The SPECTROGRAM

Newsletter for the Society of Telescopy, Astronomy, and Radio

November, 2002

November's Meeting

The next meeting of S*T*A*R will be Thursday, November 7th. The meeting will begin promptly at 8:00 PM at the King of Kings Lutheran Church, 250 Harmony Street, Middletown.

Our featured speakers will be Dr. Haimin Wang, Associate Director for Solar Research at NJIT & for the Big Bear Solar Observatory, California. Dr. Wang will talk with us about Space Weather forecasting. You can learn more about Dr. Wang at http://physics.njit.edu/~haimin/.

In this Issue

From the Editor

Thank you to this month's contributors. The Spectrogram is your newsletter and appreciates your support. Articles may be submitted to Greg Cantrell at monthly meetings or electronically at cantrell@optonline.net .

DUES are DUE!

Membership dues of $25 per individual or $35 per family are due now. You may pay dues directly to Paul Nadolny at the meeting, or through the mail to:
STAR Astronomy Club
P.O. Box 863
Red Bank, NJ 07701

Calendar

September 5, 2002
Ernie Rossie
STAR Astronomy Club

October 3, 2002
David Segelstein & Gordon Waite
STAR Astronomy Club

November 7, 2002
Dr. Haimin Wang
NJIT

December 5, 2002
Dr. Jerry Sellwood
Rutgers University

January 2, 2003
Dr. Eddie Guerra
Rowan University

February 6, 2003
Bob Sal
ASTRA Astronomy Club

March 6, 2003
Dr. Dale Gary
NJIT

April 3, 2003
TBA

May 1, 2003
TBA

June 5, 2003
Annual Business Meeting

President's Corner

by Greg Cantrell

I'd like to touch on several topics this month. First, dues! To those who have paid your dues this year, **Thank you**! Still, many of last year's STAR members haven't paid this year's dues. Dues are extremely important to the club, paying for our meeting space, speakers, insurance, and other club expenses. STAR Membership is $25 per year for individuals, or $35 per family. You may pay dues directly to Paul Nadolny at the meeting, or through the mail to: STAR Astronomy Club, P.O. Box 863 Red Bank, NJ 07701.

This month's meeting features the first "professional" speaker for this year's schedule. Dr. Wang's talk about space weather forecasting and the effects of the 11 year solar cycle on our environment should prove interesting as well as educational.

As announced during the September meeting, the Board indicated a desire for better balance this year between professional and club speakers and I've worked hard to develop a program that reflects that request. As we continue to work on the meeting format, I'd appreciate member's comments or recommendations. If there are topics that you would like to present at our regular meetings, please feel free to discuss those with me either at the monthly meeting, on the club's bulletin board, or via email at cantrell@optonline.net.

November means the annual return of the Leonids meteor shower. Every November, Earth passes through the orbit of Comet Temple-Tuttle, a periodic comet that crosses Earth's orbit every 33 years. This year, Earth is predicted to pass through debris left behind during the comet's 1767 and 1866 visits during November 18 - 19. At about 5:30 am on the morning of the 19th, U.S. observers may be treated to an outburst of nearly 2000 meteors per hours. Though the full moon may dampen this year's event, 2000 meteor per hour should still offer quite a show.

Finally, several club members continue to work on projects that are important to the club. Most of these projects will be discussed at this month's meeting. Hope to see you there!

STAR Meeting Minutes

October 3, 2002
King of Kings Lutheran Church, Middletown

STAR held its second meeting of the 2002/2003 year at the King of Kings Lutheran Church. About 35 people attended the meeting.

Short announcements and discussions:

1. Chris Olszewski brought the meeting to order more-or-less promptly at 8:05 PM. Members are requested to pay their dues.
2. The date for the star party with the Sunday-school children (6th grade +) at King of Kings church will be on October 20, 2002. To support this party, and the church that is very accommodating to us, please talk to Andy Zangle or check the web site.

Main Program:

The main program of the evening was a very entertaining and informative tag-team talk on astrophotography by David Segelstein and Gordon Waite, two of STAR's members. David does film photography, and Gordon does charge-coupled device (CCD) photography, and so this talk was an intended comparison between the strengths, weaknesses, and applications of the two types of image recording. They also presented a comparison of the same objects, captured in both film and CCD.

