



GuideStar

August, 2009

At the August 7 meeting...

Justin McCollum

HAS Novice Chair

Hypernovae

When a very massive star, up to 150 times the mass of our Sun reaches its end of life and collapses astronomers see a very bright supernova. At the time of the collapse, the core of the star can form a black hole, an object so massive that even light cannot escape its gravatational pull.

Hypernovae are extremely rare. With 100 to 200 billion stars in the Milky Way the frequency of a hypernova is approximately once in every 200 million years.

These events are thought to be the source of long gamma ray bursts.

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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 cover for a map to the location.

Novice meeting: 7:00 p.m.
The Art and Science of Visual Astronomical Observations --
Brian Cudnik

Site orientation meeting: 7:00 p.m.
Classroom 121

General meeting: 8:00 p.m.
Room 117

See last page for a map 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.

Officers & Past President

President: Bill Leach.....H: 281-893-4057
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 Secretary: Open
 Treasurer: Bill FlanaganH:713-699-8819
 Past President: Steve Sartor

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 Don Pearce.....713-432-0734
 Doug McCormick.....
 Allen Grissom281-617-9813
 John Missavage.....

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 Field Tr./Obsg..... Mike Edstrom281-347-7267
 Novice..... Justin McCollum.....
 Observatory..... Bob Rogers281-460-1573
 Program..... Brian Cudnik.....
 Publicity..... John Missavage.....
 Telescope..... Bram Weisman.....
 Welcoming..... Susan Bruneni.....

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 Librarian..... Peggy Gilchrist281-443-8773
 Logo Mds Sales..... Judy Dye281-498-1703
 Long Range Plan..... Bill Leach.....281-893-4057
 Parliamentarian Kirk Kendrick281-633-8819
 Publ. Star Party Richard Nugent713-524-1993
 Rice U. Coord..... Matt Delevoryas713-666-9428
 Schedule Obs'v't'y Steve Goldberg713-721-5077
 Texas Star Pty Steve Goldberg713-721-5077

Special Interest Groups & Help Committees

These are now listed on the inside of *GuideStar* (not every month). See the Table of Contents

Advisors

Dr. Reginald DuFour, Rice Univ.
 Dr. Lawrence Pinsky, U. of H.
 Dr. Lawrence Armendarez, U. of St. Thomas

Dues and Membership Information

Annual Dues:Regular\$36.00
 Associate\$6.00
 Sustaining\$50.00
 Student\$12.00
 Honorary None

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*. Regular, Student, and Honorary Members receive *The GuideStar*. 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 outside cover 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. Also, see the "Ad Hoc Committee Chairpersons" on the inside front cover and the "Special Help Volunteers" listing (not in every issue).

Advanced..... Bill Leach.....281-893-4057
 Comets Don Pearce713-432-0734
 Lunar & Planetary..... John Blubaugh713-921-4275

Other Meetings...

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>

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

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

August / September Calendar:



Photo by Scott Mitchell

Check the web site:
www.astronomyhouston.org
Webmaster: Kay McCallum
kaym@mcclibrary.net

The Houston Astronomical Society Web page has information on the society, its resources, and meeting information.

Want your astronomy work and name on the Internet for the whole world to see? Have some neat equipment? Pictures in film, CCD, hand drawings or video format are all welcome on the page. Do you have an idea to improve the page? I'm listening. Send me Email at kaym@mcclibrary.net.

Date	Time	Event
August		
2	6:00 p.m.	Mercury 0.59 deg NNE of Regulus
6	7:55 p.m.	Full Moon Penumbral eclipse of the Moon
7	7:00 p.m.	HAS Novice Meeting, U of H
	8:00 p.m.	HAS General Meeting, U of H
12		Perseid meteors peak
13	1:55 p.m.	Moon at last quarter
14	1:00 p.m.	Jupiter at opposition
17	1:00 a.m.	Mercury 2.9 deg SSW of Saturn
	4:00 p.m.	Neptune at opposition
20	5:01 a.m.	New Moon
22		Prime Night, Columbus Observing Site
24	11:00 a.m.	Mercury at greatest elongation east
27	6:41 a.m.	Moon at first quarter

September		
4	11:03 a.m.	Full Moon
	7:00 p.m.	HAS Novice Meeting, U of H
	8:00 p.m.	HAS General Meeting, U of H
12	9:16 p.m.	Moon at last quarter
17	5:00 a.m.	Uranus at Opposition
18	1:43 p.m.	New Moon
19		HAS Picnic/All Clubs/BBQ, Columbus Observing Site
		Prime Night, Columbus Observing Site
22	4:22 p.m.	Autumn Equinox
25	11:48 p.m.	Moon at first quarter
30	7:30 p.m.	HAS Board of Directors Meeting Houston Chronicle Building, Downtown Houston

Columbus Field Trips 2009

Mike Edstrom
Field trip/Observing committee chair

The schedule is as follows:

- September 19 - Annual picnic / all clubs/BBQ
- October 17 - All clubs BBQ
- December 19 – HAS Observing

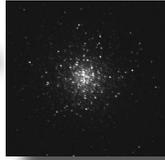
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**GuideStar deadline
for the September
issue
is August 15**

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Observations... of the editor

by Bill Pellerin, GuideStar Editor



Board of Directors Meeting September 30

There will be a Board of Directors Meeting on September 30th at 7:30 p.m. at the Houston Chronicle building in downtown.

