

# THE MERIDIAN

Newsletter of the  
Quad Cities  
Astronomical Society

[www.qcas.org](http://www.qcas.org)



**MAY 2018**

**QCAS Mission Statement:**

To stimulate an interest in the science of astronomy in the Quad Cities Area, to nurture an ongoing desire by Quad Cities Astronomical Society members to study the cosmos and to provide members of our community opportunities to experience the beauty and joy of Astronomy.



## **Presidents Greeting:**

Hi all!

As things seem well under control for the 2018 Eastern Iowa Star Party, efforts can again be directed more toward our observatory relocation to the Menke Observatory site. We have received a few donations that are earmarked for the move, but we are just scratching the surface... but before we jump into grants and fund raising, we have a few things to get in order.

Things that I'd like to have in order before seeking funding include a set of prints and materials list, a recommendation for location by an architect, an artist rendition of what the end product will look like, reference and recommendation letters from St. Ambrose University, Menke Observatory, the Wapsi River Environmental and Educational Center, and Scott County Parks and Recreation. It would also be a good idea to have thank you cards and a perpetual recognition plaque to thank our donors.

Dr. Mitchell has secured the blueprints for the Menke roll of roof structure which will serve as a great starting point for our roll of roof structure. I have been in contact with a gentleman in Germany who specializes in structures of this nature, and he advised that he would donate his time in helping with the design and a 3-D digital rendition that we can use for demonstration purposes. He is just asking to use our referral on his web site. Cool!

As far as the reference letters, Dr. Mitchell will probably write up the document on behalf of Menke Observatory, and he will seek out someone appropriate for the SAU reference. I will talk to the WREEC folks as well as the Park Board after the aforementioned documents are completed.

The club Board will be discussing Thank You cards and the Recognition Plaque at the next Board meeting... I am thinking a card with our logo on the front, and when opened, the artists' rendition of the site, which on top of, we will hand write our thank you with the Board members signatures.

If you or any of your family members or friends and/or co-workers wish to contribute to this incredible project, checks can be made payable to the Quad Cities Astronomical Society. It's a great way to secure a lasting memorial!

So... let me digress a bit... back to the Eastern Iowa Star Party! If you still have not turned in your registration, time and space is running out! At this writing, there are only 19 open spots! \$50 will get you a spot on the field, access to the lectures and door prizes, and 1 ticket for the raffle, which is a new 102mm Explore Scientific Carbon Fiber Triplet! If you just want to attend the lectures, access is \$35, and if you want to purchase raffle tickets, they are \$10 each, must be purchased either via registration or directly from me, and you must be present on Saturday afternoon after the lectures to win.

Clear Skies!

Jeff

## Last Society Meeting Minutes:

### **Date/Time Location**

6:30 PM on Monday April 16<sup>th</sup>, 2018  
105 McCarthy, St. Ambrose University, Davenport, IA

### **Attendance** (11 in attendance)

Jeff Struve	Alan Sheidler	Paul Levesque	Robert Mitchell	Don Robinson	Matt Neilssen
George Bailey	Ken Boquist	Craig Cox	Tom Bullock	Mike Dannenfeldt	

### **Presentations**

New Gear (and for sale)

- None

### **Member Outings**

- March 10<sup>th</sup> – Ken Boquist continues to work on his Astronomical League programs
- March 24<sup>th</sup> – Nebulae Viewing at Jens-Wendt Observatory... Matt Neilssen was going to lead the event, but it was cancelled due to weather.

### **Announcements**

- April 21<sup>st</sup> – Astronomy Day at Bettendorf High School and then Jens-Wendt
  - PAC
    - Rusty Case – BHS Only (Scope)
    - Terry Dufek – BHS Only (Scope)
  - QCAS
    - George Bailey - BHS (Scope/Display pending weather)
    - Matt Neilssen – Jens Wendt (Run a Scope)
    - Robert Mitchell – BHS Displays, Globes and Posters and Jens Wendt Scope
    - Paul Levesque – Photo journalism
  - QCAS/PAC
    - Ian Spangenberg - BHS
    - Craig Cox – BHS Scope
    - Jeff Struve – BHS and Jens Wendt - Scope
  - Logistics
    - Set up 12 noon, BHS for solar viewing displays, and planetarium shows from 1pm – 5pm. Jens Wendt at sunset until???
    - Planetarium Schedule:
      - 1:00 PM “From Earth to the Universe”
      - 2:00 PM “Oasis in Space”
      - 3:00 PM “Two Small Pieces of Glass”
      - 4:00 PM “Phantom of the Universe”
      - 5:00 PM “Sunstruck”
- April 28<sup>th</sup> Menke Field Trip
- May 5<sup>th</sup> – Public night at Menke Observatory
- June 21 – Wayne Jens Memorial Solar Observing Day
- July 13<sup>th</sup> or August 10<sup>th</sup> – David Grossman, Jackson County Conservation in Maquoketa – Public Outing. Anyone interested? We have a Sherman Park outing on July 14<sup>th</sup> and our Meteor Shower Party is on August 11<sup>th</sup>.
  - Forward to PAC
- Alan spoke about PAC hosting the 2019 NCRAL event. Thanks Alan!

