



# The Meridian

Newsletter of the Quad Cities Astronomical Society • February 2014

## Meeting Notes

John Robbins, Secretary

**February 17.** Meeting canceled due to snow.

**March 3.** Meeting called to order by Dale Hendricks at 6:40pm. The meeting was attended by 15 members, including two new members. Cecil Ward, John Baker, Dana Taylor, Dale Hendricks, John Robbins, Brian Haysbrook, Robert Mitchell, Mitch White, Deake Schneider, Craig Cox, Matt Neilssen, Jeff Struve, Sam Snow, Debbie Ven-Horst-Snow and Karl Adlon. We want to welcome Sam and Debbie who joined QCAS at the meeting.

### Agenda

*Treasurer's Report.* The Society account balance was \$2097.86.

*Upcoming QCAS Events:*

**May 2nd, 8pm,** Riverdale School, Port Byron, An evening to highlight Mars. Karl Adlon is coordinator.

**July 16 & 17,** Scott County Library in Eldridge is hosting a summer skies program with the Star Lab. Dana Taylor is coordinator.

*Facilities.* Dana reports that the permanent electric connection to the dome has been finalized.

John Baker gave some photographic examples of how well the Baader coma corrector Mk III works on the 16" scope. Remarkable improvement.

February's monthly workshop meeting took place as a Board of Director's meeting on **Monday, February 3rd.** Minutes from the meeting are attached at the back of the issue.

*Presentations.* John Baker gave a presentation on NASA's Kepler mission to "explore the structure and diversity of planetary systems." Dana Taylor showed the workings of an app called Exoplanet, available for Android and iOS devices.

John outlined the camera, the methodology and the part of the sky being examined. As of this date, Kepler has confirmed the detection of 961 exoplanets. Material, below, comes from NASA web sites.

The Delta II rocket carrying NASA's Kepler spacecraft lifted off March 6, 2009 from Launch Complex 17-B at Cape Canaveral Air Force Station. The continuous viewing needed for a high detection efficiency for planetary transits requires that the field-of-view (FOV) of the photometer be out of the ecliptic plane so as not to be blocked periodically by the Sun or the Moon. A star field near the galactic plane that meets these viewing constraints and has a sufficiently high star density has been selected (in Cygnus and Lyra). In its orbit, the spacecraft slowly drifts away from the Earth and is at a distance of 0.5 AU (worst case) at the end of four years.

The mission must last long enough to detect and confirm the periodic nature of the transits of planets in or near the HZ. A four year



*The Kepler Mission launch on March 6, 2009.*

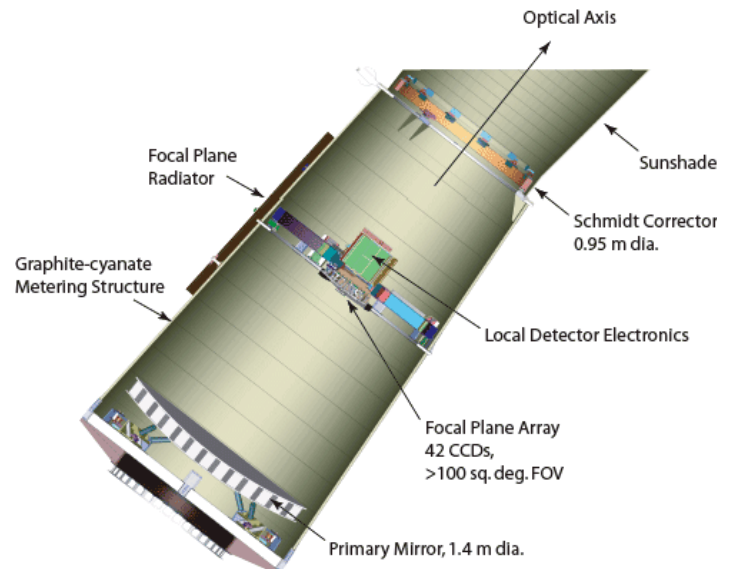
[Kepler Mission, continued] mission is proposed which enables a four-transit detection of all orbits up to one year in length and a three-transit detection of periods up to 1.33 years. This mission duration also provides three-transit detections for 50% of 1.6 year orbits and 10% of 1.9 year orbits.