Over the past few weeks there has been some concerns expressed about decisions that the board has made. If you want your voice to be heard come to the board meeting. The meeting is open to everyone!

We're all connected... economically

At a time when telescope manufacturers are bringing out some exciting new products I am doing what I can to watch my expenses, and probably you are too. If you haven't lost your job you may have had to reduce your hours, or you're hearing rumors of cutbacks at your company. As someone who lost his job in January and started a new one in April, I'm being very careful about my spending until I get some confidence back. This is affecting all kinds of companies, especially those who sell items that we don't *have* to buy.

There has been a series of reports on the CBS Evening News showing the connectivity among various businesses when things start to slow down. The electrician is getting fewer jobs to do because homebuilding is down, so he's eating out less, the restaurant isn't doing as well so they're not buying as much fresh fish at the fish market, and the people who fish for a living aren't selling their catch like they used to.

You get the idea. News stories talk about the 'new normal' in which households hold back on their spending to conserve cash or because they have either lost their jobs or are fearful of losing their jobs. (You can read the CBS News story at CBSNews.com.)

Some of the mid-range astronomical gear is getting better and cheaper, and the vendors of this equipment are cutting prices to get our business. You can get some very nice equipment these days at very attractive prices. Keep your eye on the market!

HAS Banquet Coming Up!!!

This issue of the *GuideStar* has quite a bit of information devoted to the HAS banquet. This is a fun event and a good opportunity to get together with your fellow HAS members for a nice meal and an outstanding presentation. Be sure to check out that information in this issue.

Microsoft Windows 7 this year

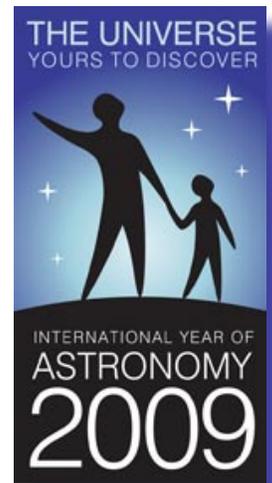
At work, today, I introduced myself to a guy who happened to be a Microsoft employee. He's running the new Windows 7 on his laptop and he gave me a quick demonstration of it. There's not much change from the look and feel of Windows Vista, but we should expect the reliability of the operating system to be better with Windows 7. Also, the machine resources required to run Windows 7 are reported to be less significant than the resources required for Windows Vista. I will be needing a new laptop this year, but I'm going to wait until I can buy one with Windows 7 pre-installed. We should start seeing these on the market in about 3 months.

I'm running Vista on this machine, and it has been reliable for me, but it required some fiddling for me to *make* it reliable.

I'll be unable to attend the August HAS meeting. Have a good time, and I'll see you at the September meeting.

***Until next time...
clear skies and new moons!***

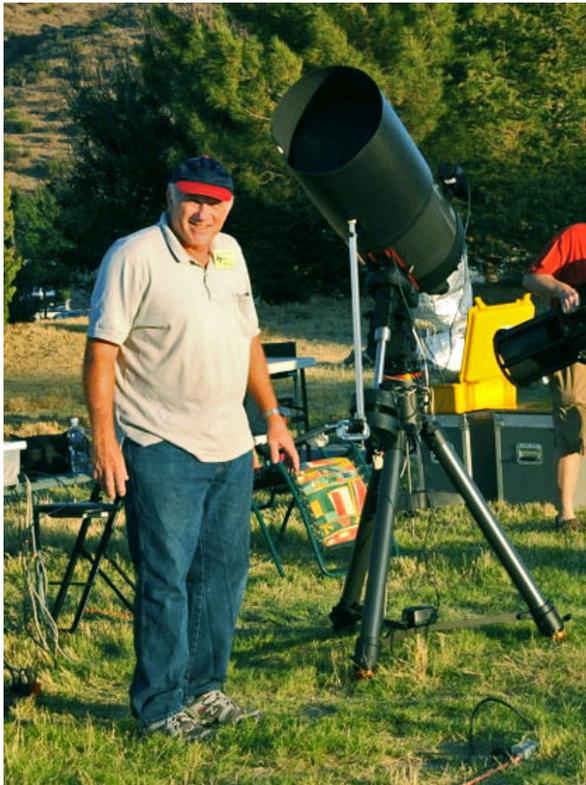
..Bill





Al Kelly -- Astroimager

It's great to hear about a telescope maker who actually uses his instrument to take beautiful astrophotos. Many ATMer's build scopes, then build the next one, and so on, never really utilizing their instrument in the field. The builder I'm bragging about is



Al Kelly and his Celestron CGE 1400

none other than Al Kelly, a JSCAS club member. Let's face it, how many 12 year old children build Newtonian reflectors these days? Al learned the night sky with his homebuilt scope back in the 1950's.

