# The Meridian

Newsletter of the Quad Cities Astronomical Society • February 2015

## Upcoming QCAS Meetings

All meetings start at 6:30pm.

**March 2nd**, Astronomy dialogs/meeting.

**March 16th**, monthly business meeting.

## Meeting Notes

**From February 16th**. Notes by Dale Hendricks. The meeting was called to order by Dale Hendricks at 6:35pm. The meeting was attended by 9 members. Members included: John Baker, Brian Haysbrook, Dana Taylor, Mitch White, Dr. Robert Mitchell, Craig Cox, Steve VanHyfte, Karl Adlon and Dale Hendricks.

The meeting began with a review and analysis of the eyepieces/peripheral equipment from Al Cattoir's collection. Dale provided an update to the group about the contact from the family about the equipment. The family is very pleased that the QCAS wanted the equipment and will see it as a proper memorial to Al and his astronomy passion.

Dana offered to buy the set of eyepieces for $500.00 and when this was offered to the group a discussion ensued that the 20" scope needs some eyepieces and some of these would be a valuable addition to the instrument and viewing. Some members noted that they had to take their own eyepieces to the site for viewing. Dale suggested that this issue be put before all members with the publishing of the February Meridian and to seek feedback as to the proper disposition of this equipment.

The next order of business was a report by Dr. Mitchell on the status and progress of his work with the Menke Observatory. He reported that the flat screen TV has been mounted on the wall next to the door to the domed observatory. Additionally, he is in the process of asking for further funding for a good mount for the scope in the observatory. It will carry 110 lb. which is more than sufficient but will need a dovetail to adequately mount the scope to it. He also shared that the dates for the Menke star parties are set and have been posted on the SAU website. Dale also followed up with Dr. Mitchell on the subject of keys for our members to the Menke site. He has not contacted the department at SAU that has this responsibility but will do so and report back.

SAU Menke Observatory Star Parties for 2015:
May 3, June 7, July 19, August 16, September 13.

Steve VanHyte provided an overview of The Mingo Creek Park observatory, near Pittsburgh, PA, having a roll off roof that moves-in under another roof on a classroom/presentation room. The full site of the work done there and blueprints for the building are found at this website:

http://home.comcast.net/~lemaaap/mingoarchive.htm

Steve's report/presentation led into the next subject introduced by Dale Hendricks – a meeting with Walt Wickham about the proposed facility. Dale contacted Walt about meeting at a time and place other than the usual CCCB meeting. Dale, Karl Adlon and

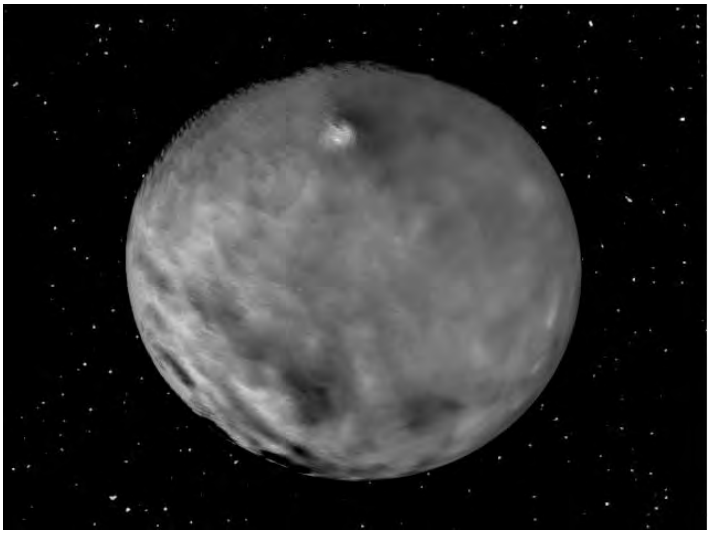
Dana plan to meet with Walt to discuss what the QCAS members consider to be critical issues. Rather than list them all here, the major issues are toilets (not water toilets as CCCB has preferred), ownership, use, maintenance, heat, etc.

