NORTH HOUSTON ASTRONOMY CLUB

North Star Newsletter

February 2011 Volume XI No. 2

NHAC General Meeting

January 28, 2011

Novice Program

"The First Steps in Observing:
What you need. What you don't need. What to do.
What to observe. When to observe. Where to observe.
No more excuses! "
By Aaron Clevenson
6:30 - 7:15 in CLA 221, The Cosmic Forum

Main Presentation

Beginning at 7:30 in CLA Teaching Theater
Featuring:

- NHAC news and announcements
- "What's Up Doc?" by Aaron Clevenson
- "Professor Comet Report" by Justin McCollum

Featured Speaker

Bill Christian on Sunspots

Inside This Issue

The Deadline for submissions for the March 2011 newsletter is February 11, 2011.

NHAC President's Message

Welcome to the New Year and what we all hope will be a great one for our club and each of us. In December I was promoted from vice-president by election to herd this organization of sky gazing cats to seek a new vision beyond the horizon. Great rhetoric eh? It should be a fun year for me and I hope for all NHAC members and friends as I work with this year's slate of officers comprised of some veterans and some new faces to bring interesting and educational programs and activities to the North Houston astronomy community. I believe we can do that and at the same time address approaching challenges which include a slumping membership (please renew if you have not done so already!), the continuing search for the ideal dark site (West Texas is too far for an evening's trip), and others. I am confident we will succeed in our goals because I feel the commitment of the officers and everyone as evidenced by their willingness to support out-reach activities, to arrange refreshments for a meeting, or to help clean up afterwards. We are always open to ideas and comments directly or via email. So as they say in at the Cape – let the countdown resume as we prepare to launch this year's NHAC journey.

Bon Voyage!

Bruce Pollard

THANK YOU!

A very special Thank You to all those who participated in the Open Forum and to all who attended December's General Meeting.

Congratulations to the Newly Elected 2011 NHAC Officers!

2011 Elected Officers

President
Bruce Pollard
president@astronomyclub.org

Vice President
Aaron Clevenson
vicepresident@astronomyclub.org

Secretary
Alan Wilson
secretary@astronomyclub.org

Treasurer
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Observation Committee Chairperson
Frank Martens
observation@astronomyclub.org

Membership Committee Chairperson
Bruce Pollard/Stuart Davenport
membership@astronomyclub.org

Program Committee Chairperson
George Marsden
program@astronomyclub.org

"It is the chiefest point of happiness that a man is willing to be what he is."
Desiderius Erasmus (1466 - 1536)

NHAC is a proud member of:

Night Sky Network — NASA

Astronomical League

ida International Dark-Sky Association

NHAC Monthly Star Parties

Come on out for Socializing and Stargazing!

Mark these dates on your calendar for future NHAC Star Parties at The White Eagle Lodge:

February 5, 2011
March 4, 2011
April 2, 2011
April 30, 2011
May 7, 2011
June 4, 2011
July 2, 2011
July 30, 2011
August 27, 2011
September 24, 2011
October 22, 2011
November 26, 2011
December 17, 2011

**These dates are tentative and subject to change.*

Rules and Directions are available online at www.astronomyclub.org

News and Tidbits

Notes from the Treasurer

It's 2011, have you renewed your membership yet? All 2010 memberships expired at the end of December so be sure to bring check or cash to renew and maintain your membership for 2011. Don't forget to ask for your personalized membership card! If you already have a membership card but it has no expiration date, that means you need to renew for 2011.

Special Club Rate Magazine Subscriptions

Club rates for personal subscriptions to ASTRONOMY and SKY & TELESCOPE magazines save about 25% over the normal subscription costs. Each magazine has its own procedure to subscribe based upon initiating the order through the club treasurer.

For ASTRONOMY magazine, write your check to NHAC (or pay in cash) for $34 (or $60 for 2 years). The Treasurer then validates your membership by writing a club check for the same amount to the magazine and sending them your address. Renewals must also be processed through the club. Please save your renewal documents for this process.

For SKY & TELESCOPE, pay the club $33 (or $32.95 if by check). As above, we write a club check to validate your membership and start your subscription. SKY & TELESCOPE renewals are processed directly by the subscriber.