If you're having a mechanical problem with your scope, trouble locating an object, or wanting to learn CCD imaging... then Al is your man. I know all of you will enjoy this interview

and learn something as we listen to what Al has to say about his astronomy interests. Meet Al Kelly...

The Al Kelly Bio...

I was born in 1946 and grew up on a farm in Indiana, about 80 kilometers north of Indianapolis. The night sky was very dark and I became curious enough about the real universe at the age of ten to ask my father for a telescope. The views through that 40mm refractor were wonderful, but I had to see more, so at the age of twelve I built a 115mm Newtonian reflector. It too was wonderful. Since that time I have built or helped build dozens of telescopes, up to 815mm in diameter, and have built a CCD camera, but it has all been in the same pursuit I started at the age of twelve: to see deeper and better into that dark night and to capture part of

it. I think this is the primary common pursuit of astronomers, particularly amateur astronomers, who are involved for the simple love of the subject.

CCD imaging has now become a mainstay for many of us who are continuing the pursuits of our youth. It is delightful in its concatenation of the most modern technology with the ancient and simple principles of capturing part of the night sky for closer inspection. Those principles have always been to use a dark, clear, steady sky; to keep your eyes as sensitive as possible; to look carefully and effectively at an area of interest; and to record what has been seen as faithfully as possible. For millenia, astronomers used their eyes, their memories, and their stones or papyrus. Over a few short decades, our eyes have become gigantic slabs of delicately hewn glass, our attention has become riveted by intricate guiding mechanisms, and our memories have been etched on fine-grain films and computer hardware. Only the cosmos is essentially unchanged.

I worked for NASA at the Johnson Space Center in Houston, Texas from 1972 to 2005. As a member of the Johnson Space Center Astronomical Society, my interests grew in the early 1980's to the construction and use of large Newtonian reflectors on Dobsonian mounts. I had also been active in film astrophotography since the late 1970's, using a Celestron 8, and was interested in ways of imaging through the larger telescopes. From about 1983 to 1987 I experimented with video imaging, sometimes using image intensifiers. Finally, sometime in 1988, I had my first experience with an astronomical CCD imaging system, a Photometrics Star I, and became an instant convert. I was fortunate enough to be able to borrow and use several other CCD cameras over the next few years, including the

Continued ...

Just Looking... from previous page

SBIG ST-4 and ST-6 systems.

With the publication of the CCD Camera Cookbook in 1994, the avenue was opened for me to build and own my own CCD camera. Since I am not an electrical engineer or electronics technician, I needed a book which could tell me in simple terms every step necessary to build such a sophisticated device. The Cookbook was perfect in that regard, so I completed a CB245 in August of 1994. I used the CB245 coupled to either my Celestron 8 (f10/f7.5) or one of my two large Newtonian reflectors. One of these was 445mm f4.5 and the other was 813mm f4. Until the late 1990's, the reflectors were mounted on equatorial platforms for tracking purposes (see the December, 1991 issue of Sky and Telescope for an article on one of these platforms). After that, my Newtonians used altitude-azimuth-focal plane (Alt-Az-FP) drive systems designed by Andy Saulietis.

From 1994 to 1996 I used my CB245 primarily for unfiltered monochrome imaging, learning much about image calibration, image stacking (summing and averaging), and image processing. Since I was using the 813mm f4 system on the unguided equatorial platform most of the time, I was limited to 15-second exposures and learned to really appreciate the CCD's capability to create long effective exposures from numerous short exposures. I quickly learned that Richard Berry's Cookbook image acquisition and processing software was the best for working with my images, so I obtained CB245 and MULTI245 and began to use them exclusively.

In 1996 I became more involved with tricolor CCD imaging, having done enough to know what I was getting into. I ordered a new RGB filter set from Edmund Scientific and an infrared blocking filter from SBIG. Meanwhile, my good friend Andy Saulietis was again designing something wonderful, a filter wheel which fits on the front of my CB245. I also needed new tricolor compositing software and Richard Berry once again came through, this time with COLOR245. To paraphrase Newton, we all stand on the shoulders of giants!

