressure. This was a critical design flaw and needed to be addressed immediately.

We countered this problem in two ways. The first was to get a pair of much heavier and harder to bend 3/16" x 1" x 4' steel flats for the arm supports, and the second was to plan on placing an even heavier 1/8" x

1.5" x 6' steel flat around the top of the two side supports and around the back rest of the chair. The addition of the 3 larger metal supports really solidified the rigidity of the armrests. As a result, the armrests now easily support my arms' weight without outward flex, and even better, they will handle the increased load of the sketch desk as well (its construction will be covered later in the description). However, this is not to say that the armrests alone will support my weight (they certainly won't). If I have to adjust my positioning in the chair I have to reach down outside the armrests to the seat itself and lift my weight through my arms pressing against the seat. To start attaching the armrest supports, the chair was inverted, the supports placed in their correct positions, and measurements were taken to evenly distribute the drilled locations for the screws (see following picture). We then countersunk the screw heads into the steel flats to ensure that there were no sharp edges to cut an unwary finger in the dark.

We decided on #8 x 3/4" flathead wood screws to attach the armrest supports to plywood on the underside of the chair. Pilot holes insured that the screws seated correctly and ended up flush with the surface of the metal without additional wood damage (see picture below). At this time, the top pieces of wood (which were already sanded,



and notched to sit on top of the lateral supports) were permanently attached to the metal supports by four #8 1/2" screws, (predrilled to prevent splitting of the thin small pieces of wood), and again counter-

sinking them for safety.

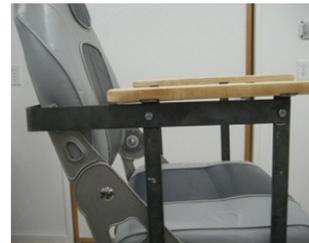
After the lateral armrest supports were complete, we started measuring the



needed length of the top restraining steel flat. Determining where the two bends were to occur was challenging as the seat

back needed to be accounted for in its fully upright position, and we did not make the final bend or cut on the steel flat until we were 100% sure they were both exactly correct. Four 1/4-20 x 1/2" screws and nuts were used to connect the overlapping pieces of metal, and any portion protruding past the nut was cut off and ground smooth. A side view and 3/4 view of this step are shown below.

The third and final use of the plywood attachment site under the chair was to support a hanging footrest. A footrest was not



an original consideration in the design of the astronomer's stool, but rather something I found out that needed to be addressed when I sat in the chair when it was at full extension. When I was high up in the air, I realized that



the weight of my legs was going to eventually crush down the front edge of the foam inside the seat, and cause an uncomfortable pressure point for the back of my up-

(Continued on page 14)

(Continued from page 13)

per legs. As a result, we had to brainstorm to think up a suitable method to account for this problem. We considered a wide metal loop, sort of like a stirrup, but noted that it would be a problem for disassembling the stool and putting it in the trunk of my car for transportation to a dark site. We also thought of a simple piece of rope, but found that it was not very comfortable for my legs or feet for long periods of time. So we settled on a combination of a stiff footrest and a flexible hanging system, all of which was attached to the underside of the chair. The picture will help with the description of the attachment site build out as well as the two ends of the rope which holds the footrest.



As you can see, we drilled two holes through the front steel flat and the underlying plywood for the 2, #2 screw eyes that provide the points of attachment for the 2, "S" hooks at the ends of the piece of rope. The total length of rope necessary was determined by attaching one fixed (completed with a tied-on spring hook) end to the eye screw, the footrest was then placed under my feet, and the other end of the rope fed through the other eye screw – with the rope being pulled and adjusted to different lengths (equaling heights of the footrest) until a comfortable position was found. The rope was then cut and the second "S" was tied onto the free end. To prevent the footrest from sliding along the length of the rope, I placed the footrest at the optimal position, then opened the weave of the nylon and inserted a bolt through it, and then attached a washer on the backside. The same process was repeated for the rope at the other end of the footrest, and as a result, movement is minimal.

But let's not get ahead of ourselves, before you make the end connections on the rope you need to have the footrest in between, and that design process is outlined here. To make footrest, we took a scrap piece of 2" x 4" and visualized what would be the maximum width I would need for a comfortable placement of my feet. My measurement was found to be 18", and we took a 1/2" X 18" drill bit, and drilled through the center of the board lengthwise from both ends. This wasn't an easy task, as a long drill bit is prone to torque and curving along its length, and we eventually had to repeat the whole process a second time as the bit broke through the side of the board on the first attempt.



Afterwards, we threaded a 4' section of nylon rope through the hole to get to the stage of construction shown in the picture at left.

Since we had previously built out the supports for the pedestal we had a fair idea of where the hanging footrest would come into contact with the plywood supports for the pedestal. As you can imagine, a moveable 2" x 4" swinging into and hitting on the edge of a piece of plywood is going to cause

considerable damage to both pieces of wood. We fixed this issue by putting 1/2" angle onto the four long corner edges of the footrest (similarly, the plywood had 3/8" channel put on its outside edges for its protection). You can get a better idea of the completed hanging footrest in the picture.



Next Month: Construction of the supporting 'legs' and 'feet'.