The other issue associated with the proposed building is funding. Clinton County has stated emphatically that they have no money – any funding the QCAS would obtain would be through grants. QCAS is a Scott County organization with our observatory is in Clinton County in association with the CCCB. Dale called the RDA, Tuesday, and left a message for one of the main contacts from the RDA with no response as of this writing. Dale found all the grants for 2014 and sent the gross numbers out to the members. The total amount of grants for 2014 was about $1.72 million.

As the discussion continued, Dale posed the question to the members present as to what was the more critical issue – our physical structure housing the 20" scope or the scope itself. The answer was quick and simple – the scope. Dana pointed out that the Cassini divisions in the rings of Saturn could not be discerned using the 20" scope but could be see through a 6" scope. The current mirror is pyrex, very thick and takes a very long time to reach ambient temperature. A thinner mirror would be preferable but the conversation was about refiguring the mirror as well as possibly procuring a new, thinner, mirror. There is a fair amount of information to be considered in comparing the two alternatives. This is an issue that needs further consideration to bring quick resolution as to what direction the QCAS should take.

The meeting adjourned at 8:15pm.

**NASA's Dawn Mission Approaches Ceres**



*NASA's Dawn spacecraft, on approach to dwarf planet Ceres, has acquired its latest and closest-yet snapshot of this mysterious world. The image of Ceres, taken on Feb. 4, 2015, from a distance of about 90,000 miles (145,000 kilometers).*

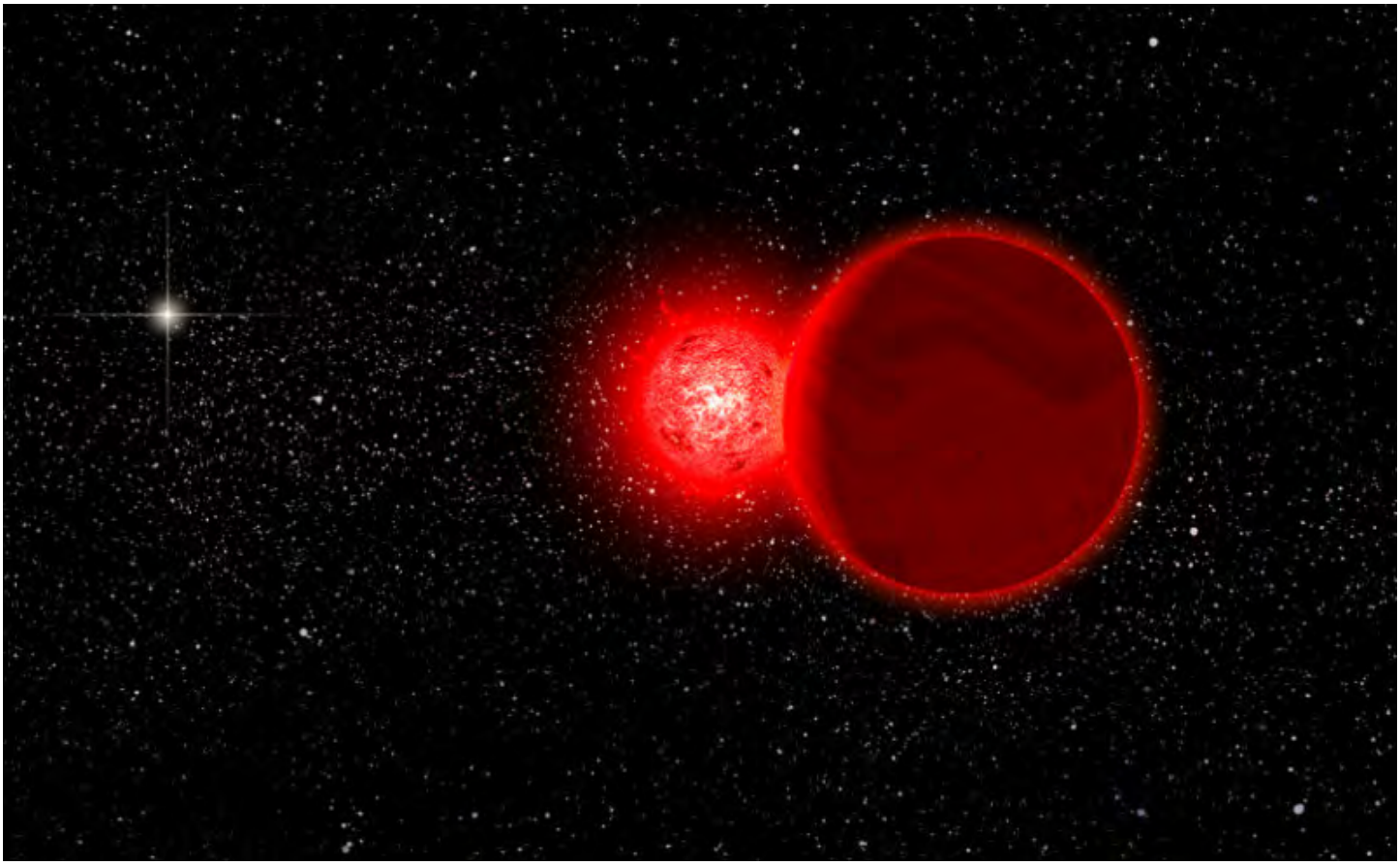
At a resolution of 8.5 miles (14 kilometers) per pixel, the pictures represent the sharpest images to date of Ceres.