Over the last few years, I have augmented my imaging equipment with a Starlight Xpress (SX) MX916 camera with a fast USB interface, an SX AO unit, and an SX Lodestar guide camera in an off-axis guider. I have also acquired improved RGB filters from Don Goldman and a new filter wheel from ATIK. The primary software programs I use for image processing now are AIP for Windows (AIP4WIN) by Richard Berry and Jim Burnell and Photoshop CS by Adobe.

I sold my 813 mm (32") Newt to the Alliance for Astronomy (St. Louis) two years ago and have put my 445 mm (17.5") Newt on permanent loan to Friendswood High School. Now I use a C-14

on a CGE mount for all imaging.

The Al Kelly interview...

Clayton: It sure is a pleasure to have you here for this informative interview. I appreciate you taking the time out to join us. From listening to you at star parties (Fort McKavett) and reading your Bio, it's obvious you're into building telescopes and astrophotography. Which is the most rewarding?

Al: Before building the Cookbook CCD camera in 1993-4, scope building and deep-



32" f4 Newtonian, built by Al Kelly and Andy Saulietis

sky observing provided the most reward. My last major foray in scope-building was the design and construction of 8" F6 "JSCAScopes" for members of the JSCAS. I designed a simple, inexpensive tube assembly on a Dob-style mount and designed a nested-box equatorial platform for scope drive. We bought Parks optics and built

Continued ...

Just Looking... from previous page

thirteen of these over a period of several months. This was a fun group project!

After that, CCDs took me over and imaging has provided the most entertainment. My CCD imaging website (<http://www.kellysky.net>) has been online since the mid-90's. This has added much to my joy in sharing the hobby. Over several years I have included hundreds of images, a fairly lengthy and detailed CCD instruction manual, and links to a couple of my magazine articles, including the 1998 S&T article where Richard Berry, Chuck Shaw, Ed Grafton, and I introduced color filter calibration by means of photometric G2V sampling.

Clayton: So you caught the astronomy bug in 1958... what was the hobby like in that era for you? Did you join a club? Where did you observe?

Al: It was exciting at the advent of the space age. I remember seeing Sputnik I and Telstar from our farm front yard. Saturn made quite an impression on me in 1958 with my 4.25" F10 reflector. I observed at home with scopes held in my lap at first (no mounts!) My Mom thought I was nuts for sitting out there in the dark, sometimes on a layer of snow. There was no local club, just a couple of buddies and the occasional Sky and Telescope magazine.

Clayton: You're most known in the Houston astronomy community as the telescope maker of that large 32" Dob that you and Andy Saulietis constructed down in Danciger TX. Can you tell us a bit about its design, optics, and performance?

Al: The Danciger Astronomy Group (Frank Cooper, Dennis Zwicky, Paul Torrance, Andy, and I) decided on a 32" F4 scope and a design drawn by Andy. I was the primary funder and there were many friends who helped in the construction of the scope and the observatory building. Andy and I led the work and did most of the shop fabrication.

The optics were made by Paul Jones of Star Instruments in Flagstaff, who is known primarily these days as the maker of optics in commercial R-C scopes. The 32" has very fine, diffraction-limited optics. After we installed good Alt-Az-FP tracking several years ago, the 32" became a fine imaging instrument.

Clayton: What is it about astrophotography that entices you to keep taking photos?

Al: There's a lot out there left to shoot! I like to concentrate on seldom-imaged galaxies and nebulae less than 12' in size.

Clayton: Here's an out of the ordinary question, but let me ask you about your eyesight... how would you rate your seeing of faint objects in the night sky through an eyepiece? Do you

think you're seeing is as good as it was 10 years ago?

Al: I have enjoyed 20/20 vision my whole life, required reading glasses (Presbyopia) only in the last 10 years or so. My dark-adapted pupil is only about 6 mm these days, compared to about 8 mm as a youth, but if I keep a scope's exit pupil below 6 mm I see about as I used to.

Clayton: We know that you and Andy Saulietis have spent hundreds of hours together building scopes and observing together. How did you two team up? Can you tell us a bit about him?

Al: Andy and I started building scopes together in 1981 or 1982. Andy, Jack Petersen, and I built Andy's 24" Newton and three identical 17.5" Newtons (Jack's, Paul Maley's, and mine), completing them in 1982. I had gotten to know Andy via the JSCAS. Andy was an MIT-educated electro-optical engineer at JSC. He has been one of the foremost amateur telescope makers in the world in the last 50 years and can dream up three designs and machine them while the rest of us are still sharpening out pencils! He has slowed down a bit physically the last few years, but his brain still pours out the ideas.

Clayton: I'm not an astrophotographer, but do you take photos of comets? Is there a different technique when shooting these moving objects?