PAC will be hosting the NCRAL annual meeting at Stony Creek Convention Center, May 3-4, 2019

Theme: Astronomical Voyages of Discovery, Past, Present, and Future

- May 3 & 4 2019 at Stony Creek
- Dr. Mitchell will be one of the many speakers
- QCAS Invited to attend (and participate in helping)
- Swap Meet?
- Tour Sherman Park (Yes) Menke (Yes) Friday Evening 2hr before sunset
- Send PAC BHS contact info

#### Main Presentation

- Alan Sheidler gave an incredible presentation on the Mauna Kea Observatory in Hawaii.

#### Treasurers Report

- Our balance - \$5623.67- \$880 is EISP
- We still need to do a complete inventory.
- Check with your employer for grants and fund matching.

#### Review of Minutes

The March Minutes as per the April Meridian were approved.

#### Old Business

- The doors at McCarthy Hall are kept locked when school is not in session. These dates are as follows: January 15, May 21, June 18, July 16, and December 17... On those meeting dates, the doors will be open from 6:30 PM and locked again at 7:15 PM. If you are running late, and need access after 7:15, text Jeff at 309-737-0206 and he'll send someone to let you in. We hold a brief social/Open Discussion time from 6:30 until the meeting starts at 7:00 PM.
- April 21<sup>st</sup> – Astronomy Day at Bettendorf High School and that evening at Jens-Wendt Observatory.
- August 11<sup>th</sup> – Meteor Shower Party at Pleasant Valley High School or Jr. High School.
- September 7 – 9, 2018 is the EISP... speakers are shaping up!
  - Dr. Paul Sipiera, author and Planetary Studies Foundation President and CEO, who will speak on space rocks, and will bring in part of his extremely large collection for us to view.



- Dr. Jenifer Anderson, Professor of Geoscience, Winona St. University, who is expert in impact craters. I believe that she has done work for NASA, and she was one of the guest speakers at last year's North Central Regions Astronomical League event.



- David Levy... yep... in person! David will also spend some time with us on the observation field both Friday and Saturday nights! Don't miss the opportunity to tell you family and friends that you spent time doing visual astronomy with the Comet Hunter in person! David will also pull the winning ticket for the winner of the grand prize.



- Explore Scientific donated a 102mm Carbon Fiber Triplet for our grand prize at this years event.



- Registration Fee
  - \$25 for the party only, \$35 for speakers only, \$50 for party, raffle, and speakers. \$10 per raffle ticket.
  - Munchies by donation
  - Please send your registration forms in ASAP!
- Matt Neilssen - the new web site
  - Major updates end of this week
- Future Society meeting presentations requested:
  - George Bailey asked for:
    - Measure double stars – position, angle, separation
    - Measuring variable stars – magnitude
  - Ken Boquist asked for:
    - Local weather forecasting for astronomical viewing
  - Ian Spangenberg asked for:
    - Black Holes
- We still will be setting up a time to collimate our SCT's

- We discussed the continuing endeavor to relocate the Jens Wendt Observatory to the Menke Observatory site. We feel that a 24' X 32' structure will meet our needs in housing the 20" and 16" Newt's as well as additional pads/piers for member use.
  - Check with Burlington Club about their roll off roof building.

### **New Business**

- Future Presentations:
  - Future Meeting – Weather Forecasting by Christen Allen
  - Future Meeting – RSpec by Jeff Struve
  - Future Meeting – Nebulae Presentation for the public – Jeff Struve
  - Future Meeting – Carl Wenning on the Astronomical League
  - Future Meeting – Alan Sheidler has a number of presentations that he had previously used for other activities
  - Steve VanHyfte – Talk on LA, Observatory, Crater, Dark Skies....

### **Next Society Meeting:**

#### **Date/Time Location**

6:30 PM on Monday, May 21<sup>st</sup>, 2018  
105 McCarthy Hall, St. Ambrose University, Davenport IA

#### **May Presentation**

The May presentation will either be Jeff Struve giving an up close look at the RSpec Spectroscopy software. Bring your laptop if you want the free 30 day trial version and a sample star to use during the presentation! You can also come prepared and get the download here: <https://spaces.hightail.com/receive/koajUp01VB>

Presentations for future meetings include Steve VanHyfte on Meteor Crater, AZ, Christian Allen on weather forecasting, Jeff Struve on Nebulae for public outreach, Carl Wenning on the Astronomical League, and Alan Sheidler on topics to be agreed upon. Contact Jim Rutenbeck or Jeff Struve if you'd like to make a presentation.

