The Spectrogram

Newsletter for the Society of Telescopy, Astronomy, and Radio

September 2013

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S*T*A*R
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September Meeting

The next meeting of S*T*A*R will be held on Thursday, September 5 at 8 p.m. at Monmouth Museum. Our speaker will be former S*T*A*R member Allen Malsbury, who will discuss his experience in telescope construction, observing, and imaging. Allen designed and built a large-aperture Dobsonian mount telescope, and is a long-time observer.

The meeting will begin at 8:00pm at Monmouth Museum on the campus of Brookdale Community College in Lincroft, NJ.

Calendar

September 5, 2013 – S*T*A*R meeting

September 6, 2013 - LADEE mission launch

September 13, 2013 - Dorbrook observing session

Editor's Corner

Welcome to a new S*T*A*R season. Our last season was a good success, with many excellent speakers, several star parties, and a number of observing sessions at Dorbrook Recreation Area.

This season S*T*A*R has a new president, Kevin Gallagher. Kevin has arranged an excellent series of talks, beginning with a talk by former S*T*A*R member Allen Malsbury. Allen is a very talented telescope builder, and will describe his experience in imaging and in building telescopes.

The S*T*A*R board and several volunteers have set up a sequence of regular observing sessions at Dorbrook Recreation Area. The sessions this summer had very good turnout, and observers enjoyed good views of many objects under quite good skies. Plan to attend some sessions. Attend even if you don't have a telescope. There are usually plenty of scopes for viewing. This fall comet ISON will arrive. ISON has the potential of becoming a bright comet. You won't want to miss it.

The board has taken a number of steps to improve the club. The observing sessions address a concern that the club was not getting out to see the night sky often enough. There are some new methods being used to advertise the club, including a Facebook page. Spectrogram was revived recently, after the long-time editor had left the club.

So enjoy the new season. Come to hear fascinating talks, and get out to see the sky.

Rob Nunn

June Meeting Minutes

By Steve Fedor

The annual June business meeting of S*T*A*R Astronomy club began at 8:05 p.m. The meeting was attended by 27 people. President Rob Nunn chaired the meeting and began by presenting the agenda and noting all the speakers, star parties and events that occurred in the 2012-2013 season.

Treasurer Arturo Cisneros then read the financial report. Copies can be obtained from any club officer.
The following issues were then discussed:
- Cost and size of the P.O. box. The club still needs a P.O. box for out non-profit status.
-Decrease in membership. It was decided a committee for increasing membership would be established. Kevin Gallagher, Ken Legal and Michelle Paci agreed to join the effort.
-Need to update our email list. This would be looked into.
-Michelle Paci said she created a Faceboook page for the club.
- Various opinions for increasing public exposure for the club by using community calendars, meetup.com, flyers at star parties and ads in the Brookdale college newspaper.
-It was decided to do "Scope and Tell" at one of the upcoming meetings.
-Mike Lindner suggested the club resume having regularly scheduled observing nights.
-It was especially noted that the club needs to greet newcomers and nurture them into the hobby.
-The possibility of partnering with The Hobby Shop was discussed. Various opinions were expressed but it was noted the shop doesn't sell quality grade instruments.

The next major topic discussed was the club's Astronomical League membership. It was noted the club has found a new source of insurance and doesn't need the AL for that purpose as was previous years. It was proposed that the club pay $10. to remain a Member Society. Then each STAR member has the option of becoming a full AL member for $7.50 annually. Ken L. made the motion. George Z. seconded it. The motion was passed unanimously.

Next up was the election of club officers. The slate this year was: Kevin Gallagher-president, Rob Nunn- vice president, Michelle Paci- secretary, Arturo Cisneros- Treasurer, Dave Britz-member at large. Jay Respler made a motion to accept the candidates in one vote. It was seconded by Mike Kozic. The slate of candidates was passed unanimously. A big thanks to Ken Legal for once again acting as our election committee.

The club then discussed the sale of the 25 inch telescope. The club has a tentative offer of $4,500. This is contingent on the buyer being able to have the mirror refigured at a reasonable price. After a lengthy discussion George Z. motioned to sell the scope. It was not recorded who seconded the motion. The motion unanimously passed.

Steve Rich then discussed the topic of having a prorated dues structure. Presently the club does not offer a percent reduction of dues when someone joins mid-season. After a short discussion it was decided to not offer this option.

Rich Gaynor then opened the topic of the club's discussion board; its uses and abuses. There were concerns over content detrimental to the club. After a lengthy discussion it was decided there was no specific changes to be implemented at this time.

