



# The Meridian

Newsletter of the Quad Cities Astronomical Society • December 2013

## Meeting Notes

John Robbins, Secretary

**December 16.** Meeting called to order by Dale Hendricks at 7:07pm. The meeting was attended by 12: Karl Adlon, Steve VanHyfte, Bruce Brooker, Dana Taylor, Robert Mitchell, John Robbins, Matt Neilssen, Jeff Struve, Dale Hendricks, Cecil Ward and Craig Cox.

### Agenda

*Treasurer's Report.* The Society account balance was \$1209.14. So far, only 13 members have paid their dues. Reminder to those who haven't paid: **please pay your dues at your earliest convenience.** Keep your club active and healthy!

*Facilities.* The permanent electric connection to the dome is yet to be done. A clear bit of slightly warmer weather will help with the completion of the permanent connection.

Bruce Brooker demonstrated his design for a failsafe means to cut-off the power to the 16" drive motor. This protects the drive motor and telescope in case an observer forgets to turn off the power to the drive motor, after an observing session. If the drive was accidentally left on, the telescope would continue to track and slew until contact is made with the floor (or another object), potentially causing damage to the drive motor, the scope and possibly the mount.

Bruce created a simple and inexpensive (~\$24) solution, utilizing two timers: one is an electrical timer which allows for about

60 minutes of drive motor power. A simple kitchen timer, attached, can be set by the observer to a value just under an hour. The kitchen timer acts as a reminder for the observer to reset the power timer when more time is needed.

Bruce also purchased and received a Baader coma corrector Mk III for the 16" scope, costing \$214 from Agena Astro.

*Future QCAS Presentations.* Dale Hendricks again made an appeal for members to please step forward with presentations that could be of educational benefit to the club.

*First monthly workshop meeting* will commence on **Monday, January 6th** at 7pm. This is intended to be more of an informal gathering where members and guests can share their personal observing activities and their knowledge in a workshop format. The third Monday of every month will continue to focus on the business, finances and facilities of QCAS along with a more formal presentation. The *first Monday of February*, will consist of a QCAS board meeting.

*Presentation.* Bruce Brooker gave a presentation on some elements of telescope optics, primarily centered on f-ratios and objective lens/mirror diameters, with a discussion on how these are related to astrophotographic exposure timings. Despite the rather simple physical principles, discussion was spirited. Additional info can be found at <http://www.telescope-optics.net/>



## Hubble catches stellar explosions in NGC 6984

Supernovae are intensely bright objects. They are formed when a star reaches the end of its life with a dramatic explosion, expelling most of its material out into space. The subject of this new Hubble image, spiral galaxy NGC 6984, played host to one of these explosions back in 2012, known as SN 2012im. Now, another star has exploded, forming supernova SN 2013ek — visible in this image as the prominent, star-like bright object just slightly above and to the right of the galaxy's center.

SN 2012im is known as a Type Ic supernova, while the more recent SN 2013ek is a Type Ib. Both of these types are caused by the core collapse of massive stars that have shed — or lost — their outer layers of hydrogen. Type Ic supernovae are thought to have lost

more of their outer envelope than Type Ib, including a layer of helium.

The observations that make up this new image were taken on August 19, 2013, and aimed to pinpoint the location of this new explosion more precisely. It is so close to where SN 2012im was spotted that the two events are thought to be linked; the chance of two completely independent supernovae so close together and of the same class exploding within one year of one another is a very unlikely event. It was initially suggested that SN 2013ek may in fact be SN 2012im flaring up again, but further observations support the idea that they are separate supernovae — although they may be closely related in some as-yet-unknown way.



## SMA Reveals Giant Star Cluster in the Making

W49A might be one of the best-kept secrets in our galaxy. This star-forming region shines 100 times brighter than the Orion nebula, but is so obscured by dust that very little visible or infrared light escapes.

The Smithsonian's Submillimeter Array (SMA) has peered through the dusty fog to provide the first clear view of this stellar nursery. The SMA revealed an active site of star formation being fed by streamers of infalling gas.

"We were amazed by all the features we saw in the SMA images," says lead author Roberto Galván-Madrid, who conducted this research at the Harvard-Smithsonian Center for Astrophysics (CfA) and the European Southern Observatory (ESO).