The Kepler photometer is a simple single purpose instrument. It is basically a Schmidt telescope design with a 0.95-meter aperture and a 105 deg<sup>2</sup> (about 12 degree diameter) field-of-view. It is pointed at and records data from just a single group of stars for the four year duration of the mission.

The photometer is composed of just one “instrument,” which is, an array of 42 CCDs (charge coupled devices). Each 50x25 mm

CCD has 2200x1024 pixels. The CCDs are read out every 6 seconds to prevent saturation. Only the information from the CCD pixels where there are stars brighter than  $m_v=14$  is recorded. (The CCDs are not used to take pictures. The images are intentionally defocused to 10 arc seconds to improve the photometric precision.) The data are integrated for 30 minutes.

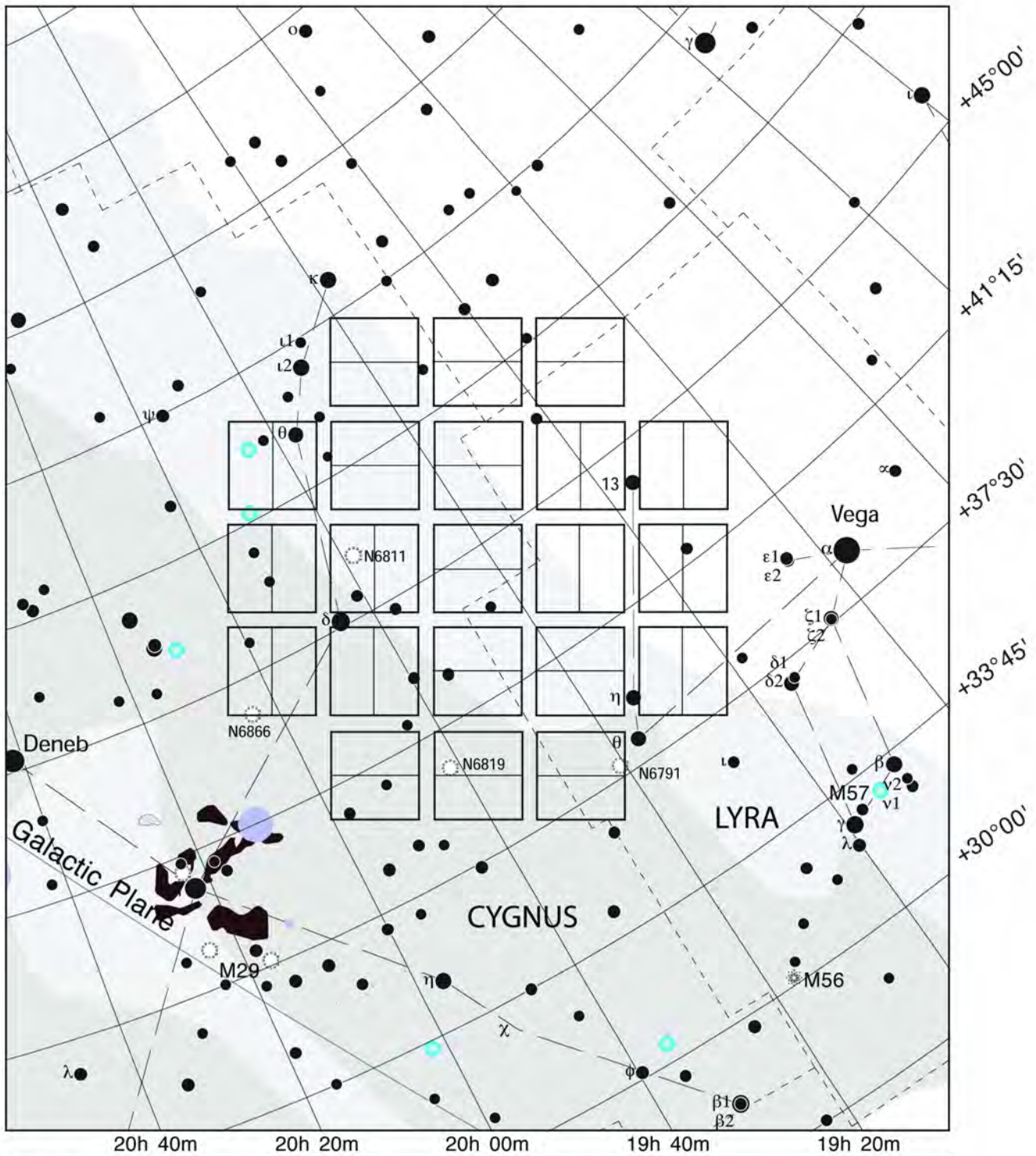
The instrument has the sensitivity to detect an Earth-size transit of an  $m_v=12$  G2V (solar-like) star at 4 sigma in 6.5 hours of integration. The instrument has a spectral bandpass from 400 nm to 850 nm. Data from the individual pixels that make up each star of the 100,000 main-sequence stars brighter than  $m_v=14$  are recorded continuously and simultaneously. The data are stored on the spacecraft and transmitted to the ground about once a month.