#### **Other Business**

- April, Sat 21 – Astronomy Day w/evening Public Night – BHS
- 2018 EISP
- 20" Newt Refurb
- Observatory Relocation
- New Web Site

### **Last Board Meeting Minutes:**

#### **Date/Time Location**

Monday, April 2<sup>nd</sup>, 2018  
6:30 PM to 8:30 PM  
Village Inn – Elmore, Davenport

#### **Attendance**

Jeff Struve – Present  
Craig Cox – Present  
Robert Mitchell – Present  
Matt Neilssen – Present  
Dana Taylor – Absent  
Jim Rutenbeck – Absent

#### **GUESTS**

Mike Dannenfeldt

## Agenda

- 2018 Calendar
  - April, Sat 21 – Astronomy Day w/evening Public Night – BHS
    - Robert and Jeff inside displays
    - George and Craig will have solar scopes out front
    - BHS will open planetarium
    - Robert, Matt, Jeff to Sherman Park
    - Invite QC Astronomy, QCAS, and PAC
      - Post on the new web site
      - Share from QC Astronomy to QCAS
  
  - August, Sat 11 – Meteor Shower Party w/Constellations and Mars – PVHS
    - May hold the event at the Jr. High... better location
    - PA, Screen
    - Bring lawn chairs and enjoy
    - Invite QC Astronomy, QCAS, and PAC
      - Post on the new web site
      - Share from QC Astronomy to QCAS
      - Add a map
  
  - September 7-9 EISP
    - Dr. Paul Sipiera
    - Dr. Jennifer Anderson
    - David Levy
    - Door Prizes – Jim Rutenbeck
      - Jeff to email Jim for an update.
    - Charge \$25 for star party only, \$35 for speakers only, \$50 for star party, speakers, and raffle, \$10 per raffle tickets.
      - SAU subsidizes \$1300.00
    - Party Crashers
      - We need wrist bands – Jeff to check MEC
      - Crashes need to be escorted out
    - Guest Speaker Lodging
    - Guest Speaker Meals
    - Guest Speaker Transportation
    - Guest Speaker Event Participation
    - Guest Speaker Honorarium
  
  - Public Nights
    - Lights Off Signs and Parking Area Signs
      - Craig will investigate
    - Canned Presentations
      - Jeff has the following presentations completed
        - Binary Star Systems
        - The Moon
      - Jeff has the following presentations in progress
        - Nebulae
        - Intro to Imaging
        - Asteroids, Comets, and Meteors
  
- Administrative
  - Main agenda topics for 2018
    - New Website
    - Moving Jens Wendt Observatory to the Menke site

- Mike Dannenfeldt accepted the position of Facilities Director pending notification to Dana Taylor.
- Treasurer Report
  - SAU is donating \$1300.00 toward the 2018 EISP
  - We need to do a complete inventory of items owned
  - Balance as of 04/02/18 \$5553.41
- Trifolds
  - Jeff to try to have draft ready for the April Board meeting
- Membership Registration/Renewal Forms
  - Jeff to try to have ready for April Board Meeting
- Membership Cards
  - Use current until they run out
- Jens Wendt Observatory Relocation to the Menke site
  - Roll off Roof Building – 24' X 32'
  - 20" Scope is 99" long and horizontally 5.5' high
  - Piers for 16" and 20" Newtonians and room for tripod mounted scopes
  - Poured floor – Expansion joints to eliminate vibrations
  - Roll off Roof building to be frame, Dome Building to be concrete block for aesthetically matching the current structures – have a warm room for PC remote control?
  - 6' walls with an additional 18" wall built onto roof for head room when roof is closed
  - Additional electrical capacity
  - Additional pads w/electricity outside
  - Make sure Wi-Fi band width is sufficient
  - Dr. Mitchell will check for the Menke Roll Off Building plans and see if their Engineering Class will take on drawing prints and materials list for our building.
- Revamp 20" (Steve VanHyfte) – Mirror cell revamp to 18 point (we are 9 point), Mirror edge support, Flip mirror, Replace the drive cover – Tentative completion date, July 14<sup>th</sup> Public Open
  - Add a refractor?
  - Focusers not aligned properly
  - Inferior focusers may be adding the flexure
  - TT John Baker about 18pt floatation system...
  - Drive Cover Box – has template ready
- Web Site
  - Will contain Treasurer Info (Board Member Access), Minutes, Applications, Links, Other
  - Approved budget of up to \$2500.00 for web site less picture gallery
- Other
  - Astronomical League
    - \$10 for club
    - Minimum of 5 members
    - \$7.50 per member unless all join then \$5.00 per member
  - Flipcause fundraising
    - Not interested

## **Next Board Meeting:**

### **Date/Time Location**

Unless otherwise noted, Board Meetings will be held on the 1<sup>st</sup> Monday of the month at 6:30 PM at the Village Inn Restaurant on Elmore and 53<sup>rd</sup> in Davenport, IA. Please notify Jeff Struve if you plan on attending so seating arrangements can be made. Ordering from the menu is Dutch treat.