Be sure to include a clearly printed name and address sheet for any new subscriptions

Upcoming Star Parties

The **Texas Star Party** will be held May 29 - June 5, 2011 at the Prude Ranch near Fort Davis, Texas. For more information and registration go to their website at: **www.texasstarparty.org**

The **Okie-Tex Star Party** will be held September 24 - October 2, 2011 at Camp Billy Joe in the Black Mesa Area of Oklahoma. For more informaton and registration go to their website at: **www. okie-tex.com/index.php**

The 28th Annual **Eldorado Star Party** will be held October 24 - 30, 2011 at the X Bar Ranch Nature Retreat in Eldorado, Texas. For more information and registration go to their website at **www.texasstarparty.org/eldorado.html**

Remember to check out the North Houston Astronomy Club Facebook page:
http://www.facebook.com/pages/North-Houston-Astronomy-Club/121350204546031?v=info
Or, just type "North Houston Astronomy Club" in the search bar.

The Administaff Observatory at Humble ISD

The Administaff Observatory at Humble ISD, 2505 S. Houston Ave., Humble, TX 77396 281-641-STAR

Upcoming Public Nights at the Observatory*

February 11, 2011 @ 6:15 pm
March 11, 2011 @ 6:30 pm
April 8, 2011 @ 7:45 pm
May 13, 2011 @ 8:15 pm
June 10, 2011 @ 8:30 pm

**Dates and times are subject to change.*

Cosmology Standard Candle Not So Standard After All

This image layout illustrates how NASA's Spitzer Space Telescope was able to show that a "standard candle" used to measure cosmological distances is shrinking -- a finding that affects precise measurements of the age, size and expansion rate of our universe. Image credit: NASA/ JPL-Caltech/Iowa State

January 12, 2011

PASADENA, Calif. -- Astronomers have turned up the first direct proof that "standard candles" used to illuminate the size of the universe, termed Cepheids, shrink in mass, making them not quite as standard as once thought. The findings, made with NASA's Spitzer Space Telescope, will help astronomers make even more precise measurements of the size, age and expansion rate of our universe.

Standard candles are astronomical objects that make up the rungs of the so-called cosmic distance ladder, a tool for measuring the distances to farther and farther galaxies. The ladder's first rung consists of pulsating stars called Cepheid variables, or Cepheids for short. Measurements of the distances to these stars from Earth are critical in making precise measurements of even more distant objects. Each rung on the ladder depends on the previous one, so without accurate Cepheid measurements, the whole cosmic distance ladder would come unhinged.

Now, new observations from Spitzer show that keeping this ladder secure requires even more careful attention to Cepheids. The telescope's infrared observations of one particular Cepheid provide the first direct evidence that these stars can lose mass - or essentially shrink. This could affect measurements of their distances.

"We have shown that these particular standard candles are slowly consumed by their wind," said Massimo Marengo of Iowa State University, Ames, Iowa, lead author of a recent study on the discovery appearing in the Astronomical Journal. "When using Cepheids as standard candles, we must be extra careful because, much like actual candles, they are consumed as they burn."

The star in the study is Delta Cephei, which is the namesake for the entire class of Cepheids. It was discovered in 1784 in the constellation Cepheus, or the King. Intermediate-mass stars can become Cepheids when they are middle-aged, pulsing with a regular beat that is related to how bright they are. This unique trait allows astronomers to take the pulse of a Cepheid and figure out how bright it is intrinsically-or how bright it would be if you were right next to it. By measuring how bright the star appears in the sky, and comparing this to its intrinsic brightness, it can then be determined how far away it must be.

This calculation was famously performed by astronomer Edwin Hubble in 1924, leading to the revelation that our galaxy is just one of many in a vast cosmic sea. Cepheids also helped in the discovery that our universe is expanding and galaxies are drifting apart.

Cepheids have since become reliable rungs on the cosmic distance ladder, but mysteries about these standard candles remain. One question has been whether or not they lose mass. Winds from a Cepheid star could blow off significant amounts of gas and dust, forming a dusty cocoon around the star that would affect how bright it appears. This, in turn, would affect calculations of its distance. Previous research had hinted at such mass loss, but more direct evidence was needed.

Marengo and his colleague used Spitzer's infrared vision to study the dust around Delta Cephei. This particular star is racing along through space at high speeds, pushing interstellar gas and dust into a bow shock up ahead. Luckily for the scientists, a nearby companion star happens to be lighting the area, making the bow shock easier to see. By studying the size and structure of the shock, the team was able to show that a strong, massive wind from the star is pushing against the interstellar gas and dust. In addition, the team calculated that this wind is up to one million times stronger than the wind blown by our sun. This proves that Delta Cephei is shrinking slightly.

Follow-up observations of other Cepheids conducted by the same team using Spitzer have shown that other Cepheids, up to 25 percent observed, are also losing mass.

"Everything crumbles in cosmology studies if you don't start up with the most precise measurements of Cepheids possible," said Pauline Barmby of the University of Western Ontario, Canada, lead author of the follow-up Cepheid study published online Jan. 6 in the Astronomical Journal. "This discovery will allow us to better understand these stars, and use them as ever more precise distance indicators."