After the spacecraft arrives and enters into orbit around the dwarf planet, it will study the intriguing world in great detail. Ceres, with a diameter of 590 miles (950 kilometers), is the largest object in the main asteroid belt, located between Mars and Jupiter.

Dawn's mission to Vesta and Ceres is managed by the Jet Propulsion Laboratory for NASA's Science Mission Directorate in Washington. Dawn is a project of the directorate's Discovery Program, managed by NASA's Marshall Space Flight Center in Huntsville, Alabama. UCLA is responsible for overall Dawn mission science. Orbital Sciences Corp. of Dulles, Virginia, designed and built the spacecraft. JPL is managed for NASA by the California Institute of Technology in Pasadena. The framing cameras were provided by the Max Planck Institute for Solar System Research, Gottingen, Germany, with significant contributions by the German Aerospace Center (DLR) Institute of Planetary Research, Berlin, and in coordination with the Institute of Computer and Communication Network Engineering, Braunschweig. The visible and infrared mapping spectrometer was provided by the Italian Space Agency and the Italian National Institute for Astrophysics, built by Selex ES, and is managed and operated by the Italian Institute for Space Astrophysics and Planetology, Rome. The gamma ray and neutron detector was built by Los Alamos National Laboratory, New Mexico, and is operated by the Planetary Science Institute, Tucson, Arizona.

# Closest known flyby of star to our solar system

*Dim star passed through Oort Cloud 70,000 years ago*



*Artist's conception of Scholz's star and its brown dwarf companion (foreground) during its flyby of the solar system 70,000 years ago. The Sun (left, background) would have appeared as a brilliant star. The pair is now about 20 light years away.*

Date: February 17, 2015 Source: University of Rochester

A group of astronomers from the US, Europe, Chile and South Africa have determined that 70,000 years ago a recently discovered dim star is likely to have passed through the solar system's distant cloud of comets, the Oort Cloud. No other star is known to have ever approached our solar system this close -- five times closer than the current closest star, Proxima Centauri.

In a paper published in The Astrophysical Journal Letters, lead author Eric Mamajek from the University of Rochester and his collaborators analyzed the velocity and trajectory of a low-mass star system nicknamed "Scholz's star."

The star's trajectory suggests that 70,000 years ago it passed roughly 52,000 astronomical units away (or about 0.8 light years, which equals 8 trillion kilometers, or 5 trillion miles). This is astronomically close; our closest neighbor star Proxima Centauri is 4.2 light years distant. In fact, the astronomers explain in the paper that they are 98% certain that it went through what is known as the "outer Oort Cloud" -- a region at the edge of the solar system filled with trillions of comets a mile or more across that are thought to give rise to long-period comets orbiting the Sun after their orbits are perturbed.

The star originally caught Mamajek's attention during a discussion with co-author Valentin D. Ivanov, from the European Southern Observatory. Scholz's star had an unusual mix of characteristics: despite being fairly close ("only" 20 light years away), it showed very slow tangential motion, that is, motion across the sky. The radial velocity measurements taken by Ivanov and collaborators, however, showed the star moving almost directly away from the solar system at considerable speed.