Ken Legal then presented Events of the Month. Ked discussed the planetary lineup, Venus being 40% illuminated on the 40 minute old moon on 6/9. Ken also mentioned the upcoming opposition of Pluto.

Jay Respler confirmed that the club picnic will be on Sat. October 5th at the Bucks Mills recreation area.

Dark Energy Survey begins five-year mission to map southern sky in tremendous detail

This image of the NGC 1398 galaxy was taken with the Dark Energy Camera. This galaxy lives in the Fornax cluster, roughly 65 million light years from Earth. It is 135,000 light years in diameter, just slightly larger than our own Milky Way.

(Phys.org) Tonight, as the sun sinks below the horizon, the world's most powerful digital camera will once again turn its gleaming eye skyward. Tonight, and for hundreds of nights over the next five years, a team of physicists and astronomers from around the globe will use this remarkable machine to try to answer some of the most fundamental questions about our universe.

On Aug. 31, the Dark Energy Survey (DES) officially began. Scientists on the survey team will systematically map one-eighth of the sky (5000 square degrees) in unprecedented detail. The start of the survey is the culmination of 10 years of planning, building and testing by scientists from 25 institutions in six countries.
The survey's goal is to find out why the expansion of the universe is speeding up, instead of slowing down due to gravity, and to probe the mystery of dark energy, the force believed to be causing that acceleration.

"The Dark Energy Survey will explore some of the most important questions about our existence," said James Siegrist, associate director for High Energy Physics at the U.S. Department of Energy's Office of Science. "In five years' time, we will be far closer to the answers, and far richer in our knowledge of the universe."

"With the start of the survey, the work of more than 200 collaborators is coming to fruition," said DES Director Josh Frieman of the U.S. Department of Energy's Fermi National Accelerator Laboratory. "It's an exciting time in cosmology, when we can use observations of the distant universe to tell us about the fundamental nature of matter, energy, space and time."

The main tool of the survey is the Dark Energy Camera, a 570-megapixel digital camera built at Fermilab in Batavia, Ill., and mounted on the 4-meter Victor M. Blanco telescope at the National Science Foundation's Cerro Tololo Inter-American Observatory in the Andes Mountains in Chile. The camera includes five precisely shaped lenses, the largest nearly a yard across, that together provide sharp images over its entire field of view.
The Dark Energy Camera is the most powerful survey instrument of its kind, able to see light from more than 100,000 galaxies up to 8 billion light-years away in each snapshot.

"The start of the Dark Energy Survey is an important milestone," said CTIO Director Nicole van der Bliek. "The Dark Energy Camera, in conjunction with the Blanco telescope here at CTIO, will greatly increase our understanding of the forces that control the expansion of our universe."

Over five years, the survey will obtain color images of 300 million galaxies and 100,000 galaxy clusters and will discover 4,000 new supernovae, many of which were formed when the universe was half its current size. The data collected will be processed at the National Center for Supercomputing Applications (NCSA) at the University of Illinois in Urbana, and then delivered to collaboration scientists and the public.
"NCSA is pleased to be producing and distributing the refined data products that will enable this science," said Don Petravick, principal investigator of the DES Data Management Operation.

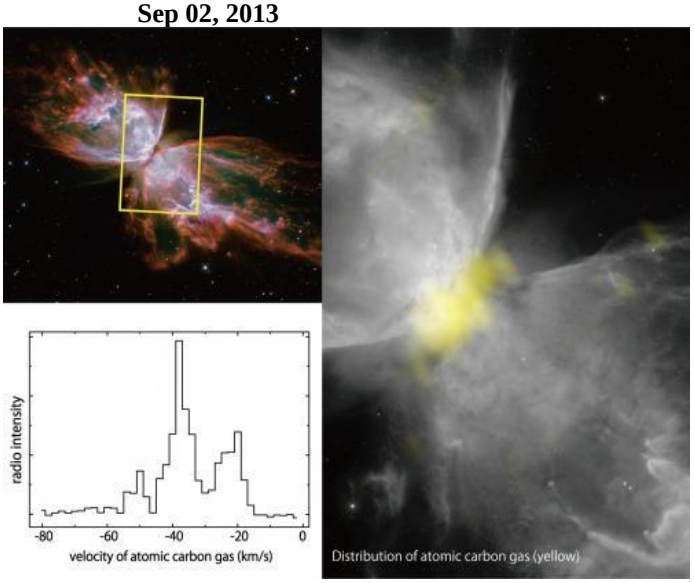
The survey's observations will not be able to see dark energy directly. However, by studying the expansion of the universe and the growth of large-scale structure over time, the survey will give scientists the most precise measurements to date of the properties of dark energy.
"We're looking at this big galaxy map of the universe as a way of finding evidence for dark energy and characterizing its nature with cosmic epoch," said Ofer Lahav of University College London and head of the DES Science Committee. "An even more challenging goal for DES is to tell if what causes the acceleration of the universe is indeed dark energy, or something entirely different."