### **Agenda**

\*\*\*Concentrated efforts will move from EISP to the observatory relocation

- Upcoming Events
- New documents
  - Trifold
  - Application Form
  - Membership Renewal Form
  - Membership Cards
- Observatory Relocation
- Discuss the new web site

### **Other Business**

- Discuss work to be done on the 20"
- Discuss continued inventory
- Discuss selling our heavy fiberglass step ladder and replacing it with an aluminum ladder for use in the roll off roof building.

### Secondary Topics

- Intro to Spectroscopy class
- PixInsight meetings/class

### **Member Spotlight:**

None this month

### **Submitted Articles:**

2018 QCAS Astronomy Day, by Jeff Struve

Thanx to Rusty Case for bringing his 11" Celestron SCT, Terry Dufek for bringing his 8" Celestron Evolution, George Bailey for bringing his 127mm Mankutov, Robert Mitchell for bringing his Exoplanet posters, and globe collection, and Alan Sheiler and Paul Levesque for bringing their cameras to take a few pics of the event.

I had brought my 60mm Lunt and my laptop showing some pics and the presentations I put together on The Moon and Binary Star Systems.... Chris Like, of Bettendorf High School ran the hourly planetarium shows...

Also in attendance and helping out were, Steve VanHyfte, Mike Dannenfeldt, Tom Bullock, and Craig Cox. Thank you to you as well!

As you all know, we were basically clouded out for the full Astronomy Day event, cancelling the Dixon event. We didn't have much of the captive audience attend... the girls dance competition in our area and a taekwondo event just adjacent... but I did count about a dozen folks that stopped by to talk and look at what we had going on... and we did draw a bit of attention to quite a few folks scurrying along to get registered for the school activity that they were there for.

So... last year we were rained out... this year we graduated to clouds... so that means next year we will have sunshine! ...again, thanx to all!