The overview of their presentation was to compare the two image techniques in the categories of technology, sensitivity, field of view, and resolution. They also included their respective costs. In addition to informative, the evening was very entertaining due to Gordon's matter-of-fact delivery of stories and David's dry wit. Gordon likes the fact that with CCD photography there are no re-curring costs, although it does have a nar-rower field of view than film. David likes the wider field of view and colors with film, but also indicated that he is genetically disposed towards suffering. Film exposures usually last for 15 to 60 minutes, while CCD expo-sures can be taken in about 1 minute (al-though several of them have to be taken and then combined to get a better image).

In terms of technology, CCD uses a single chip of an array of light-sensitive material. When a photon (light) hits one of these arrays, it causes an electron to be emitted. These electrons can then be stored and counted, and their numbers indicate the relative amount of light falling on that pixel. Film, on the other hand, has a layer of silver bromide (NaBr) crystals. Initially, the bromine is negatively charged, and the silver is positively charged, and they stick together. When light hits one of these crystals, it neutralizes the charges on both atoms, and so they become neutral. De-veloping washes away the unconverted ions, and so all that is left are the clumps of atoms that were hit by the light.

In terms of sensitivity, more light should produce a denser (brighter) image. Film dis-plays a very non-linear relationship between amount of light and density. For low levels of light, the density increases very little; for higher levels of light, the density goes up at a faster rate than at low levels; and at high levels of light, the density again hardly increases. Unfortunately, all the interesting objects are at the low-levels of exposure, meaning that they are easily swamped by light pollution. On the other hand, CCD has a very linear relationship between density and light exposure. This means that dim and bright objects produce image densities according to their brightness. Many CCD images of short duration are thus equivalent to one image of a longer duration (with the added complication of having to add up all the separate images). In film, this image combination is done in essentially real time, with the necessity of a very steady telescope.

In terms of field of view, the statement was made that, for a given focal length, a larger detector will result in a larger field of view. Field of view is the amount of sky that is on the image. CCD devices are usually fairly small (for reasonable prices at this point), and so the field of view that they generate is also be small. Generally it is smaller than the corresponding field of view with the same telescope using film. For comparison, Gordon's CCD field of view is about 8 x 11 arc minutes, while David's film field of view is about 54 x 81 arc minutes. This difference was demonstrated clearly in some of the images later displayed.

In terms of resolution, it is determined by the pixel size in CCD, and the size of converted-atom clumps (grain?) in film. Typically, CCD pixels are slightly smaller than clump sizes in film (~9 microns for CCD, and about 15 microns for film). This translates to resolu-tions for Gordon's CCD camera of about 1.7 x 1.3 arc seconds, and David's film camera of about 2 x 2 arc seconds.

Color is another difference between film and CCD. With color film, color is part of the process: no extra steps need be taken. With CCD however, to produce a color image several pictures have to be taken with different color filters, and then the pictures have to be combined. This processing is complex and time-consuming. On the other hand, taking the long (~hour) exposures needed for film re-quires a well-aligned and stable scope. David's 350+ lbs portable (?) scope takes him about 2-4 hours to set up and align before he's ready to

take pictures. And then he has to focus the image. (Well, he did say he was used to suffering.)

In terms of cost, for both telescope, computer, camera, etc., Gordon paid about $8K. For his scope and mounts and alignment equipment, David paid about $16K since the late 1970s. (Both gentlemen ask that their wives not be told this amount.)

David and Gordon finished the evening with a stunning array of images that they've captured. Gordon's images had a smaller field of view, but excelled in showing awe-inspiring structures of astronomical objects. David's pictures had more field of view, and showed marvelous colors and larger structures. Both men's images were breathtaking.

The meeting ended about 10:05 PM, or thereabouts.

Next STAR Meeting:
The next STAR meeting will be held in on November 7, at King of Kings Church.