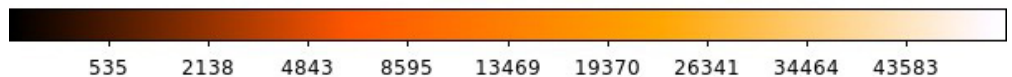
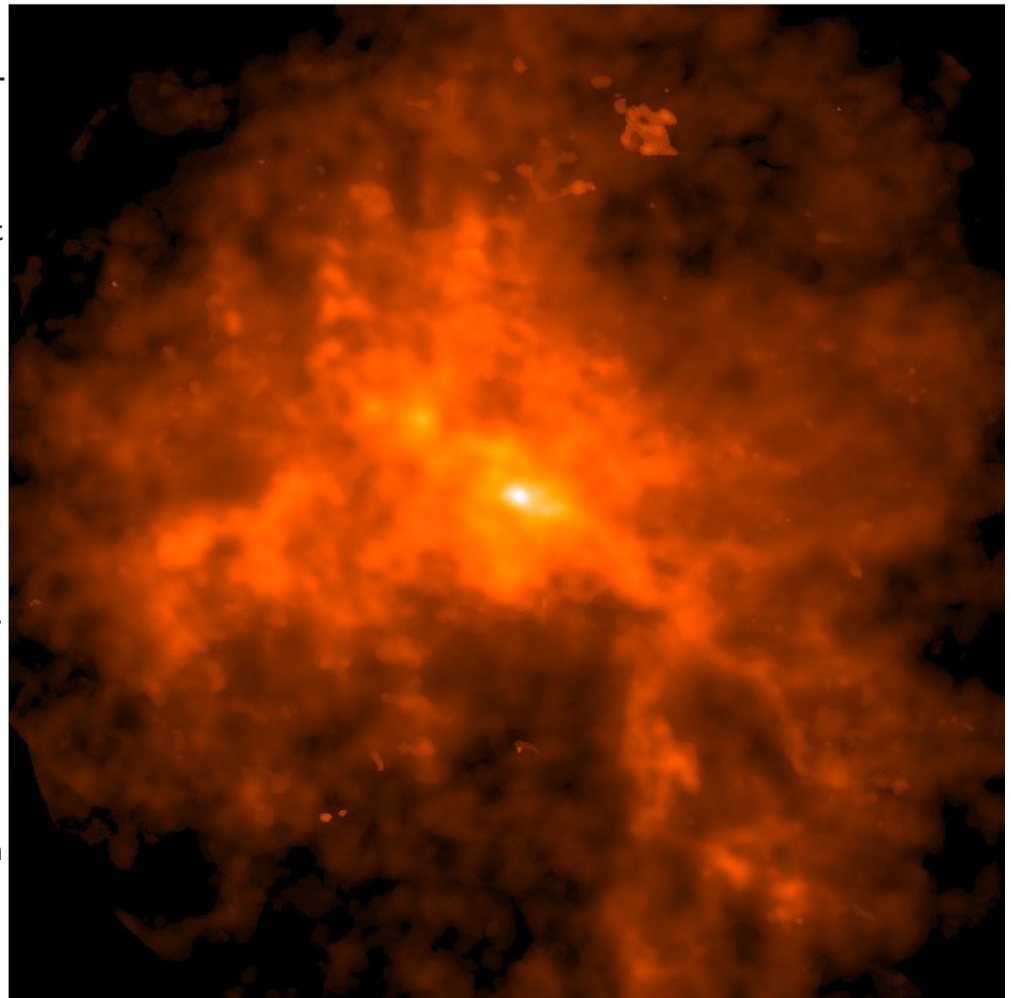
W49A is located about 36,000 light-years from Earth, on the opposite side of the Milky Way. It represents a nearby example of the sort of vigorous star formation seen in so-called "starburst" galaxies, where stars form 100 times faster than in our galaxy.

The heart of W49A holds a giant yet surprisingly compact star cluster. About 100,000 stars already exist within a space only 10 light-years on a side. In contrast, fewer than 10 stars lie within 10 light-years of our Sun. In a few million years, the giant star cluster in W49A will be almost as crowded as a globular cluster.

The SMA also revealed an intricate network of filaments feeding gas into the center, much like tributaries feed water into mighty rivers on Earth. The gaseous filaments in W49A form three big streamers, which funnel star-building material inward at speeds of about 4,500 miles per hour (2 km/sec).