## CCD versus CMOS: Which is Better?

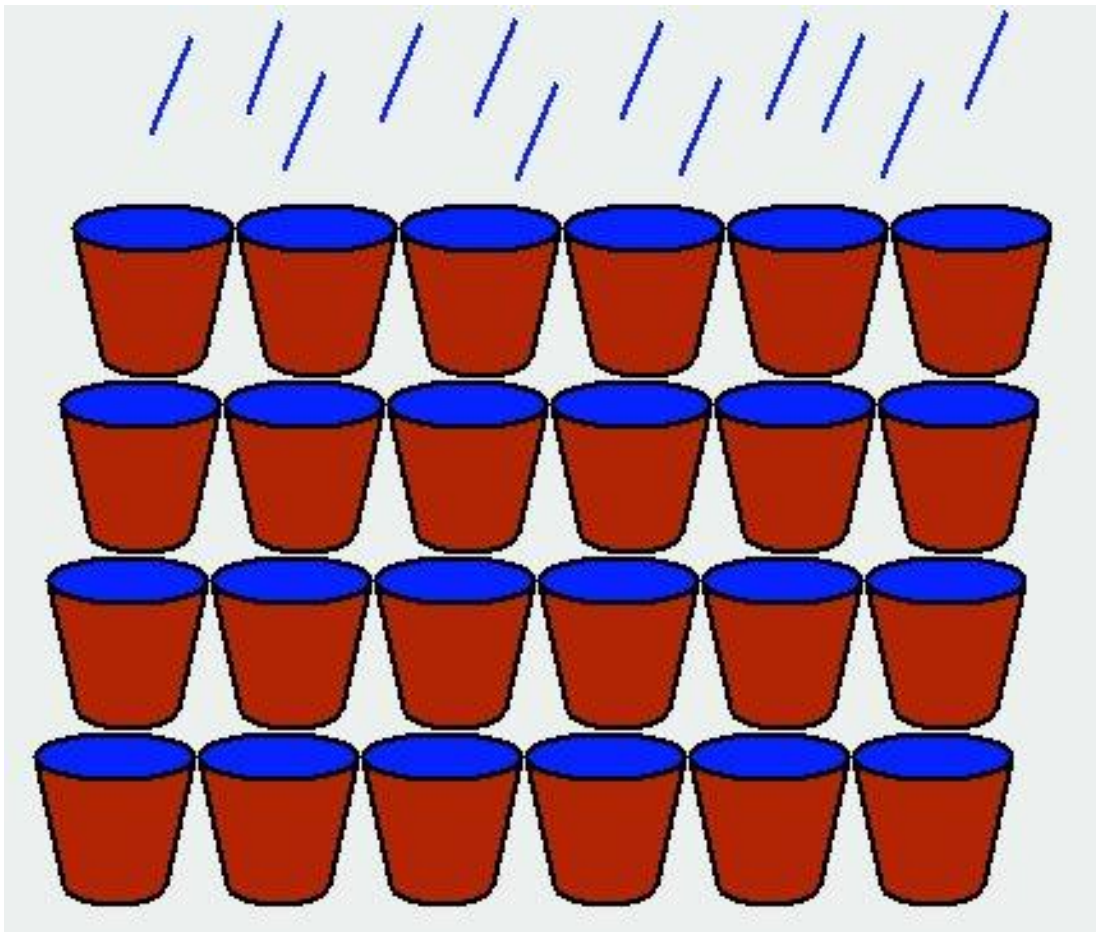
April 9, 2018

by Doug George.

We're often asked whether CMOS or CCD sensors are better. The simple answer is, "it depends."

Both types of sensors detect light the exact same way. An incoming photon hits an atom of silicon, which is a semiconductor. When this happens one of the electrons in the atom is boosted to a higher energy level (orbital), referred to as the conduction band. Silicon normally behaves like an insulator, so its electrons can't move around. But once an electron is boosted up to the conduction band, it is freed to move around to other adjacent atoms, as if the silicon was a metal. What was an insulator becomes a conductor – this is why silicon is called a semiconductor. In optical sensors these now-mobile electrons are referred to as photoelectrons.

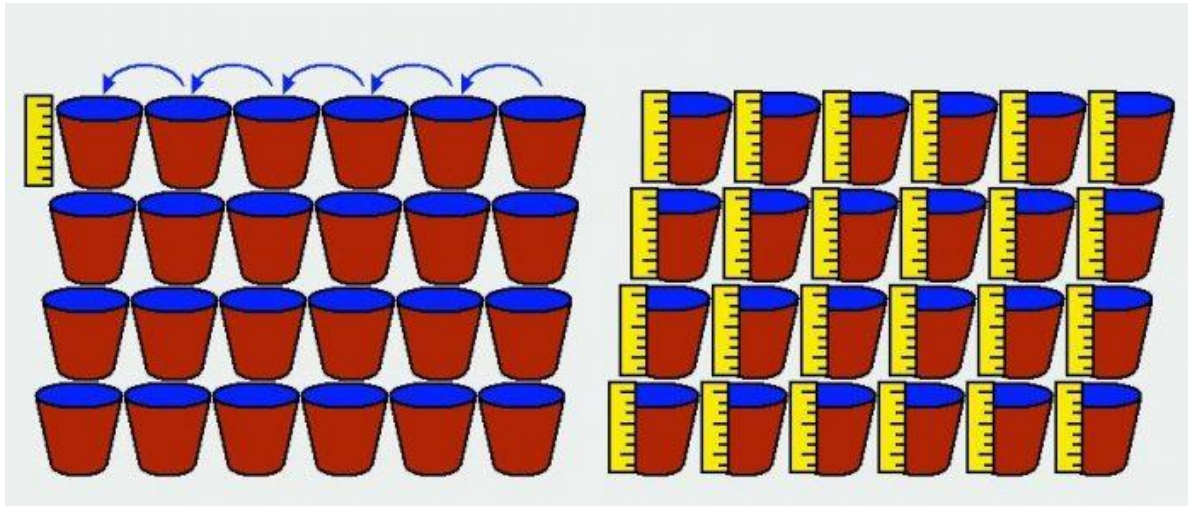
Both types of sensors use pixels. Pixels are simply a tiny square region of silicon, which collect and hold these photoelectrons. The usual analogy is an array of rain buckets in a field, each collecting rain water. If you want to know how much it rained in any part of the field, you just have to measure how full each bucket is. So far everything is the same for CCD and CMOS; it's the measuring process where things are very different.



