

S.C.R.A.P.S.

Society's ChRonological Astronomical PaperS



From the Chair By Bob Arr

In the next meeting, we will offer special interest groups (SIGs) for members interested in earning Astronomical League observing awards. There are currently 17 different awards, including Urban Observing Club, Lunar Telescope, Messier Binocular, Messier Telescope and Earth Orbiting Satellite Observing Club, just to name 5. The SIGs will show how to select targets in advance, fill in and submit the logs, and provide help when needed. The fun comes at the star parties, finding the targets and sharing the hunt.

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We're pleased to announce that the club's two smaller telescopes, the 80mm refractor and the 10" dob, are once again in working order. The refractor fell victim to years of neglect. Basically, all it needed was a thorough cleaning, lube and tightening up. The dob needed much more, including removal of 24 lbs. of lead! Thanks to Wayne Thompson who donated two days of effort to the project.

When individuals check out these telescopes, they generally keep them until someone else asks to use them. But it often happens that months go by before the next person asks. So, if you'd like to use one, speak up. They are for all club members.

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SMAS's website, www.smokymtnastro.org, has several new features that may interest you. There are how-to articles on "Choosing Eyepieces" and "Taking Astrophotos", plus a catalog of the books in our lending library and maps to Hoopers Bald.

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Wow, what a Star Party! April 7 saw one of the biggest turnouts in many years. Big--really big--dobs came out of the woodwork (the woods?). Attendees included Roy Morrow and friend Owen, Gene Johnson and son, new member Richard Good, Wayne Thompson, Shawn Grant, Bill Dargan, visitor Bill Clegg, Bill Burgess and sons, Robb Felthege, Tom Rimmell, Mike Naney, Mike Littleton, honorary member Pete Youmans, myself, and possibly a couple others hidden in the dark.

Skies were great, galaxies abounded and even the temperature cooperated (no frostbite reported). Talk about glass: we had two 18s", one 15", one 14.5", and of course, one 20" (Sasquatch!) A few of the diehards ushered in Daylight Savings Time.

Presentation for May: "Jet Propulsion Laboratory, Past, Present and Future"

The May meeting of SMAS will be at 7 PM on May 10th at the Discovery Center. Paul Lewis will talk about the Pioneer missions, Voyagers I and II and about two current missions, Stardust and Odyssey. He will discuss some upcoming missions as well.

Paul reminds us that the Big South Fork date is May 4. There will be solar observing from 3:00-4:30 PM, an evening program at 9:00 PM followed by observing. The program will happen regardless of weather, as we will conduct it indoors.

The Ikeya-Zhang Expedition

By Mike Fleenor

My first trip up the Cherohala Skyway

Driven by my quest to capture Ikeya-Zhang on film, I worked feverishly after 12 hour days at my real job getting my gear ready and borrowing what I didn't have on hand. I was finally ready, but the weather proved most incompatible with comet photography. In the words of Forrest Gump's mother, the weather in East TN is "like a box of chocolates- you never know what you're gonna get." Ok, so I guess you know it's gonna always be partly cloudy in the spring and summer. Its not supposed to be hot and sticky in April though!

Miraculously, the haze gave way to a clear sky presenting one 24 hour window of time that turned out to be fabulous for the trip. Several SMAS members also expressed an interest in going to observe or photograph the comet, but unfortunately the weather didn't cooperate with the agendas of most folks who needed a weekend opportunity to go. I was delighted to have Bob Arr and Mike Naney accompany me up to Unicoi Crest and introduce me to the Cherohala Skyway. Being a resident of East TN since my childhood, I had yet to discover this remarkable piece of highway that literally leads up into the sky! This was my first trip to truly dark skies since my children have been born. Needless to say, I was in a state of shock!

We departed Bob's house just before midnight. As we began to ascend into the sky, many summer constellations came into view. We stopped at Unicoi Crest just across the NC line and found a breeze blowing. We then checked out Hooper's Bald about 7 miles away, but the wind had become a full blown gale by comparison with the gentle breeze below. We settled for Unicoi Crest, about 600 feet lower.

This was a first time for me going mobile with my main observatory scope. I got polar aligned and ready to go, leaving just enough time to take in a few sights through Bob's big Starmaster and chat with Mike Naney who was busy snapping constellation shots with his cameras before catching some I-Z photons on film. I took a peek at I-Z through my 3" apo and was stunned by the detail in the nucleus. I was here to make pictures, though, and just when I was ready to fire the shutter I needed to adjust my reticle-guiding eyepiece and suddenly it flew apart sending springs and screws onto the ground. Yikes! can't guide photographs without that. I am sure glad we were set up in a paved parking lot or I would've had to pull a Mac Gyver at 4am.