"Move over, Mississippi!" quips co-author Qizhou Zhang of the CfA.

Being denser than average will help the W49A star cluster to survive. Most star clusters in the galactic disk dissolve rapidly, their stars migrating away from



each other under the influence of gravitational tides. This is why none of the Sun's sibling stars remain nearby. Since it is so compact, the cluster in W49A might remain intact for billions of years.

The Submillimeter Array mapped the molecular gas within W49A in exquisite detail. It showed that central 30 light-years of W49A is several hundred times denser than the average molecular cloud in the Milky Way. In total, the nebula contains about 1 million suns' worth of gas, mostly molecular hydrogen.

"We suspect that the organized architecture seen in W49A is rather common in massive stellar cluster-formation," adds co-author Haoyu Baobab Liu of the Academia Sinica Institute of Astronomy and Astrophysics (ASIAA) in Taiwan.

The team expects to continue analyzing the SMA data for some time to come.

"It's a mine of information," says Galván-Madrid.

Their research was published in the December 2013 *Astrophysical Journal*.



## Hobby-Eberly Telescope

McDonald Observatory, Davis Mountains, Texas

The HET was designed and constructed with a unique objective: to gather a very large amount of light, specifically for spectroscopy, at extremely low cost.

A fixed elevation-axis design, based on the radio telescope at Arecibo, and an innovative system for tracking stars, contributed to an 80% reduction in initial costs compared to optical telescopes of similar size. The primary mirror of the HET is the largest yet constructed, at 11.1 x 9.8 meters. At any given time during observations, only a portion of the mirror is utilized. The HET's 9.2 meter effective aperture makes it currently the world's fourth largest optical telescope.

Work is underway to modify the telescope for the upcoming Dark Energy Experiment. A new tracker, the massive framework on the top of the HET, will increase the telescope's field of view. The addition of 150 integral field spectrographs, mounted to the sides of the main framework, will give the HET the ability to map the expansion rate of the early universe, looking back in time billions of years, to measure how clusters of galaxies moved in relation to one another as the universe evolved.

Information courtesy of Univ. of Texas, Austin.



### QCAS Officers and Contacts:

President: Dale Hendricks	Vice-president: Craig Cox
Secretary: John Robbins	Treasurer: John Baker
Director: Dana Taylor	Facilities: John Baker
Web Master: Dana Taylor	Outreach: Matt Nielssen
Programming: Jim Rutenbeck	

## Celestial Calendar

Dec 25 07:48 Last Quarter Moon  
 22 09 Ursid Meteor Shower  
 22 17:47 Regulus 5.4°N of Moon  
 25 08:48 LAST QUARTER MOON  
 25 21:45 Mars 4.6°N of Moon  
 26 21:10 Spica 1.0°S of Moon  
 27 19:21 Moon at Ascending Node  
 28 20:42 Saturn 0.9°N of Moon: Occn.  
 29 01 Mercury at Superior Conjunction  
 Jan 01 05:14 NEW MOON  
 01 15:00 Moon at Perigee: 356922 km  
 02 18 Mars at Aphelion  
 03 14 Quadrantid Meteor Shower  
 03 23:59 Earth at Perihelion: 0.98333  
 05 14 Jupiter at Opposition  
 07 21:39 FIRST QUARTER MOON  
 09 05:26 Moon at Descending Node  
 11 06 Venus at Inferior Conjunction  
 12 02:36 Aldebaran 2.6°S of Moon  
 15 00:00 Jupiter 4.9°N of Moon  
 15 19:53 Moon at Apogee: 406537 km  
 15 22:52 FULL MOON  
 18 22:43 Regulus 5.2°N of Moon

List from [www.astropixels.com](http://www.astropixels.com)

**Please pay your membership dues!** Thanks!

**Happy Holidays and Happy New Year!**



**Meetings:** First and third Monday, of each month, 7:00pm, Bettendorf Library, 2950 Learning Campus Dr., off of 18th Street, Bettendorf.

### Correspondence:

Please send to the society at:  
 P.O. Box 3706, Davenport, IA, 52808.  
 Members are welcome and encouraged to submit articles for The Meridian.  
 Submit Any and all interesting items (via e-mail) to: John Robbins or Dale Hendricks.