The Bucket Analogy

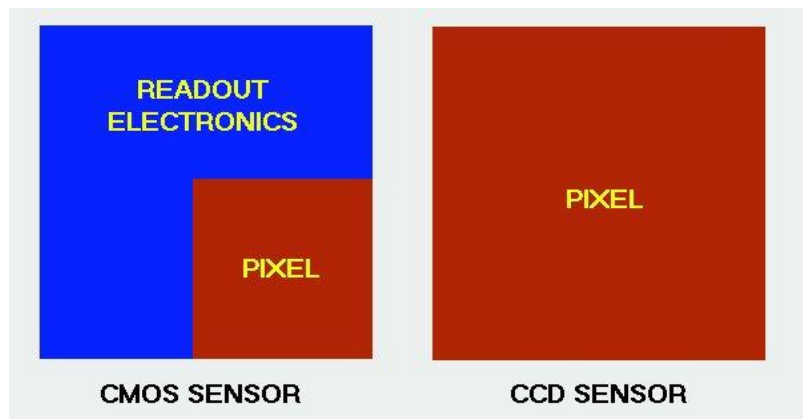
The Charge Coupled Device, or CCD, is the older and more mature technology. The chips are fabricated using either NMOS or PMOS technology, which was popular in the 70's but is otherwise rarely used today. During readout CCDs move the electrons from pixel to pixel, like a bucket brigade. They shuffle one-by-one out through a readout amplifier in the corner of the sensor. The big advantage of doing this is that every pixel is measured in the identical same way. The use of a single readout amplifier makes the readout process extremely consistent. This

produces high quality data with low fixed pattern noise and read noise. There's also no wasted space in the pixel, which is a problem with CMOS sensors. Shuffling all the photoelectrons to one corner of the device does limit the readout speed though; as a result some sensors have readout amplifiers in each corner for faster readout.



CCD Sensors Have One Readout In Corner, CMOS Sensors Have Readout at Each Pixel

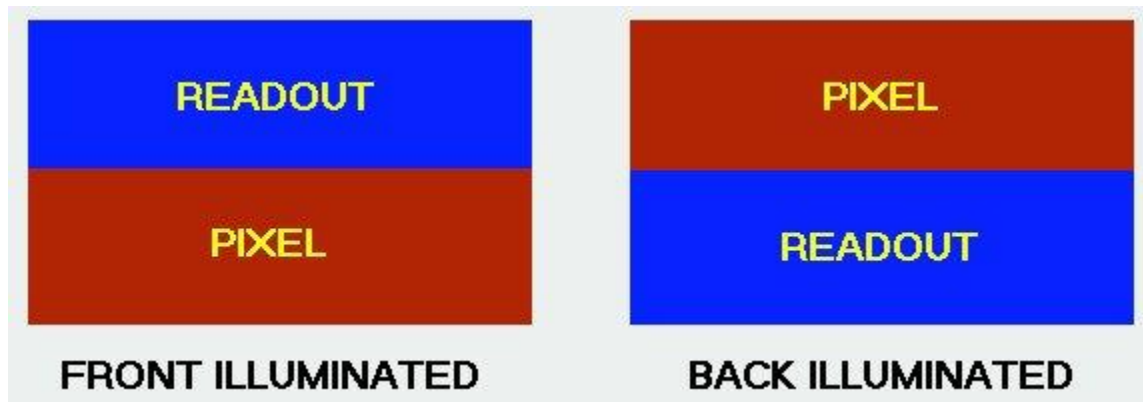
Most modern electronics are built using CMOS technology, or Complementary Metal Oxide Semiconductors. CMOS devices use both NMOS and PMOS transistors, which gives them excellent switching characteristics. Building sensors with CMOS technology allows them to incorporate additional electronics, such as analog-to-digital converters. Each pixel in a CMOS sensor has its own readout amplifier, and often sensors have A/D converters for each column; this makes it possible to read out the array extremely quickly. The transistors located at each pixel use up some space, resulting in less sensitivity and well depth. Aside from speed, the primary motivation in developing CMOS sensors was cost, not performance. As a result for many years the sensitivity, noise, and dark current performance of CMOS sensors was far inferior to CCD sensors.



CMOS Readout Consumes Some Pixel Area, Reducing Well Depth and Sensitivity

CMOS sensors do not require complex external clock driver electronics that produce precise voltages and waveforms to move charges around the sensor. They do not require complex external readout electronics, double-correlated samplers, and A/D converters. All of the electronic components needed for readout are built right into the sensor. The single chip just needs clean power to provide a good image, and it is directly read out digitally. That is the reason that CMOS sensors have a big advantage in terms of cost. That said, for scientific applications the additional mechanical and electronic hardware required to support cooling the sensors is still a major cost driver, regardless of the sensor type.