Other authors of this study include N. R. Evans and G.G. Fazio of the Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.; L.D. Matthews of Harvard-Smithsonian and the Massachusetts Institute of Technology Haystack Observatory, Westford; G. Bono of the Università di Roma Tor Vergata and the INAF-Osservatorio Astronomico di Roma in Rome, Italy; D.L. Welch of the McMaster University, Ontario, Canada; M. Romaniello of the European Southern Observatory, Garching, Germany; D. Huelsman of Harvard-Smithsonian and University of Cincinnati, Ohio; and K. Y. L. Su of the University of Arizona, Tucson.

The Spitzer observations were made before it ran out of its liquid coolant in May 2009 and began its warm mission.

NASA's Jet Propulsion Laboratory, Pasadena, Calif., manages the Spitzer Space Telescope mission for NASA's Science Mission Directorate, Washington. Science operations are conducted at the Spitzer Science Center at the California Institute of Technology, also in Pasadena. Caltech manages JPL for NASA. For more information about Spitzer, visit http://spitzer.caltech.edu/ and http://www.nasa.gov/spitzer .

How Far Away is That?

By: Aaron Clevenson, VP Education

One of the most frequent questions I hear at outreach events is: "*How far away is that ...*" Happily with the help of the internet, books, and magazines, we can find the answers. The next question though should then be: "*How do they know that?*" As part of my role as VP of NHAC, I will use our Northstar Newsletter as a way to share information and insights of an educational nature. So for February, let me see if I can answer that question.

So, "*How do they know that?*" The answer is: "*It depends...*" It depends on the distance to the object. Some objects are quite close, like the Earth's Moon. Some are quite distant, like quasars. Let's start up close and move outward.

- Up to one (1) AU (Astronomical Unit). This covers the space from the sun on one side to the asteroid belt on the other. This means the sun and moon all the time, and Mercury, Venus, and Mars when they on our side of the sun. It also includes comets and near Earth asteroids when they are close by. This distance can be measured directly using *Radar*.

But, that does not get us very far from Earth, and most of the Universe is beyond 1 AU.

- Out to about 100 parsecs (pc) we use a technique called *Stellar Paralax*. This too is a direct technique. (Note: A parsec is 3.26 lightyears, and a lightyear is the distance that light travels in one year. One parsec = 19,173,528,100,000 miles.) Stellar parallax involves measuring the angle between the object and a very distant object (one of those quasars?). You do this from two locations where you know the very accurate distance between your observations. This can be done from one observatory, six months apart. This puts the distance between the two observations at 2 AU (one from each side of the Earth's orbit). With this distance and the two angles you can use trigonometry to calculate the distance to the object. This will work for many stars that we see. On Earth, surveyors do a version of this called Triangulation to measure surface distances.

That will still not get us to all of the stars we see with just our eyes... The rest of our measurements are done indirectly. We take a measurement that we can compare with known objects and make an estimate.

- To get out to about 10,000 pc, we can use *Spectroscopic Parallax.* This uses the Hertzsprung-Russell diagram. Every star is somewhere on the diagram. By studying the spectrum of a star, we can determine where it is on the diagram. Once it is on the diagram, we can determine its absolute luminosity. (This is a standard brightness scale. It is the apparent brightness of a star if you obseve it from 10 pc.) We can also measure its apparent brightness (how bright it appears to us) using a CCD camera. We know that an object's apparent brightness drops using this function: Absolute Magnitude = Apparent Magnitude – 5 * log(Distance / 10). If we measure the Apparent Brightness and can determine the Absolute Brightness, we can calculate the Distance.

- To go out to 15 Mpc (megaparsecs or million parsecs) we use a special kind of object: *Variable Stars*. Variable Stars are stars that change their brightness over time. There are two types that have very standard light curves: LL Lyrae and Type I or Type II Cepheid. You can tell which type of Variable Star it is by the light curve from the star during one complete cycle. If you also measure the period (how often it gets bright), you can determine its Absolute Brightness. Comparing this to its measured Apparent Brightness and using the equation mentioned above, you can calculate the Distance to the object.
- 200 Mpc is the limit for the *Tully-Fisher Relation*. This is used for galaxies. This relation tells us that the speed of the rotation of a galaxy is related to its Absolute Brightness. We then calculate the Distance like we did for the previous two types.
- Out to 1 Gpc (gigaparsec, or billion parsecs) can be measured for a galaxy if we can observe a *Type 1 Supernova*. These are not huge stars exploding at the end of their life, but are a very specific type of supernova: a Carbon Detonation Supernova. It is a carbon white dwarf star getting matter from a neighbor. When it reaches about 1.4 solar masses it explodes as a Supernova. The two types have very different light curves. Type 1 Supernovae have a very standard Absolute Brightness. Using the Apparent Brightness, we can once again calculate the Distance.
- Beyond 100 Mpc we use a technique called *Hubble's Law*. This law tells us that the further away an object is, the more red shifted its common spectral lines will be. We measure the red shift of those lines (for example the Hydrogen Alpha line) and it translates directly to its distance.

