The Spectrogram

Newsletter for the Society of Telescopy, Astronomy, and Radio

September 2014

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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 Thursday September 4. Our speaker will be Kevin Conod from Star Ledger, whose talk is titled "Glass Giants: The Biggest Telescopes in the World."

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

Calendar

September 4, 2014 – S*T*A*R meeting

September 6, 2014 – International Observe the Moon Night at Dorbrook Park

September 26, 2014 – S*T*A*R observing session at Dorbrook Park

June Meeting Minutes

By Rob Nunn

The STAR meeting of June 5, 2014 was held at Monmouth Museum. The meeting began at 8:05 pm and was chaired by president Kevin Gallagher. There were 16 people in attendance.

This meeting was the annual business meeting, and Kevin began by reviewing the year's activities. STAR had eight speakers, several of whom were club members. The annual winter social meeting in January was canceled because of weather. The club conducted about half a dozen star parties for schools and the Middletown library, and a number of observing sessions at Dorbrook Park. It was recognized by Night Sky Network for its public astronomy promotion activities.

We next discussed membership and strategies for attracting new members. Mike Kozic noted that first time attendees often don't return if the meeting they attend features a speaker whose topic is of a highly technical nature. He suggested that we have a separate discussion for those who are more interested in practical astronomy. We could use a separate room to set up a small telescope and discuss its use, or explain the use of a planisphere, for example. Mike, George Zanetakos, and Steve Seigel volunteered to lead such a discussion. Steve Fedor offered to call people whose membership has lapsed recently to encourage them to rejoin, or learn why they decided not to rejoin. George offered to contact Asbury Park Press about covering club activities. Mike suggested preparing a DVD describing how to use the club web site. Such a disk would be helpful for new members.

George Zanetakos, as a representative of the nominating committee, then presented the slate of candidates for election to the STAR board: Kevin Gallagher, president; Rob Nunn vice president; Michelle Paci, secretary; Arturo Cisneros, treasurer; and Dave Britz, member at large. George noted that Michelle is sometimes busy with school work, but that her husband Andrew should be able to assist with duties of the secretary. The club voted to approve the slate of candidates.

We next discussed several financial issues. We began by considering again the possibility of finding a location for meetings whose cost would be less than the $100 charged by the museum. Steve Seigel said he would contact a woman at Monmouth University with whom he has worked. He thought the university might provide us a meeting room at no cost. Jay Respler said Ft. Monmouth migh thave a room for $25. He also suggested using a meeting room at a restaurant. George Zanetakos wondered if Dorbrook Park might have a space we can use. He will call the county about possible places to meet.

Treasurer Arturo Cisneros was not able to attend the meeting, so Kevin presented the report that Arturo had prepared. With the benefit of a canceled meeting, several speakers from the club who are not paid the $50 speaker fee, and income from sale of Messier image disks donated by George Zanetakos, the club finished the year in the black by $518.12. The club voted to keep dues at the current levels.

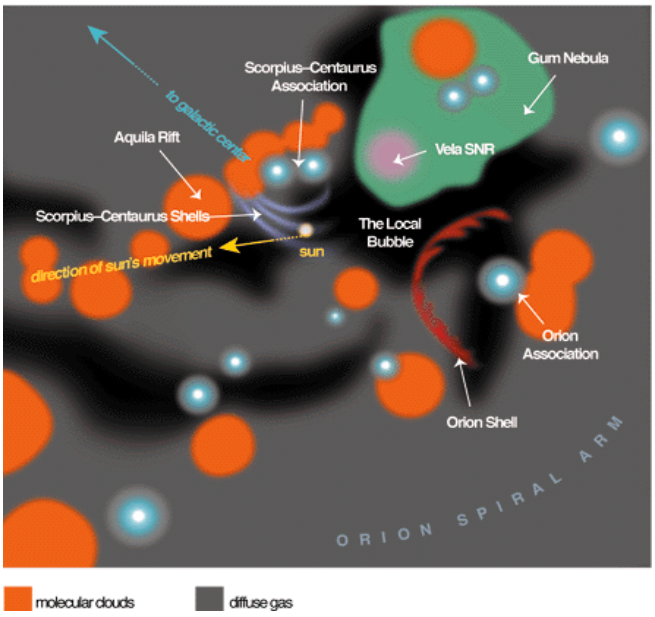
While we ended this year with a surplus, finances for the club are still difficult. We therefore considered again the possibility of requesting a donation for star parties. Club visitor Dan Pontone said that schools have a budget for such expenses, and that a group he works with charges $250 per scope for star parties. Dave Britz expressed strong concern about charging a fee instead of volunteering our services. But George noted that the club has expenses, such as insurance, and feels that a request for money to help cover such costs is not in conflict with our purpose to bring astronomy to the community. Kevin noted that such an arrangement is not in violation of rules that apply to a non-profit organization. We voted on a proposal to request a flat fee (rather than a fee per telescope) for star parties. The proposal was approved.