Over time the more mature CCD technology was enhanced through many innovations, both big and small. Interline sensors were developed for higher speed and shutterless operation. Microlenses were added to improve sensitivity, by directing light around readout electrodes on top of the chip. Back-Illuminated Thinned sensors avoid passing light through electrodes and other structures, resulting in quantum efficiency approaching 100%; however it is difficult and expensive to accurately thin the sensors. Electron multiplication devices (EMCCDs) with incredibly low read noise were also developed. Some of these innovations can be also applied to CMOS sensors, including back-illumination and microlens technologies. Others such as EMCCD techniques are specific to the CCD architecture. Naturally CMOS device manufacturers adopted the technologies that were applicable, improving the performance of their sensors. This has helped close the gap in imaging performance between CMOS and CCD.



Back-Illuminated Thinned Technology Dramatically Improves Sensitivity, but is Expensive to Manufacture

In addition to adopting these technologies, the overall architecture of CMOS sensors has also improved; for example, various methods are used to reduce the impact of the readout transistors on the sensitive area of the sensor, and others to reduce electrical noise. Some modern CMOS sensors have comparable performance to CCD sensors, and in some cases exceed their performance in certain respects. Recent scientific-grade CMOS devices, such as the GPixel GENSE400BSI have extremely high quantum efficiency and incredibly low read noise, on the order of 1.5 electrons in certain operating modes. But large amplifier glow and limited well depth combine to significantly limit the maximum usable exposure times. This limitation can be overcome through stacking images, but that process brings the final read noise back to conventional CCD levels. Still, these sensors have greatly closed the gap, and depending on the application can be superior to a CCD solution.

Today CMOS sensors have become dominant over CCD sensors in video, smartphone, and DSLR applications due to their low cost and fast readout speed. They are also making inroads into scientific applications. We can expect over time that CMOS will gradually supplant CCD in higher-performance applications. CCD technology currently still has advantages in well depth, amplifier glow, and large array sensors. But the gap continues to narrow, and we expect in the next 5-10 years to see CMOS supplant CCD in many high-performance imaging applications. It is likely, though, that for some time the highest-performance applications will still utilize EMCCD or back-illuminated thinned CCD technology.



Gallery

Astronomy Day at Bettendorf High School – Pics by Alan Sheidler, Paul Levesque, and Jeff Struve



## Alans Presentation on Mauna Kea



### For Sale – Wanted

For Sale:

- A gentleman by the name of Jerry Hansen is selling his telescope, filters, and other associated equipment. If you are interested in finding out more about it, please let me know and I will send you his contact information so you can find out more and negotiate directly with him (if interested). It looks like a nice unit. Thanks. Al Sheidler. [ADSheidler@gmail.com](mailto:ADSheidler@gmail.com)

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- An amateur astronomer by the name of Noe Vega is wanting to sell his 10" Collapsible SkyWatcher Dobsonian. He can be contacted at: <http://machlink.com/~nvega/10-DOB/>
- New 2<sup>nd</sup> Addn "Inside PixInsight" by Warren Keller. \$30.00 – 1 left! Contact Jeff Struve at [PwrHsePro@aol.com](mailto:PwrHsePro@aol.com)



- Mike Ombrello has for sale the pictured binocular boom and tripod... Contact Mike at [Ombrello@mac.com](mailto:Ombrello@mac.com)



### **Editor's Note:**

Please help improve the substance of our newsletter by submitting articles and pictures for publication. Variety is the spice of life... be spicy!

Types of articles that would really be interesting could include What's In the Sky This Month, equipment reviews, experiences you've had in astronomy, sketches you've drawn, trips you've taken to observatories or star parties, a high level overview of your favorite astronomer, movie, book or article reviews, list astronomy gear that you want to buy or sell, and of course pictures you've taken and how they were done...

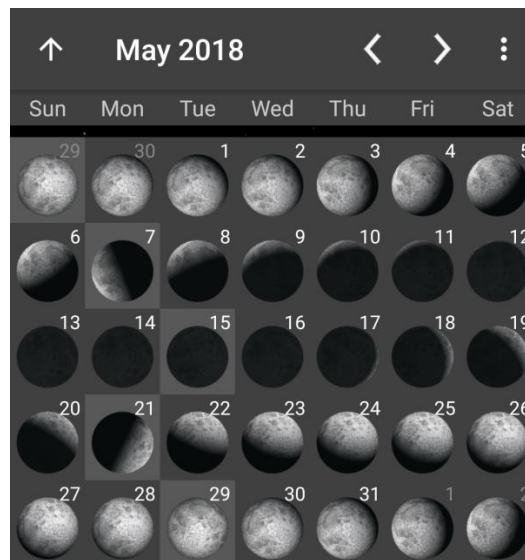
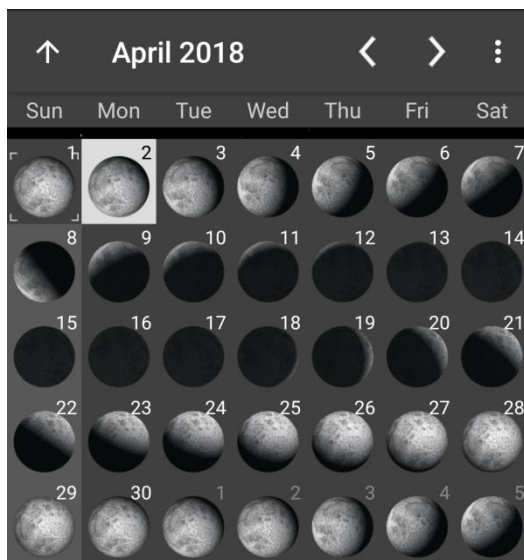
If each member submitted 1 article per year we could have an incredibly varied and interesting newsletter... that is my challenge to you!