"Most stars this nearby show much larger tangential motion," says Mamajek, associate professor of physics and astronomy at the University of Rochester. "The small tangential motion and proximity initially indicated that the star was most likely either moving towards a future close encounter with the solar system,

or it had 'recently' come close to the solar system and was moving away. Sure enough, the radial velocity measurements were consistent with it running away from the Sun's vicinity -- and we realized it must have had a close flyby in the past."

To work out its trajectory the astronomers needed both pieces of data, the tangential velocity and the radial velocity. Ivanov and collaborators had characterized the recently discovered star through measuring its spectrum and radial velocity via Doppler shift. These measurements were carried out using spectrographs on large telescopes in both South Africa and Chile: the Southern African Large Telescope (SALT) and the Magellan telescope at Las Campanas Observatory, respectively.

Once the researchers pieced together all the information they figured out that Scholz's star was moving away from our solar system and traced it back in time to its position 70,000 years ago, when their models indicated it came closest to our Sun. Until now, the top candidate for the closest flyby of a star to the solar system was the so-called "rogue star" HIP 85605, which was predicted to come close to our solar system in 240,000 to 470,000 years from now. However, Mamajek and his collaborators have also demonstrated that the original distance to HIP 85605 was likely underestimated by a factor of ten. At its more likely distance -- about 200 light years -- HIP 85605's newly calculated trajectory would not bring it within the Oort Cloud.

Mamajek worked with former University of Rochester undergraduate Scott Barenfeld (now a graduate student at Caltech) to simulate 10,000 orbits for the star, taking into account the star's position, distance, and velocity, the Milky Way galaxy's gravitational field, and the statistical uncertainties in all of these measurements. Of those 10,000 simulations, 98% of the simulations showed the star passing through the outer Oort cloud, but fortunately only one of the simulations brought the star within the inner Oort cloud, which could trigger so-called "comet showers."

While the close flyby of Scholz's star likely had little impact on the Oort Cloud, Mamajek points out that "other dynamically important Oort Cloud perturbers may be lurking among nearby stars." The recently launched European Space Agency Gaia satellite is expected to map out the distances and measure the velocities of a billion stars. With the Gaia data, astronomers will be able to tell which other stars may have had a close encounter with us in the past or will in the distant future.

Currently, Scholz's star is a small, dim red dwarf in the constellation of Monoceros, about 20 light years away. However, at the closest point in its flyby of the solar system, Scholz's star would have been a 10th magnitude star -- about 50 times fainter than can normally be seen with the naked eye at night. It is magnetically active, however, which can cause stars to "flare" and briefly become thousands of times brighter. So it is possible that Scholz's star may have been visible to the naked eye by our ancestors 70,000 years ago for minutes or hours at a time during rare flaring events.

The star is part of a binary star system: a low-mass red dwarf star (with mass about 8% that of the Sun) and a "brown dwarf" companion (with mass about 6% that of the Sun). Brown dwarfs are considered "failed stars;" their masses are too low to fuse hydrogen in their cores like a "star," but they are still much more massive than gas giant planets like Jupiter.

The formal designation of the star is "WISE J072003.20-084651.2," however it has been nicknamed "Scholz's star" to honor its discoverer -- astronomer Ralf-Dieter Scholz of the Leibniz-Institut für Astrophysik Potsdam (AIP) in Germany -- who first reported the discovery of the dim nearby star in late 2013. The "WISE" part of the designation refers to NASA's Wide-field Infrared Survey Explorer (WISE) mission, which mapped the entire sky in infrared light in 2010 and 2011, and the "J-number" part of the designation refers to the star's celestial coordinates.

## QCAS Officers and Contacts:

President: Dale Hendricks
Vice-Pres: Bruce Brooker
Secretary: John Robbins
Treasurer: John Baker
Director: Dana Taylor
Facilities: John Baker
Web Master: Dana Taylor
Outreach: Tom Bullock
Programming: Jim Rutenbeck