With the right equipment, you too could be measuring the distance to astronomical objects.

If you have any questions that you would like answered, please send me an email, to: **aaron@clevenson.org** and I'll see what I can do.

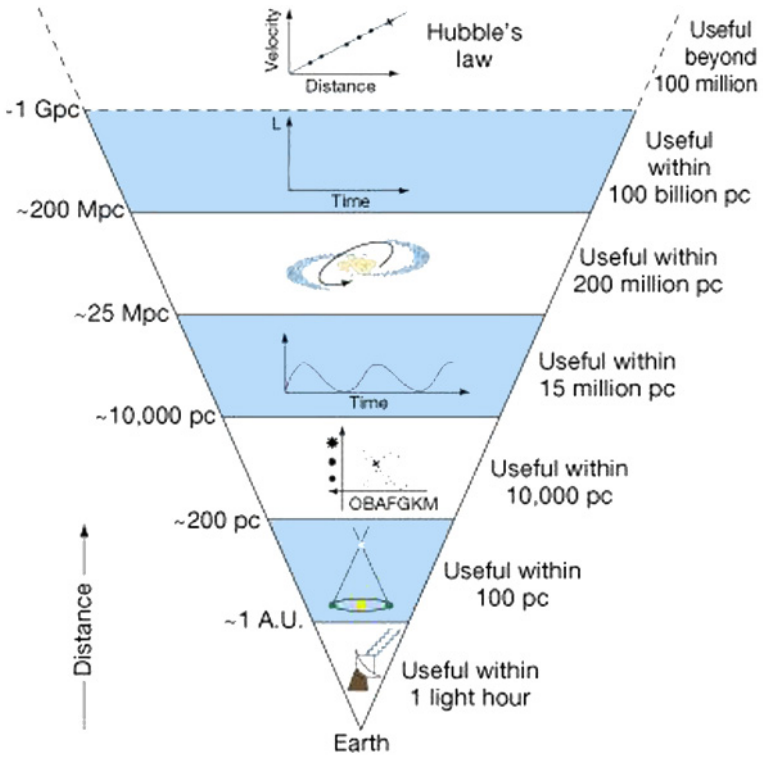

Image credit: "Astronomy Today" by Chaisson/McMillan

Refreshment Committee Chairman Needed

Your hungry club members need YOU! Yes, YOU!!

Have you been thinking about getting more involved with the club, but weren't quite sure what to do? Well, this would be a great way to help out! We are looking for someone to be in charge of the meeting refreshments each month.

Your job would be to see that the refreshments are ordered, picked up and delivered to he meeting each month. They would need to be set up prior to the meeting and taken down after the meeting. You would also need to see that all of the necessary utensils were kept on hand.

As Chairman, you may choose to delegate this monthly, or handle it yourself with a few bodyguards. :)

Position: Availabile immediately

Salary: We will pay you on Tuesday for the hamburger today

Satisfaction: Priceless

Contact board@astronomy.club.org

We need YOU!!
Step on up!!

About NHAC

The North Houston Astronomy Club (NHAC), was formed for educational and scientific purposes, for people of all races, creeds, ethnic backgrounds and sex, for the primary purpose of developing and implementing programs designed to increase the awareness and knowledge of astronomy, especially for those living near the north side of Houston Texas.

NHAC is a non-profit organization dedicated to providing the opportunity for all individuals to pursue the science of astronomy, by observing in a dark-sky site, learning the latest technology, and sharing their knowledge and experience. Thus, our "Observe-Learn-Share" motto.

North Houston Astronomy Club is Sponsored by:

LONE STAR COLLEGE KINGWOOD

Membership Benefits

- Loaner telescopes
- Borrow from the NHAC "Library"
- Observe from Dark Sky Observing Sites
- Learn from experienced amateur astronomers
- Share your knowledge at club hosted picnics and star parties
- Discount magazine subscriptions (contact our Treasurer)
- Includes membership in the Astronomical League
- The quarterly Astronomical League magazine "Reflector"
- Eligibility for NHAC Executive Board

www.astronomyclub.org
www.nhac.info

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Observe - Learn - Share