Also.... Drop an email, text, or make a phone call or two... members want to get together outside of normal club events to discuss and work on our hobby!

Jeff

## **Calendar of Events – 2018**

01/04/18 – Board Meeting  
01/15/18 – Society Meeting  
01/20/18 – Public Night at Jens Wendt (Waxing Crescent 5:00 PM Intro to Spectroscopy and Double Stars Presentation)  
02/13/18 – Board Meeting  
02/17/18 – Public Night at Jens Wendt (Waxing Crescent 5:30 PM Intro to Imaging Presentation)  
02/19/18 – Society Meeting  
03/02/18 – PVHS Astronomy Club to Menke Observatory  
03/05/18 – Board Meeting  
03/14/18 – Sherman Park requested event for the Iowa Association of Naturalists Statewide Workshop  
03/16-18/18 – Messier Marathon  
03/19/18 – Society Meeting  
03/24/18 – Public Night at Jens Wendt (First Quarter 7:00 PM Orion and Other Nebulae Presentation)  
04/02/18 – Board Meeting  
04/16/18 – Society Meeting  
04/21/18 – Bettendorf High School Astronomy Day w/evening Public Night at Jens Wendt (Waxing Crescent 8:00 PM EAA Presentation)  
04/28/18 – Menke Student Field Trip  
05/05/18 – Menke Public Open  
05/07/18 – Board Meeting  
05/19/18 – Public Night at Jens Wendt (Waxing Crescent 8:30 PM Presentation???)  
05/21/18 – Society Meeting  
06/04/18 – Board Meeting  
06/09/18 – Menke Public Open  
06/16/18 – Public Night at Jens Wendt (Waxing Crescent 8:30 PM Star Cluster Presentation)  
06/18/18 – Society Meeting  
06/21/18 – Wayne Jens Memorial Solar Observing Day  
07/02/18 – Board Meeting  
07/07/18 – Menke Public Open  
07/14/18 – Public Night at Jens Wendt (Waxing Crescent 8:30 PM Presentation???)  
07/16/18 – Society Meeting  
07/21/18 – Niabi Zoo w/PAC  
08/04/18 – Public Night at Jens Wendt (Last Quarter – 8:00 PM Planets Presentation)  
08/06/18 – Board Meeting  
08/11/18 – Pleasant Valley High School – Meteor Shower Party w/Constellations and Mars  
08/18/18 – Menke Public Open  
08/20/18 – Society Meeting  
09/06/18 – Board Meeting  
09/07-09/18 – Eastern Iowa Star Party  
09/15/18 – Menke Public Open  
09/17/18 – Society Meeting  
09/29/18 – Public Night at Jens Wendt (Waning Gibbous – 7:00 PM Moon Presentation)  
10/01/18 – Board Meeting  
10/13/18 – Public Night at Jens Wendt (Waxing Crescent 6:30 PM Andromeda and other Galaxies Presentation)  
10/15/18 – Society Meeting  
10/20/18 – Niabi Zoo w/PAC  
11/05/18 – Board Meeting  
11/10/18 – Public Night at Jens Wendt (Waxing Crescent 5:00 PM Presentation???)  
11/17/18 – Niabi Zoo w/PAC  
11/19/18 – Society Annual Dinner Meeting and Elections  
12/03/18 – Board Meeting  
12/15/18 – Public Night at Jens Wendt (1<sup>st</sup> Quarter 4:30 PM ISS, Satellites, Iridium Flares Presentation)  
12/17/18 – Society Meeting



**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: [PwrHsePro@aol.com](mailto:PwrHsePro@aol.com) and/or [MitchellRobertC@sau.edu](mailto:MitchellRobertC@sau.edu)

**QCAS Officers and Contacts:**

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Vice-Pres: Craig Cox

Secretary: Dr. Robert Mitchell

Treasurer: Matt Neilssen

Director: Dana Taylor

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