The club voted to hold a picnic again this summer. The proposed date is some time in August, with a starting time of about 4 pm. Jay said that Bucks Mill will charge $50, but that we would not have access to the building (which has toilets and a freezer). Mike Kozic offered to contact Monmouth Park about picnic facilities, and Kevin will contact Manasquan Reservoir Park.

Kevin asked about having an equipment night for one of our meeting programs. The members thought that was a good idea. And he noted that Gordon Waite is working on the 25-inch telescope, and has begun placing ads for the refurbished scope.

The meeting concluded at 10:15.

Evidence for supernovas near Earth



The Local Bubble and the Galactic Neighborhood. Credit: Illustration Credit & Copyright: Linda Huff (American Scientist), Priscilla Frisch (U. Chicago)

(Phys.org) Once every 50 years, more or less, a massive star explodes somewhere in the Milky Way. The resulting blast is terrifyingly powerful, pumping out more energy in a split second than the sun emits in a million years. At its peak, a supernova can outshine the entire Milky Way.

It seems obvious that you wouldn't want a supernova exploding near Earth. Yet there is growing evidence that one did—actually, more than one. About 10 million years ago, a nearby cluster of supernovas went off like popcorn. We know because the explosions blew an enormous bubble in the interstellar medium, and we're inside it.

Astronomers call it "the Local Bubble." It is peanut-shaped, about 300 light years long, and filled with almost nothing. Gas inside the bubble is very thin (0.001 atoms per cubic centimeter) and very hot (roughly a million degrees)—a sharp departure from ordinary interstellar material.

The Local Bubble was discovered gradually in the 1970s and 1980s. Optical and radio astronomers looked carefully for interstellar gas in our part of the galaxy, but couldn't find much in Earth's neighborhood. Meanwhile, x-ray astronomers were getting their first look at the sky using sounding rockets and orbiting satellites, which revealed a million-degree x-ray glow coming from all directions. It all added up to Earth being inside a bubble of hot gas blown by exploding stars.

However, not all researchers agreed.

"Within the last decade, some scientists have been challenging the [supernova] interpretation, suggesting that much or all of the soft X-ray diffuse background is instead a result of charge exchange," says F. Scott Porter of the Goddard Space Flight Center.

"Charge exchange": Basically, it happens when the electrically-charged solar wind comes into contact with a neutral gas. The solar wind can steal electrons from the neutral gas, resulting in an X-ray glow that looks a lot like the glow from an old supernova. Charge exchange has been observed many times in comets.

So, is the X-ray glow that fills the sky a sign of peaceful "charge exchange" in the solar system or evidence of terrifying explosions in the distant past?

To find out, an international team researchers including Porter and led by physics professor Massimiliano Galeazzi at the University of Miami in Coral Gables, developed an X-ray detector that could distinguish between the two possibilities. The device was named DXL, for Diffuse X-ray emission from the Local Galaxy.

On Dec. 12, 2012, DXL launched from White Sands Missile Range in New Mexico atop a NASA Black Brant IX sounding rocket, reaching a peak altitude of

160 miles and spending five minutes above Earth's atmosphere. That was all the time they needed to measure the amount of "charge exchange" X-rays inside the solar system.

The results, published online in the journal *Nature* on July 27, indicate that only about 40 percent of the soft X-ray background originates within the solar system. The rest must come from a Local Bubble of hot gas, the relic of ancient supernovas outside the solar system.

Obviously, those supernovas were not close enough to exterminate life on Earth—but they were close enough to wrap our solar system in a bubble of hot gas that persists millions of years later.

"This is a significant discovery,' said Galeazzi. "[It] affects our understanding of the area of the galaxy close to the sun, and can, therefore, be used as a foundation for future models of the galaxy structure."

Galeazzi and collaborators are already planning the next flight of DXL, which will include additional instruments to better characterize the emission. The launch is currently planned for December 2015.