*The Kepler instrument design.*

Kepler will look at just one large area of the sky in the constellations Cygnus and Lyra. The star field for the Kepler Mission was selected based on the following constraints:

- The field must be continuously viewable throughout the mission.
- The field needs to be rich in stars similar to our sun because Kepler needs to observe



|   |   |   |
|---|---|---|
| <p>Star Magnitudes</p> <p>● ● ● ● ● ● ● ●</p> <p>0 1 2 3 4 5 6</p> <p><i>Kepler FOV</i></p> | <p>○ Open Cluster</p> <p>⊛ Globular Cluster</p> <p>☁ Nebula</p> <p>● Planetary Nebula</p> | <p><b>THE SKY</b><br/>Astronomy Software</p> <p>FOV Center RA: 19h 22m 40s Dec: +44 30' 00" 9/10/04</p> |
|---|---|---|

Kepler's field of view. The rectangles represent the 95-megapixel camera's 42 charge-coupled devices, or CCDs. Scientists selected the orientation of the focal plane's field of view to avoid the region's brightest stars, which are shown as the largest black dots.

[Kepler Mission, continued] more than 100,000 stars simultaneously.

• The spacecraft and photometer, with its sunshade, must fit inside a standard Delta II launch vehicle. The size of the optics and the space available for the sunshield require the center of the star field to be more than 55-degrees above or below the path of the sun as the spacecraft orbits the sun each year trailing behind the Earth. The Sun, Earth and Moon make it impossible to view some portions of the sky during an orbital year. Thus, Kepler looks above the ecliptic plane to avoid all these bright celestial objects.

NASA publishes a table of confirmed exoplanet discoveries. It can be seen via this link. <http://kepler.nasa.gov/Mission/discoveries/>



Kepler team at NASA Ames Research Center presents a plaque to Nichelle Nichols (Lieutenant and Commander Uhura of Star Trek). Plaque reads: "Kepler - NASA's First Missions Capable of Finding Earth-size Planets... To Nichelle Nichols." February 24, 2010.

### 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

Mar 04 17:45 Moon at Descending Node  
08 13:27 FIRST QUARTER  
11 19:46 Moon at Apogee: 405367 km  
14 06 Mercury at Greatest Elong: 27.6°W  
16 17:09 FULL MOON  
19 03:14 Mars 3.2°N of Moon  
19 06:30 Moon at Ascending Node  
19 23 Mercury at Aphelion  
20 16:57 Vernal Equinox  
21 03:40 Saturn 0.2°N of Moon: Occn.  
22 21 Venus at Greatest Elong: 46.6°W  
24 01:46 LAST QUARTER  
26 15:10 Mars-Spica: 4.6°N  
27 09:52 Venus 3.6°S of Moon  
27 18:30 Moon at Perigee: 365706 km  
30 18:45 NEW MOON

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



The Kepler focal plane is approximately one foot square. It's composed of 25 individually mounted modules. The 4 corner modules are used for fine guiding and the other 21 modules are used for science observing. At left is a single science module and the assembled focal plane with all 25 modules installed is at right. Note that the fine guidance modules in the corners of the focal plane are very much smaller CCDs than the science modules. Under normal operations, each module and its electronics convert light into digital numbers. For the darkest parts of the image between stars, we expect these numbers to be very small (but not zero).