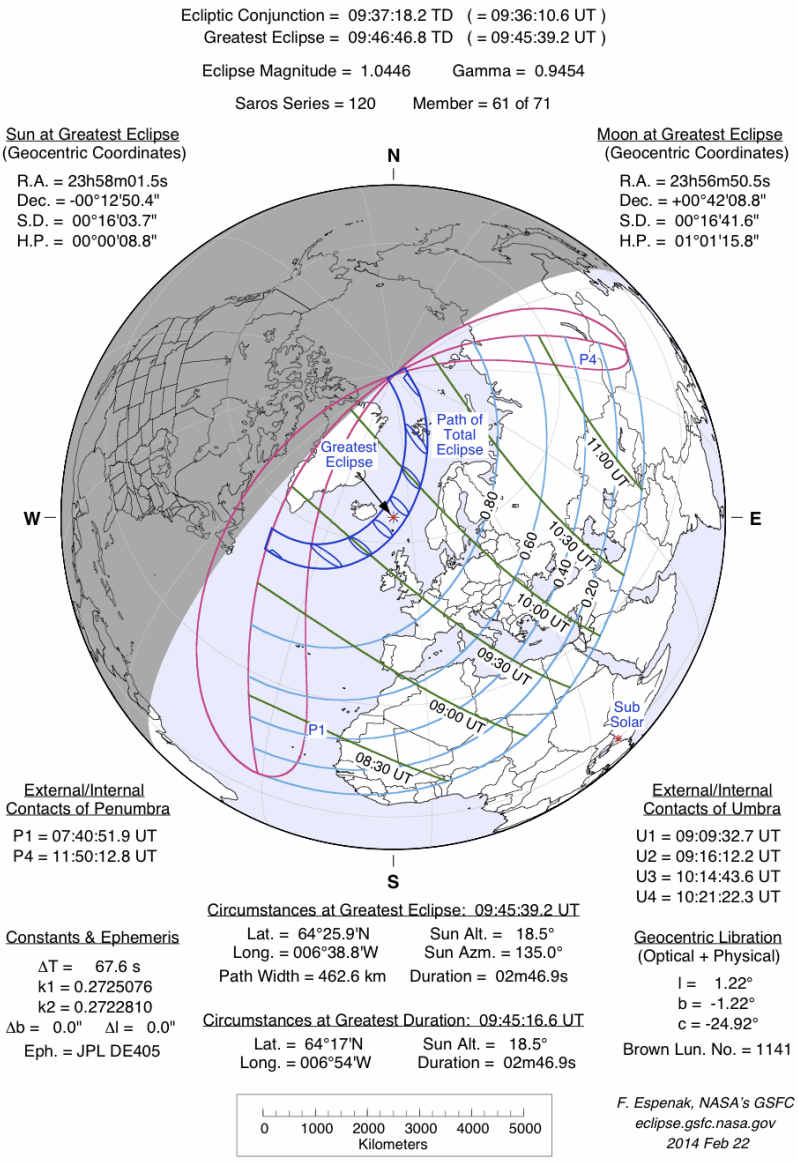
**QCAS Meetings:** First Monday (workshop) at 6:30pm, and third Monday, (business), at 6:30pm, Bettendorf Library, 2950 Learning Campus Dr., off of 18th Street, Bettendorf.

### QCAS Correspondence:

Please contact 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.

# In Svalbard

## Total Solar Eclipse of 2015 Mar 20




# Celestial Calendar

Feb 24 10 Mercury at Greatest Elong: 26.7°W
25 11:14 FIRST QUARTER MOON
25 17:02 Aldebaran 1.0°S of Moon
25 22 Neptune in Conjunction with Sun
Mar 03 01:56 Jupiter 5.5°N of Moon
04 08:29 Regulus 4.0°N of Moon
05 01:35 Moon at Apogee: 406,386 km
05 12:05 FULL MOON
06 14 Mercury at Aphelion
07 15:04 Moon at Ascending Node
08 16:21 Spica 3.4°S of Moon
12 02:25 Saturn 2.3°S of Moon
13 11:48 LAST QUARTER MOON
18 22:57 Mercury 5.2°S of Moon
19 13:38 Moon at Perigee: 357584 km
20 03:36 NEW MOON
20 03:46 Total Solar Eclipse; mag=1.045
20 16:45 Vernal Equinox
20 20:19 Moon at Descending Node
21 16:13 Mars 1.0°N of Moon: Occn.
22 13:51 Venus 2.8°N of Moon
25 00:55 Aldebaran 0.9°S of Moon
27 01:43 FIRST QUARTER MOON

from www.astropixels.com