Finally everything was ready to go and after wasting 30 minutes with the reticle I was shooting the comet on film. Oh what a feeling to capture the cosmos on film! The moon finally had set for the night and the sky literally lit up with the multitude of stars. Talk about sensory overload-got to get out more often! I found it refreshing to look up into the sky every few seconds while I was guiding the scope and camera becoming reacquainted with old friends. We also got to see a few Lyrid meteors.



Not too long after getting started the sky began to brighten and the wind picked up as well. I also became acutely aware that my fingertips were numb and I was shivering! Oh well, it was worth it even if all the photos turned out to be duds-which by the way they didn't.

Ever been stargazing along the Cherohala? Well if not you're in for a treat. It's quite a bit farther than Big South Fork from Knoxville and doesn't have showers and campgrounds nearby, but it does have altitude and for a one night trip to dark sky country the trek up there is worth it.

For Sale or Wanted

Wanted: (to complete our Time-Life Voyage through the Universe set): "Atlas" and "The Near Planets." Steve Rothschild 379-5251

APRIL MEETING

by Janice Erickson and Bob Arr

The April SMAS Meeting was held on 5th at the Discovery Center. There were 21 members in attendance. We had one visitor, Georgia Chadwick, and one new member, Richard Good. Welcome, Richard!

This month we had two programs in addition to Charles Ferguson's Night Sky. Mike Fleenor gave an excellent PowerPoint presentation on CCD imaging titled "Astronomy in the Twenty First Century, Part I: Through the Eyes of Silicon". He showed images he had made as he learned the techniques and upgraded his equipment. They clearly showed the development of his skills, and created great interest in the audience. His current images rival the best in astronomy magazines. He and his family have recently moved, and he is now planning an observatory at his new home. He currently uses a Genesis camera for CCD imaging. Additional information can be found at <http://www.genesis16.net>.

Ken Ferguson presented the new Beginner's Course and solicited suggestions for improvements. While the course is intended to be shown with a live moderator answering newcomers' questions, Robb Feldhege offered the idea of canning it on CD as well, so that the newcomers could take it home and review it after the live presentation. Shawn Grant and Robb agreed to help with the technical aspects of assembling it. Mike Fleenor offered digital images from his large library. Several members felt that the program's section on telescopes would be better at the end than the beginning.

Charles Ferguson's Night Sky concentrated on Gemini, and the amazing and wonderful multiple stars Castor and Pollux, as well as M35 and the Eskimo Nebula. The audience response clearly showed how much this feature is appreciated.

Old Business:

Bill Burgess reported on the current status of Telescopes for Kids. We decided to delay nomination of recipient groups until the May meeting, in order to recruit more volunteers to finish 5 telescopes, then allow all volunteers to nominate groups. Several additional members volunteered. April 28th was set as the next work session during which we hope to complete all 5 telescopes.

Shawn Grant described our impending star parties. Shawn emphasized the Big South Fork star party on May 3d and 4th.

Jack McConnell reported on UT's star parties scheduled through the summer months. These will be shown in SCRAPs.

Sparky Sparks presented an Astronomy League award for "Universe Sampler" to Ron Dinkins. The AL is still processing his certificate for Messier object observing. Ron also just finished the requirements for "Deep Sky Binocular" observing as well. There was discussion about other members participating in the AL awards program. Bob Arr encouraged and challenged members to become familiar with it and try it. There are nineteen different observing certificates through the Astronomy League. For more information, there is a link to the AL from the SMAS web site or you may contact Sparky or Ron.

New Business:

We learned that the Tennessee Star Party (TNSP) will be held Oct 4-6 at Camp Nakanawa near Monterey this year, because Fall Creek Falls was not available on a new moon weekend. Additional information to be provided later.

Steve Rothschild reminded everyone of the process for checking out books from our library. Just sign the card from the jacket and drop it in the little white box. Check them out at the SMAS meetings and return them at the following meeting.

PUMP UP YOUR MIND!

Share your astronomical experience with the rest of SMAS and everyone on the Internet by writing an article for SCRAPs. Contact Mike Littleton at (865) 671-1022 or email littlem@ix.netcom.com.

CCDS VERSUS FILM FOR ASTRONOMICAL IMAGING

Is Using Film a Thing of the Past?