The survey will use four methods to probe dark energy:

- Counting galaxy clusters. While gravity pulls mass together to form galaxies, dark energy pulls it apart. The Dark Energy Camera will see light from 100,000 galaxy clusters billions of light-years away. Counting the number of galaxy clusters at different points in time sheds light on this cosmic competition between gravity and dark energy.
- Measuring supernovae. A supernova is a star that explodes and becomes as bright as an entire galaxy of billions of stars. By measuring how bright they appear on Earth, we can tell how far away they are. Scientists can use this information to determine how fast the universe has been expanding since the star's explosion. The survey will discover 4000 of these supernovae, which exploded billions of years ago in galaxies billions of light-years away.
- Studying the bending of light. When light from distant galaxies encounters dark matter in space, it bends around the matter, causing those galaxies to appear distorted in telescope images. The survey will measure the shapes of 200 million galaxies, revealing the cosmic tug of war between gravity and dark energy in shaping the lumps of dark matter throughout space.
- Using sound waves to create a large-scale map of expansion over time. When the universe was less than 400,000 years old, the interplay between matter and light set off a series of sound waves traveling at nearly two-thirds the speed of light. Those waves left an imprint on how galaxies are distributed throughout the universe. The survey will measure the positions in space of 300 million galaxies to find this imprint and use it to infer the history of cosmic expansion.

The world's first interferometric image at 500 GHz with ALMA Band 8 receivers

Sep 02, 2013



Planetary Nebula NGC 6302. The right image is the composite image of ALMA Band 8 (yellow) and the Hubble Space Telescope (gray). Upper left image is the whole view of NGC 6302 taken by the Hubble Space Telescope, and yellow rectangle.

(Phys.org) ALMA opens another window to the universe in the 500 GHz frequency band. Astronomers successfully synthesized the distribution of atomic carbon around a planetary nebula NGC 6302 in test observations with the ALMA Band 8 receiver, developed by the National Astronomical Observatory of Japan (NAOJ). This is the first 500 GHz band astronomical image captured by a radio interferometer with unprecedentedly high resolution.

ALMA has 10 receiver bands to cover a wide range of observing frequency. All antennas are equipped with dedicated receivers for each frequency band. NAOJ assumes the development of three bands: Band 4 (receiving frequency: 125 to 163 GHz, millimeter-wave); Band 8 (385 to 500 GHz, submillimeter-wave); and Band 10 (787 to 950 GHz, Terahertz-wave).
The frequency band observable with the Band 8 receiver covers a wide range of radio emission lines from various atoms and molecules. Among them, one of the most attractive targets for many astronomers is the emission from atomic carbon at 492 GHz. What can we expect to see from it?The main component of the cosmic gas is hydrogen. The abundance of carbon is only 1/3000 of that of hydrogen, although carbon is the third most abundant element in the universe. The cosmic gas can be classified into three groups

by its temperature and density; "plasma cloud" (number density of plasma particles: 0.01 per 1 cm^3, temperature: several million degrees Celsius), "atomic cloud" (number density of atom: 10 per 1 cm^3, temperature: -160 degrees Celsius), and "molecular cloud" (number density of molecule: 10000 per 1 cm3, temperature: - 260 degrees Celsius). Dense regions of atomic cloud grow into molecular cloud, and molecular cloud with increased density becomes a seedbed of stars. On the other hand, molecules composing molecular cloud dissociate into atoms when exposed to intense ultraviolet light. Detailed study of the distributions of atomic cloud and molecular cloud gives us insights into the evolution of cosmic gas. In particular, observation of carbon atom is important not only in studying the distribution and characteristics of atomic cloud, but also in exploring chemistry in the universe because various complex molecules are formed from chemical reactions between carbon atom and other atoms such as oxygen and hydrogen.