Witnessing the early growth of a giant

This illustration reveals the celestial fireworks deep inside the core of a developing galaxy in the young Universe, as seen from a hypothetical planetary system. The sky is depicted as ablaze with the glow from nebulae, fledgling star clusters, and stars exploding as supernovae. The rapidly forming core may eventually become the heart of a mammoth galaxy similar to one of the giant elliptical galaxies seen today. Credit: NASA, ESA, Z. Levay and G. Bacon (Space Telescope Science Institute)

(Phys.org) Astronomers have uncovered for the first time the earliest stages of a massive galaxy forming in the young Universe. The discovery was made possible through combining observations from the NASA/ESA Hubble Space Telescope, NASA's Spitzer Space Telescope, ESA's Herschel Space Observatory, and the W.M. Keck Observatory in Hawaii. The growing galaxy core is blazing with the light of millions of newborn stars that are forming at a ferocious rate.

Elliptical galaxies are large, gas-poor gatherings of older stars and are one of the main types of galaxy along with their spiral and lenticular relatives. Galaxy formation theories suggest that giant elliptical galaxies form from the inside out, with a large core marking the very first stages of formation.

However, evidence of this early construction phase has eluded astronomers—until now.

Astronomers have now spotted a compact galactic core known as GOODS-N-774, and nicknamed Sparky. It is seen as it appeared eleven billion years ago, just three billion years after the Big Bang.

"This core formation process is a phenomenon unique to the early Universe," explains Erica Nelson of Yale University, USA, lead author of the science paper announcing the results, "we do not see galaxies forming in this way any more. There's something about the Universe at that time that could form galaxies in this way that it now can't. We suspect that the Universe could produce denser objects because the Universe as a whole was denser shortly after the Big Bang. It is much less dense now, so it can't do it anymore."
Although only a fraction of the size of the Milky Way, the infant galaxy is crammed with so many young stars that it already contains twice as much mass as our entire galaxy. It is thought that the fledgling galaxy will continue to grow, eventually becoming a giant elliptical galaxy. The astronomers think that this barely visible galaxy may be representative of a much larger population of similar objects that are too faint or obscured by dust to be spotted—just like the Sun can appear red and faint behind the smoke of a forest fire.

Alongside determining the galaxy's size from the Hubble images, the team dug into archival far-infrared images from NASA's Spitzer Space Telescope and the ESA Herschel Space Observatory to see how fast the compact galaxy is churning out stars. GOODS-N-774 is producing 300 stars per year. "By comparison, the Milky Way produces thirty times fewer than this—roughly ten stars per year," [2] says Marijn Franx of Leiden University in the Netherlands, a co-author of the study. "This star-forming rate is really intense!"

This tiny powerhouse contains about twice as many stars as our galaxy, all crammed into a region only 6000 light-years across. The Milky Way is about 100 000 light-years across.

Astronomers believe that this frenzied star formation occurs because the galactic centre is forming deep inside a gravitational well of dark matter, an invisible form of matter that makes up the scaffolding upon which galaxies formed in the early Universe. A torrent of gas is flowing into the well and into the compact galaxy, sparking waves of star birth.

"They're very extreme environments," said Nelson. "It's like a medieval cauldron forging stars. There's a lot of turbulence, and it's bubbling. If you were in there, the night sky would be bright with young stars, and there would be a lot of dust, gas, and remnants of exploding stars. To actually see this happening is fascinating."

The sheer amount of gas and dust within an extreme star-forming region like this may explain why they have eluded astronomers until now. Bursts of star formation create dust, which builds up within the forming core and can block some starlight [3]—GOODS-N-774 was only just visible, even using the resolution and infrared capabilities of Hubble's Wide Field Camera 3.

"This galaxy seems to have been furiously forming stars for more than a billion years," adds Franx. "We have spotted it very early on in its life. Shortly after the time period we're looking at, we think that this core will have stopped forming stars, and that smaller galaxies will have merged with it over the next 10 billion years until it expanded and grew outwards in size. It would resemble one of the mammoth, sedate ellipticals we see today."

"We had been searching for this galaxy for years, and it's very exciting that we finally found it", says Dokkum, "The big challenge is to understand the physics driving the formation of such objects. The James Webb Space Telescope, Hubble's successor, will be able to help us find an answer."

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, and 13" f/4.5 Dobsonian telescopes which are available for use by members. To borrow a telescope, 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

S*T*A*R members can join the Astronomical League (AL) for a small fee. Members receive the AL publication Reflector.

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

Coordinates are equinox 2000.0