Al: Long-exposure, deep-sky imaging is my forte, but occasionally I will spend time on a local piece of icy dust if it is putting on show. The primary difference is guiding on the cometary nucleus or central coma to preclude smearing the image of the comet. This trails the stars, but that can be overcome by superimposing separate exposures of the field stars as cometary background. I usually don't do this, but allow the stars to trail, which seems to me to add a bit of motional reality to the

Continued ...

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image.

Clayton: I know you have taken hundreds of astrophotos...ever have any published in one of the astronomy publications?

Al: Yes, I have had many images published in S&T and Astronomy over the years, as well as two APODs. Articles on my imaging techniques and images have appeared in French and German astronomy magazines. Most recently, Astronomy included my image of NGC 6905 (the "Blue Flash" nebula) in the June, 2009 issue.

Clayton: You told me that you have attended past TSP star parties... are there other parties that you would recommend around the country?

Al: I am a veteran TSPer (off and on since 1983) and have attended one Okie-Tex and one El Dorado star party, but no other nationally known venues. The JSCAS has two excellent star parties each year at Fort McKavett, TX, which I usually attend, but these are not national events.

Clayton: How do you envision amateur astronomy in the next 10 to 25 years?

Al: Technologically, I expect that observing will benefit through the application of improved auto-charting and GOTO capabilities for large, portable instruments; but the greater leaps will occur in imaging capabilities. Sensors (CCD and CMOS) will be more sensitive and single-shot color will come into its own when "Foveon" technology is brought to cooled astronomical sensors. This technology will allow each pixel in an array to distinguish among impinging wavelengths by the depth of photon travel into the pixel substrate. This will improve the resolution of single-shot color and allow deeper color images in shorter total exposure times.

Additionally, CCDs with segmented charge transfer should become available to amateur imagers. These will allow simultaneous guiding and imaging with the same chip, with no loss of sensitivity to the imaging section of the array.

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

Al: Start with a simple chart or planisphere and your eyes, aided only with binos at first. Quickly study the basics of how the Earth rotates and revolves and how the Solar System functions internally and within the galaxy. Once you experience the satisfaction of being able to step out at night and orient yourself to known objects on the celestial sphere, the delights of learning more each visit and seeing deeper with larger instrumentation will come naturally.

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

tional question or two?

Al: I learned the hard way never to put my e-mail address online in a "clickable" way on a website. This allows spammer bots to incorporate your e-mail address on their lists. Anyone can go to my website at <http://www.kellysky.net> and see a non-clickable image of my e-mail address. I hope that is satisfactory and I look forward to hearing from anyone (except the spammers <grin>.)

Clayton: Thanks Al for taking the time to share your interest and thoughts with us for our monthly HAS newsletter, *The GuideStar*. We wish you luck with all of your astronomy interests. Please come visit our society when in the Houston downtown area or at our observing site in Columbus. We'd love to see you. Clear skies, always.

Al: Thank you, Clayton. Clear skies to all of you at HAS.

Publicity Suggestion Box

I welcome any suggestions that any member has to offer. It doesn't matter how trivial you think your idea may be. All input will be reviewed and welcomed.

Let's grow.

Please drop me a note at the following address.

itjdm0@yahoo.com

John Missavage- HAS Publicity

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2009 Houston Astronomical Society Banquet

presents

Gravitational Wave Astronomy 101

by

David Garrison, PhD

Faculty Chair and Associate Professor of Physics
University of Houston-Clear Lake

Saturday October 10, 2009

Marriott Westchase - Richmond Room
2900 Briarpark Drive, Houston, Texas 77042

6:30 – 7:30pm Registration & Cash Bar (for details, see <http://www.astronomyhouston.org>)
7:45 – 8:30 Dinner
8:30 – 9:30 Presentation by Dr. David Garrison

Brief Biography

Dr. David Garrison
Associate Professor and Chair of Physics,
University of Houston – Clear Lake

David Garrison began his academic career at the Massachusetts Institute of Technology where he earned his B.S. in Physics in 1997. During his course of study, he minored in Earth, Atmospheric & Planetary Science and completed a concentration in Political Science. He then moved on to The Pennsylvania State University where he completed a Ph.D. in Physics in 2002. After which, he accepted a position as a Visiting Assistant Professor at the University of Houston – Clear Lake.

After serving as a visiting faculty member for one year, he was promoted to tenure-track. During his time in academia, Dr. Garrison earned several awards from organizations including NASA, the Institute for Space Systems Operations, The Alfred P. Sloan Foundation, the Council of Graduate Schools and the Texas Educational Grid Project in addition to several internal grants and scholarships.