**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.

### 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.

## QCAS Board Meeting minutes

03 February 2014, Bettendorf Library – minutes compiled on 7 February 2014 by Dale Hendricks

### Directors present –

|                |                         |
|----------------|-------------------------|
| Dale Hendricks | President               |
| Craig Cox      | Vice President          |
| John Baker     | Treasurer               |
| Dana Taylor    | Director Past President |

### Members present –

|                |               |               |
|----------------|---------------|---------------|
| Steve Van Hyte | Karl Adlon    | Mitch White   |
| Jeff Struve    | Jim Rutenbeck | Bruce Brooker |

### Agenda –

- 1) Two observatory sites –
  - a) finish/complete the remaining items to make the new dome observatory fully functional: Dana Taylor, Facilities Chair, reports that connecting electrical power is the only outstanding activity required for complete functionality. This will be completed upon onset of a few days of reasonably warm weather.
  - b) repairs/updates to roll off observatory building – siding, etc.: one piece of 4’X8’ siding is all that is required. Roof leaks have been identified and repaired.
- 2) QCAS web site – back up and possible changes (nothing specific – just the item itself) ; update with changes that have been suggested: it was recommended that presentations be uploaded to the site for member use.
- 3) Expand membership base – (open to suggestions here from everyone)
- 4) How to reengage members who have currently not been attending: current membership is ~ 35 and fluctuates down around the time dues are to be paid and comes up after. We have been experiencing a rather steady number of members (12-15) attending our regular meetings. Star parties and public viewing nights indicate that a majority of our members are active. Just need to continue our focus on this issue and take follow up action if a significant change is seen.
- 5) Grants for new/improved equipment: need our incorporation letter. Dana Taylor is the contact and he will provide it. We need the info for the grant application process. We need to “write the story” of our Society – our vision or future perfect state. We use this information for our grant writing process. Bruce Brooker and Steve VanHyfte and Dana Taylor will provide a skeleton outline by our regularly scheduled meeting the 3<sup>rd</sup> Monday of February – the 17<sup>th</sup>.
- 6) By Laws – Board (all) members need to read and understand them. Make any required changes: review of the By Laws confirmed they are up to date and need no changes, revisions or updates. They just need to be referenced and followed.
- 7) Public observing – do we want/need to do more? Need a decision on this issue: Answer – Yes, and we need to continue to advertise.

- 8) Outreach (could be associated with 7) above)
  - a) When we receive requests they need to be shared quickly and discussed within the group before the next meeting if the regular meeting is days/weeks away, make a decision and respond to the requestor. We need commitments from members if we make the decision to accept the invitation – we need solid commitments to support these requests.
  - b) Dark Sky Observational involvement with the City of Davenport – update/what from this?
  - c) Other suggestions/comments?
- 9) The “other” Monday night meeting that has been scheduled through the year for purely “observational” stuff – we agreed that we would leave this on the schedule for now and use it for sharing experiences. It was also suggested that if we limited our regular meeting to no more than 20 minutes of “business” we could work in presentations and sharing of stuff observational.
- 10) Presentations at our meetings with a schedule and committed presenters. This is a subject that will continue to receive focus and we had two or three members offer to make presentations. Follow up will be necessary to ensure we have a committed schedule.
- 11) Need to set a date for this year’s EISP – Prairie Skies has scheduled their event for 18/19/20 SEP in Kankakee. It was determined that we would schedule 26/27 SEP as our EISP date.
- 12) Any other items that need/or people want to be discussed? No comments/input

Meeting adjourned at 8:30 with the next meeting being the regular meeting 17 February at the Bettendorf Library

Thanks to all of you who attended and contributed.

Dale Hendricks