So far, observations in the 500 GHz band, including emission line from cosmic carbon atom, have been made with single dish radio telescopes such as the University of Tokyo's Mt. Fuji Submillimeter Telescope and Caltech Submillimeter Observatory (CSO). The typical spatial resolution of those observations is 15 arcseconds or larger (1 arcsecond corresponds to 1/3600 of 1 degree), which is far worse than the resolution of existing 8-meter class optical telescopes (0.1 arcsecond). ALMA is the first radio interferometer which allows observations in this frequency range with remarkably improved resolution compared to single dish telescopes. This time, the Band 8 receivers were installed in five 7-m antennas developed by Japan and achieved a high resolution of 3.5 arcseconds. By installing the receiver into all the ALMA antennas, the resolution becomes even better by 400 times. Astronomers around the world have high expectations for observations with Band 8.

Yutaro Sekimoto, an associate professor at NAOJ and the leader of the Band 8 receiver development team at the NAOJ's Advanced Technology Center says "I deeply appreciate long and hard efforts of all staff to realize ALMA observation of carbon atom. I expect further ALMA observations will unveil the evolution process of interstellar matter." Naohisa Sato, a member of the development team, says "We went through difficult times during receiver production phase. We made a number of adjustments and replacements to achieve required performance for every receiver. I am really happy with this successful result."

NGC 6302 is a planetary nebula, which is in the final stage of the life of a star with a mass several times that of the Sun. Visible light image shows a bipolar shape of gas ejected from the dying star. ALMA with the Band 8 receivers targeted at the center of the nebula and revealed that the distribution of carbon atom is concentrated in a small part, which is similar to a dust and gas disk around the central star that has been found by previous observations with other telescopes. Further observations of carbon atom with better resolution will give us more detailed view of the chemical environment in the nebula.

Are you a S*T*A*R Member?

S*T*A*R meets the first Thursday of each month, except July and August, at 8:00 p.m. at Monmouth Museum on the campus of Brookdale Community College in Lincroft, NJ. Meetings usually include a presentation of about one hour by a guest speaker, a break for refreshments and socializing, a description of interesting objects to view, and a discussion of club business.

Memberships:
( )Individual...$35
( ) Family...$45
( ) Student…$15

Name_____

Address_____

City_____State___Zip_____

Phone_____

Email_____
Make checks payable to: STAR Astronomy Society, Inc. and mail to P.O. Box 863, Red Bank, NJ 07701

The club owns 8" f/8, 13" f/4.5 and 25" f/5 Dobsonian telescopes which are available for use by members. Because of its large size use of the 25" requires the supervision of two qualified operators. To borrow a telescope or become a qualified operator of the 25", please contact the Vice President.

The officers of S*T*A*R are:
President Kevin Gallagher
Vice President Rob Nunn
Secretary Michelle Paci
Treasurer Arturo Cisneros
Member at Large Dave Britz

In the Eyepiece

Here is a list of objects for this month. This is reproduced from www.skyhound.com with the kind permission of its creator and author of SkyTools Greg Crinklaw.

Object(s)	Class	Con	RA	Dec	Mag
Garnet Star	Multiple Star	Cepheus	21h43m30.5s	+58°46'48"	4.2
Zeta Aqr	Multiple Star	Aquarius	22h28m49.9s	-00°01'12"	3.7
LW Cyg	Multiple Star	Cygnus	21h55m13.8s	+50°29'50"	9.2
M2	Globular Cluster	Aquarius	21h33m28.4s	-00°49'39"	7.3
M15	Globular Cluster	Pegasus	21h30m01.0s	+12°10'12"	7.3
Helix	Planetary Nebula	Aquarius	22h29m38.4s	-20°50'13"	7.6
Humason 1-2	Planetary Nebula	Cygnus	21h33m06.6s	+39°38'17"	12.7
NGC 7139	Planetary Nebula	Cepheus	21h46m08.2s	+63°47'59"	13.0
Cocoon	Diffuse Nebula	Cygnus	21h53m24.0s	+47°16'00"	10.0
IC 5217	Planetary Nebula	Lacerta	22h23m55.7s	+50°58'00"	12.6
NGC 7094	Planetary Nebula	Pegasus	21h36m53.0s	+12°47'19"	13.7
Stephan's Quintet	Galaxy Group	Pegasus	22h36m00.5s	+33°57'57"	12.0
NGC 7354	Planetary Nebula	Cepheus	22h40m20.9s	+61°17'39"	12.9
Einstein's Cross	Gravitational Lens	Pegasus	22h40m32.5s	+03°21'48"	17.4