During his time on the faculty of UHCL, Dr. Garrison served as Chair of the Physical Science and Physics Programs and successfully developed and oversaw the approval of a revised Bachelors Degree in Physical Science, a Bachelors Degree in Physics, a Masters Degree in Physics, a Professional Masters of Physics sub-plan in Technical Management and a Collaborative Ph.D. Program in Physics. His research in computational and theoretical physics consists of work in Numerical Relativity and Cosmology

Houston Astronomical Society Annual Banquet
October 10, 2009

Registration Form

Name: _____
Address: _____
City: _____
State: _____ zip: _____

Number of people in your party: _____

Home Phone: _____
Work Phone: _____

Club Affiliation: HAS FBAC NHAC JSCAS ASSET UHCL UH

Names of other persons in your party:

Name	Entree

Dinner choices (mark the number of each meal)

Beef Brisket Plate _____
Roasted Chicken _____
Vegetarian Plate _____

Total number of meals: _____
Total Due: (# of meals x \$49.00) _____ Until Sept 23 deadline.

Dinner includes Chef's choice of dessert, coffee or tea, gratuity, tax

Make checks payable to Houston Astronomical Society.

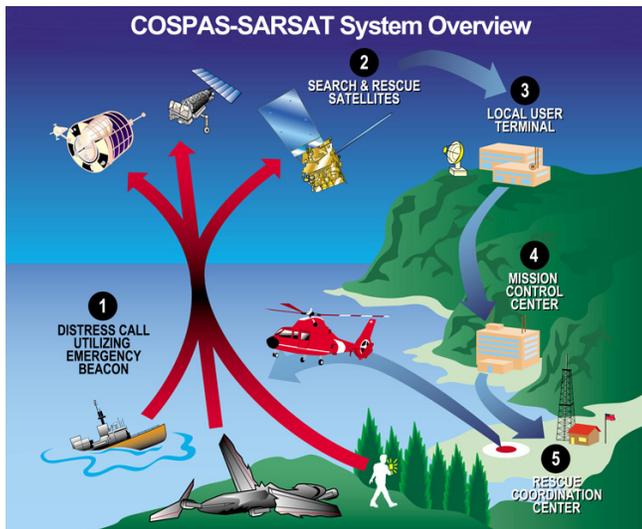
Mail this form to:
Houston Astronomical Society
Attn: Judy Dye, Banquet Chairman
12352 Newbrook
Houston TX 77072-3910
281-498-1703
jadye@rice.edu

Dress Code: Business Casual to Semi-Formal

SARSAT to the Rescue

If a plane crashes in the woods and nobody hears it, does it make a sound?

Never mind contemplating this scenario as a philosophical riddle. This can be a real life or death question. And the answer most of the time is that, even if no people are nearby, *something* is indeed listening high above.



NOAA's polar-orbiting and geostationary satellites, along with Russia's Cospas spacecraft, are part of the sophisticated, international Search and Rescue Satellite-Aided Tracking System.

In the last 25 years, more than 25,000 lives have been saved using the satellite response system called Search and Rescue Satellite-aided Tracking (SARSAT). So what *are* these life-saving superhero satellites?

Why they are mild-mannered weather satellites.

“These satellites do double duty,” says Mickey Fitzmaurice, a National Oceanic and Atmospheric Administration (NOAA) systems engineer for SARSAT. “Their primary purpose is to gather continuous weather data, of course. But while they’re up there, they might as well be listening for distress signals too.”

In February, NASA launched the newest of these Polar-orbiting Operational Environmental Satellites (or POES) into orbit. This new satellite, called N-Prime at launch and now dubbed NOAA-19, prevents a gap in this satellite network as another, aging NOAA satellite reached the end of its operational life.

“The launch of N-Prime was a big deal for us,” Fitzmaurice says. With N-Prime/NOAA-19 in place, there are now six satellites in this network. Amongst them, they pass over every place on Earth, on average, about once an hour.

To pinpoint the location of an injured explorer, a sinking ship, or a downed plane, POES use the same Doppler effect that causes a car horn to sound higher-pitched when the car is moving toward you than it sounds after it passes by.



In a similar way, POES “hear” a higher frequency when they’re moving toward the source of the distress signal, and a lower frequency when they’ve already passed overhead. It takes only three distress-signal bursts — each about 50 seconds apart — to determine the source’s location.

Complementing the POES are the Geostationary Operational Environmental Satellites (GOES), which, besides providing weather data, continuously monitor the Western Hemisphere for distress signals. Since their geostationary orbit leaves them motionless with respect to Earth below, there is no Doppler effect to pinpoint location. However, they do provide near instantaneous notification of distress signals.

In the future, the network will be expanded by putting receivers on new Global Positioning System (GPS) satellites, Fitzmaurice says. “We want to be able to locate you after just one burst.” With GPS, GOES will also be able to provide the location of the transmitter.

Philosophers beware: SARSAT is making “silent crashes” a thing of the past.