The telescope and photographic camera have been used for astronomical imaging for over 100 years. Photographic film consists of an emulsion of a light-sensitive compound of silver halides in gelatin. The emulsion coats a flexible film or a glass plate. When the silver halide absorbs a light photon, an electron is pushed into a higher energy state in the conduction band and a positive hole is left in the lower energy valence band. In pure silver, the electron and the hole would quickly recombine and release a photon. Chemical or physical traps in the crystal lattice immobilize the electrons. The electron may neutralize a silver ion leaving a silver atom in the crystal structure. The silver atom captures more conduction electrons, which in turn capture more silver ions. Thus, a speck of pure silver is formed in the lattice. Developers are solutions that slowly convert silver halide into pure silver. The silver speck is a catalyst, which accelerates the action of the developer. The image is formed by the presence of the silver accelerating the reaction in the areas of the light exposure. The fixer makes the film no longer light sensitive by removing the unexposed silver halide and produces the stable negative.

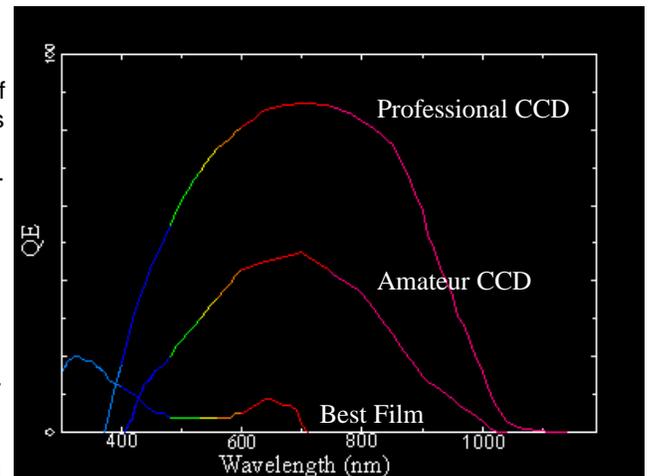
CCDs are fabricated by dividing the silicon chip into tiny light-sensitive areas called pixels. The columns and rows of pixels are defined by impurity doped areas where the electrons cannot cross. When light strikes the silicon surface of a charge coupled device (CCD), a silicon electron is moved to the conduction band and is free to migrate within the crystal lattice. When an electric field is applied across the lattice, the electron moves towards the positive potential. The electrons freed by light accumulate in the pixel during exposure. During the read, an electric field is cycled (clocking) and the electrons move from pixel to pixel to a register where the information is serially transferred into the computer.

The efficiency of a radiation detector can be defined by *quantum efficiency* (QE), which is the ratio of useful output divided by the number of incoming photons. A perfect radiation detector would have a QE of 100%. The figure at the right illustrates the efficiency of CCDs versus the best film. Even the best film is 4 or 5 times less sensitive than amateur CCDs. Therefore, having a CCD is like increasing the objective size of the telescope. An 8-inch telescope with a CCD has the light gathering power of an 18-inch telescope with film. The CCD also responds much farther into red and infrared than film. This allows the penetration of sky fog using deep red filters.

Film can integrate the light from dim objects over many minutes revealing details of astronomical objects lost to the eye. The major disadvantage using film for astronomy is film's low QE and low-intensity reciprocity failure (LIRF). LIRF is loss of film sensitivity to light at long exposure times and low light levels. Cooling common film using dry ice, using emulsions designed for astronomy, or using hypersensitized film can mitigate the effects of LIRF. Still the amateur astronomer is forced into exposures of many minutes to hours for the "faint fuzzies". Conversely, the CCD has a high QE and linear response. With a linear response CCDs record twice the information when the exposure is doubled. This linearity also permits much easier subtraction of sky background during image processing. The properties of CCDs allow imaging of dim objects in moderately light polluted skies.

Background subtraction and the higher quantum efficiency of the CCDs permit much shorter exposure times than film. Also with digital addition of multiple images of an object, exposures can be broken up into smaller segments. This is a definite advantage because only a small effort is lost when an imaging session is ruined by a passing aircraft entering the field of view during an exposure. When traveling to a temporary observing site, accurate polar alignment of a telescope is tedious and time consuming. Even with good polar alignment, telescopes suffer tracking errors from mechanical causes in the drive. Shorter exposures permit much greater leniency in telescope tracking. Dim objects can be captured with multiple 5 or 10-minute exposures with a CCD, which allows imaging without manual or automatic guiding with only reasonable polar alignment.

In the next installment, I shall compare some of the advantages and disadvantages of both methods of celestial imaging.



*Quantum Efficiency vs. Wavelength (HET 609
"Astrophotography and CCD Imaging", Swinburne
University 2001)*

May Star Party at Big South Fork

Just a reminder that the weekend of May 3rd and 4th is the great, wonderful, super groovy can't get any better than Big South Fork Star Party. Big South Fork is a national recreation area located 80 miles northwest of Knoxville near Oneida. Go north on I-75 and get off on the Huntsville exit. Go down highway 63 past Huntsville. A few miles out of Huntsville you will come to Highway 27. Turn right on 27 and this will take you to Oneida. When you get into Oneida, you will turn left onto Highway 297. Take that road all the way to the park. When in the park, follow signs to Bandy Creek Campground. From Knoxville it takes me about 1 hour and 20 minutes to get to Bandy Creek. There are signs pointing the way to Big South Fork all the way there even on the interstate.