Shallow Sky Object of the Month

Melotte 111

By Bill Pellerin, GuideStar Editor

Object: Melotte 111
Class: Open Cluster
Constellation: Coma Berenices
Magnitude: 1.8
R.A.: 12 h 25 m 06 s
Dec: 26 deg 06 min 00 sec
Size/Spectral: 2 degrees
Distance: 310 ly
Optics needed: Binoculars or wide-field telescope

Why this object is interesting:

How many open clusters can you see well from the city with binoculars. Not many. Melotte 111 is a notable exception. Nice and bright with several interesting groupings of stars. There are about 25 stars brighter than 8th magnitude in this cluster.

Under dark skies you might be able to find one or more galaxies in the background of the stars. Remember, the Coma Cluster of Galaxies is nearby, and you may want to work your way through that grouping under dark skies. (This is always a good challenge at the Texas Star Party.)

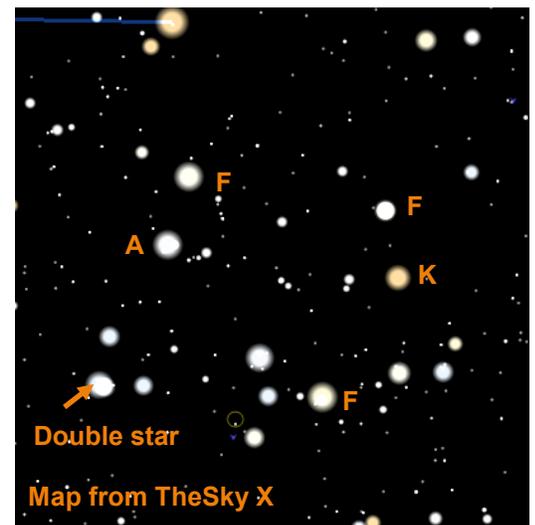
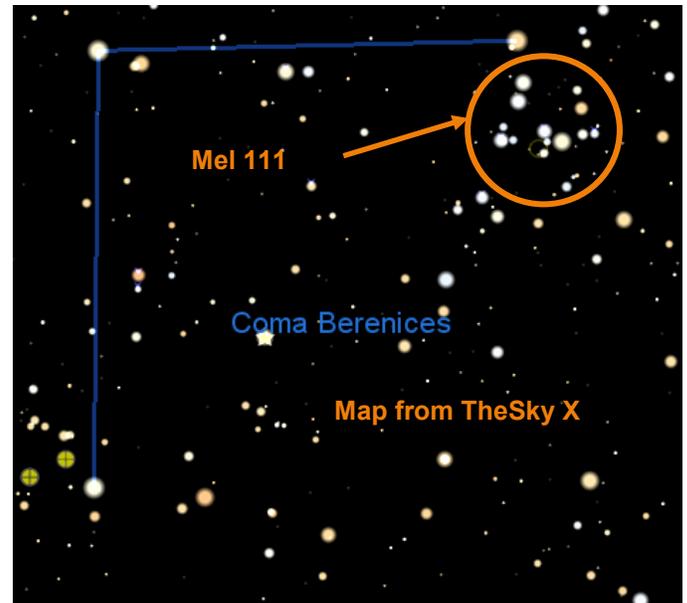
If you have trouble finding the constellation Coma Berenices (the hair of Bernice) you'll find it between the constellation Leo and the constellation Boötes, each of which has enough bright stars to make them easy to find.

This is a young cluster, about 450 million years old. Contrary to intuition, globular clusters are older than open clusters, which generally contain young stars.

There are also stars of various colors in this cluster. Can you see color differences? I've included a detailed chart that shows the colors of some of the stars in the cluster. There's a nice double star identified, too. It's two A class stars about 2.5 arc-minutes apart.

P. J. Melotte was an astronomer born in the late 19th century who cataloged various deep-sky objects in 1915. He died in 1961. His catalog of 245 open clusters is not in general use today. As is usual with astronomy, most of the objects are in other catalogs.

SkyTools 3 lists 156 Melotte objects, so if you want to be the first



astronomer on your block to see 100 or more Melotte objects, you can set up an observing list in SkyTools and work your way through the list.

Houston Astronomical Society

P.O. Box 20332

Houston, TX 77225-0332

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. Meetings are in Room 117 of the Science and Research Building at the University of Houston. A Novice Presentation begins at 7:00 p.m.. The short business meeting and featured speaker are scheduled at 8:00 p.m.

Parking is NOW across from Entrance 14, by the stadium.

Board of Directors Meeting

The Board of Directors Meeting is held on dates scheduled by the board at 7:00 p.m. at the Houston Chronicle office, downtown. 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 BillPellerin@sbcglobal.net. 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; FAX: 713-880-8061;

Email: BillPellerin@sbcglobal.net

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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.
- 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, May 6

7:00 Novice Meeting

8:00 General Meeting

University of Houston

Directions to meeting:

From I-45 going south (from downtown)

- exit at Cullen Boulevard
- turn right on Cullen
- turn right into the parking lot (by the stadium)
- 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 into the parking lot (by the stadium)
- Science and Research is across the street (2nd building back)

Parking:

There is Free Parking, **BUT DO NOT PARK IN ANY RESERVED PARKING SPACES AT ANY TIME.**
U of H parking enforcement will ticket your vehicle.