Download a two-page summary of NOAA-19 at www.osd.noaa.gov/POES/NOAA-NP_Fact_Sheet.pdf. The Space Place gives kids a chance to rescue stranded skiers using their emergency rescue beacons. The Wild Weather Adventure game awaits them at spaceplace.nasa.gov/en/kids/goes/wwa.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Gravataional Wave Astronomy 101

Abstract of the 2009 HAS Banquet Presentation

By David Garrison, PhD

University of Houston Clear Lake, Physics Department

In this talk I introduce the field of gravitational wave astronomy. I do this from the point of view of someone who is using astronomy to answer several fundamental but challenging questions about our universe. How did the universe begin? How do we know what we think we know about the history of the universe? How can we test our theories? To answer these questions, I show how we use conventional astronomy, Einstein's General Theory of Relativity, lots of large machines and a few supercomputers. My goal is to make this information accessible to a general audience so those without a background in physics or astronomy can also understand this talk.

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RR Lyr -- The Prototype

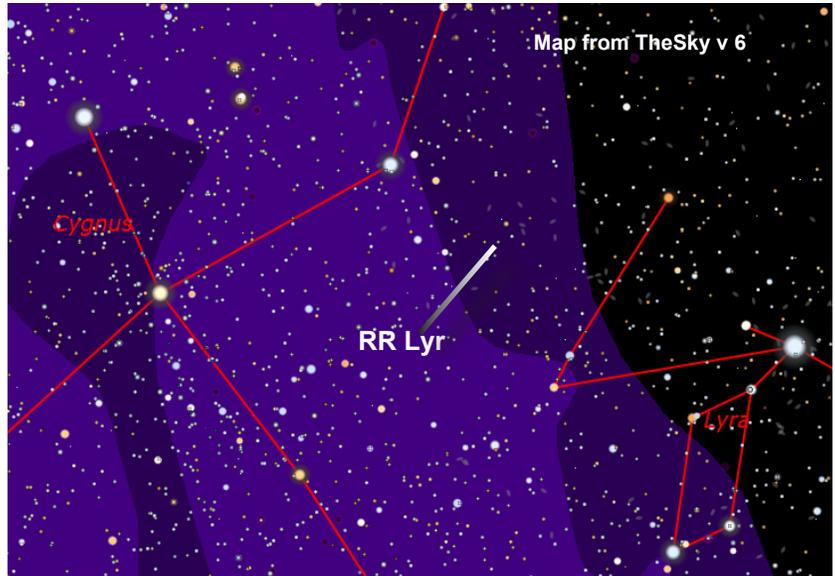
by

Bill Pellerin, GuideStar Editor

Object: RR Lyr
Class: Variable star
Magnitude: 7.2 to 8
R.A.: 19 h, 25 m, 28 s
Dec: 42 degrees, 47 minutes, 04 sec
Distance: 750 ly
Constellation: Lyra
Size: n/a
Optics needed: Small telescope, away from the city

Why this object is interesting.

Mike Inglis in his book *Astrophysics is Easy* identifies the 'main types' of variable stars as 'long period variables, the Cepheid variables, and the RR Lyrae stars'. So, this month, we'll take a look at the prototype of the RR Lyr stars, RR Lyr itself.



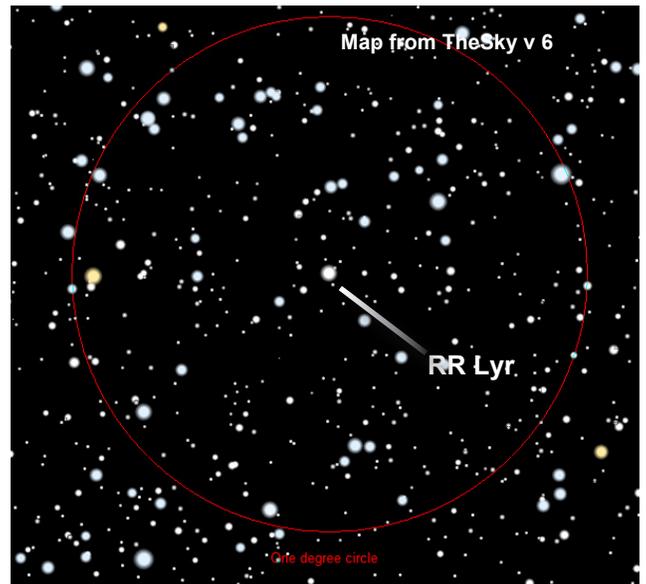
Intrinsically variable stars (not eclipsing binary stars) are variable because the outer layer of the star is expanding and contracting. It's simple, really. The core fusion in the star provides pressure to the outer layers of the star, which respond by expanding away from the star. Inertia keeps the layers expanding past what would be the 'balance' point so the outer layers, once at their maximum distance from the center of the star, begin to contract again. The process is like a child on a swing -- you push the swing, it goes past the balance point and swings back, again passing the balance point. More energy goes into the swing system when you give a push at the back end of the cycle.