On Friday evening, we are going to observe at the East Rim Area. This is about 4 miles from the Bandy Creek Campground. There are large areas with open fields that are very private for us to observe. We can meet at my campsite 45 minutes before sunset. Why so early? The East Rim Overlook is a great spot for sunsets. You are overlooking a river gorge with mountains in the background. I wish to arrive early enough to photograph it and encourage anyone to look at it as well. Also, it is easier to set up a telescope while it is light. For those who wish to come later, just drive out of the campground and go towards Oneida. Look for a sign on the right that points to East Rim Overlook. Turn on that road and drive till you see us. On Saturday, there is solar observing from 3:00 to 4:30 at the Bandy Creek Visitors center. Then at 8:00 in the parking lot across from the visitor center is the evening program. There will be 100+ campers waiting to get a look through a telescope. We need all the help we can get to accommodate the large crowd so bring your telescope. There is nothing better than showing a child their first view through a telescope. This alone is worth the trip. Later in the night, the campers will go to bed and we will have the night sky to ourselves. The skies are very dark and you can see 7th magnitude stars naked eye!

The facilities at Bandy Creek are very nice. Electricity and running water are at most campsites and there are clean bathrooms with hot showers all free. For those of you who do not like to camp, there is lodging nearby. Oneida has plenty of motels and there is a bed and breakfast and cabins nearby. Also, Big South Fork is close enough for you to drive down just for the day and leave that same night.

There are plenty of things to do during the day. There are a few waterfalls to hike to and there is the twin arches which are the two largest natural land bridges in Tennessee. See my picture of it on <http://www.shawngrantsworld.com/photography/twinarchd.htm>. There are several overlooks. There will be several spring wildflowers such as Showy Orchids, Lady Slippers, Creeping Phax, Wild Geraniums, various trilliums and other favorites. There is fishing, whitewater rafting, horseback riding and a world of other things.

Be sure to contact me at 470-9439 or email s.grant2001.comcast.net to let me know if you are coming and if you need a camping site reserved.

Shawn Grant
www.shawngrantsworld.com

Finding Sky Objects BY THE WIZ

Dear Wiz,

I'm just a beginner, and when I go to a star party, all the old heads seem to already know what to look for, but I don't. It's intimidating and embarrassing! How do I find out ahead of time what's good to look at?

S. Highgrass

Dear Shortdogin,

Sky & Telescope is man's best friend. Every month in their centerfold they highlight interesting sights and talk about them in the text. Even though they may only talk about half a dozen, it will be a different half dozen than last year's issue. Think about that: if you have access to back issues (as in the library), you can find the same month's sky featured every year, but they'll highlight different sights each year. (they're good about that).

The only thing that changes is the position of the planets, moon and comets. But July's *stars* are the same in 2002 as they were in 1992 and 1982 and, in fact, every year. So a collection of old magazines can be invaluable in finding fresh sights for anyone, young or old. (I guess you know, SMAS has 20 year's worth of S&T in its library...)

Keep your nose to the ground.

The Wiz



May 2002

Chair:
Bob Arr

Vice Chair:
Tom Rimmell

ALCOR:
John Sparks

Secretary:
Lee Erickson

Treasurer:
Janice Erickson

Star Party Organizer:
Shawn Grant

SCRAPS Editor:
Mike Littleton

SUN	MON	TUE	WED	THU	FRI	SAT
			1	2	3 BSF	4 Last Qt. BSF
5	6	7	8	9	10 SMAS Mtg.	11 Look Rock
12 New Moon	13	14	15	16	17 UTK	18
19 1st Qt.	20	21	22	23	24	25
26 Full Moon	27	28	29	30	31	

SCHEDULE OF EVENTS

- **5/3/02 and 5/4/02** Star Party at Big South Fork
- **5/4/02** The Eta Aquarids Meteor Shower peaks which is from remnants of Halley's Comet
- **5/10/02** SMAS meeting 7 PM (new time) at the Discovery Center: The guest speaker is Paul Lewis on "JPL: Past, Present, and Future"
- **5/11/02** Star party at Look Rock
- **5/15/02** Venus sets at 10:58 PM; Mars sets at 10:44 PM; Jupiter sets at 12:14 AM; Saturn sets at 10:06 PM
- **5/17/02** Public observing from the roof of the Physics Building at UTK

SMAS Website:
<http://www.smokymtnastro.org/>

Webmaster:
Mike Fleenor