In the case of a star the push is provided by a layer of ionized helium between the outer hydrogen layer and the star's core.

For a more thorough explanation of how variable stars work, get the book *Astrophysics is Easy* (mentioned above).

The Cepheid variables have the characteristic that their period of variability is proportional to their intrinsic brightness. It was this characteristic, discovered by Henrietta Swan Leavitt at Harvard University, that allowed Edwin Hubble to conclusively determine the distance to the Andromeda galaxy (M31) and demonstrate that the universe is larger than the Milky Way. (See *The Day We Found the Universe* by Marcia Bartusiak for the whole story, or read the article beginning on page 30 of the September, 2009 *Sky & Telescope*. The magazine article is called "The Cosmologist Left Behind" and is also written by Marcia Bartusiak.)

The RR Lyr variables have the same characteristic as the Cepheids. Their period is proportional to their absolute brightness. Because the RR Lyr variables are much dimmer than the Cephe-



ids, the only RR Lyr variables we can easily see are the ones that are nearby. Many RR Lyr variables will show you a whole cycle of their variability in one observing night; their periods range from a few hours to about a day.

According to James Kaler in his book *The Hundred Greatest Stars* RR Lyr's period of variability as it goes between magnitude 7.2 and magnitude 8 is

Continued ...

RR Lyr... from previous page

"13 hours, 36 minutes, and 14.9 seconds". Kaler also says that the star goes from its lowest brightness (mag 8) to its highest brightness (mag 7.2) quickly. Its return to magnitude 8 takes a while, so if you can catch it on the way up you'll see the brightness change in a small time. It'd be a fun project to plot a full cycle of the star's variation in brightness. You'd have to devote the better part of an observing session to this effort, but your trophy would be a chart or a table showing the variability.

You'll need a small telescope to see this star, and you'll need a good finder chart. The star is near the plane of the Milky Way, so it's a crowded star field.

A CCD imager (use a Johnson V filter if you want to submit the data to the AAVSO), would help with the data gathering process. This star is bright enough that an only short exposures would be required to get good data. An alt-az telescope (on a mount with drive motors) should get the job done.

RR Lyr is a population II, low metal star. It is a F (color) star, only slightly bluer than our Sun, which is a G star.

They are commonly found in globular clusters and since globulars are (relatively speaking) fairly close to us, the RR Lyr type variables in the cluster can help us determine the distance to the cluster. This allows us to place the globular in three dimensions and provides information about the structure of the Milky Way galaxy.

The Citizen Sky Project

I'll be working with the AAVSO on the Citizen Sky project (www.citizensky.org). The program is based around Epsilon Aurigae an eclipsing variable star with a 27.1 year period. It turns out that the year of the eclipse is 2009. Some reports say that the eclipse has already started.

I wrote a 'shallow sky' article about this star in the June issue of the *Guidestar* so I won't repeat myself here.

There is training material on the CitizenSky.org web site as well as information on how you can submit your observations. You do not have to be a variable star observer now, and you do not need to be a member of the AAVSO to participate. The project will go for a couple of years, until the eclipse ends.

By mid August, Epsilon Aurigae will rise about 00:30 (thirty minutes past midnight), and be observable at just over 20 degrees above the horizon by 3:00 a.m. If you're an early riser, the Sun comes up about 7:00 a.m., so the star should be visible at 5:00 a.m. or so.

If these times do not work for you, just wait until later in the year when the star's schedule will be a better match for yours.

**Want new information in the
GuideStar?
Write it!!**

You, too, can be published here.

- What are you doing that's new and exciting?
- What have you read recently (book report!)?
- What new and interesting software are you using?
- Did you have an observation that was especially interesting?
- Any 'lessons learned' from observing attempts?
- What are you looking forward to at the next Texas Star Party?

Send your materials to Bill Pellerin,
the *GuideStar* editor at:

BillPellerin@sbcglobal.net

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. Also typically included are Committee Reports, Special Interest Group Reports, current activity announcements, hardware reviews, an astrophotography slide show by members and other items of interest. 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.

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Email: BillPellerin@sbcglobal.net

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Houston Astronomical Society

Meeting on Friday, August 7

7:00 Novice & Site Orientation

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 left into UH entrance 14
- Science and Research is on the left

From I-45 going north (from NASA/Galveston)

- exit at Cullen Boulevard
- turn left on Cullen to UH entrance 14

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.

Houston Astronomical Society

P.O. Box 20332 • Houston, TX 77225-0332



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 banquet with a special guest
- 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.***