Respectfully submitted,

Chris Olszewski

What's Mike Been Up To?

by Michael Lindner

As some of you know, I *always* have at least one ATM project going on, and usually several. This was a disappointing month for me, ATM-wise.

I spent several more hours grinding side two of corrector one for the Lurie Anastigmat, with no apparent change in sagitta. I put the corrector on the test stand and used Gordon's Foucault tester (which is very nice, by the way, I'm going to copy some of its features for my next tester, and I'll bet there's an article in that) to try to measure the sagitta accurately. It looks like the sagitta is way off (4") from what I measured, and off in the wrong direction as well (the curve is worse than I thought).

The result is that I'm going to go back to 320 grit and try to lengthen the focal length another 6 inches. The worst part is that I doubt the results of my spherometer. Speaking of which, that's another source of disappointment. I've been packing it in my grinding bucket to take back and forth to Gordon's, as it's one less thing to carry, and one time I forgot to take it out of the bucket when I got home.

The result is that it sat for days in the bucket with the damp tool/glass, and the ball bearings (which are supposed to be chromed) rusted and separated from the epoxy holding them in place. So now my spherometer has no feet, and if I rebuild it I have to recalibrate is anyway (since the new feet might not be in exactly the right place). I am ordering stainless steel balls for the new feet, but they come in a pack of 100. Anybody want some ¼" stainless steel balls?

In the wake of all these disappointments, and while I wait for my parts to arrive to rebuild the spherometer, I decided to spend some time working on my half completed grinding machine. Even getting only the turntable built would help.

I easily mounted the turntable and tried it out. There are two problems with the grinding machine, unfortunately. First off, I mounted the cleats that couple the turntable to the drive shaft slightly off center, so the table turns eccentrically. This is not a fatal problem, but it would be much easier to center the glass on the turntable if the turntable itself were centered. I rigged up a jig for my belt sander, and went to work, but there's quite abit to remove. This is still in progress.

The second problem is the speed. When I bought the motors for my grinding machine, they were sold as 30 RPM 24V DC motors. When I opened the box, the documentation said they were 72 RPM 24V DC motors, and

in fact, the seller has since corrected their catalog.

So, my turntable turns at 72 RPM, which doesn't seem fast (and in fact is not outside the range "normally" used in grinding machine turntables), until you see it in action, with glass and grit hurtling at your face (OK, perhaps that's exaggerating a little bit).

I had designed an electronic speed control for it, but the speed controller was supposed to adjust the speed between 30 and 20 RPM, not 72 and 20 RPM. The problem is that the motor cannot be slowed down as much as I would like without losing torque, at which point it stalls under load.

For the overarm, there is no problem. I connected the motor to a lawnmower transmission, which gives it a nice 12 stroke/minute rate (and has a clutch to boot). However, the turntable was built to be directly driven by the motor. I need to add a set of pulleys to bring the speed down by at least a factor of 2, and rebuild the table to accommodate the pulleys and belts.

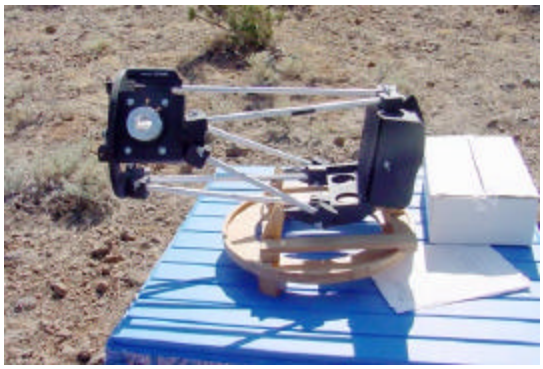
So, its back to the drawing board on both my Anastigmat and my grinding machine. You may notice that this month I have neither pictures nor diagrams of my work to show you. That's because there really hasn't been any progress. Instead, I'll show you pictures of someone else's progress.

Mel Bartels, of ATM fame, has come up with something new (or at least he's developing an idea that's been talked about but I haven't seen on a scope before). He calls it the "tridob". The tridob has three altitude bearings instead of two. Each bearing rides on a single Teflon pad, instead of each riding on two pads. There are thus a total of three Teflon altitude pads, making three points of contact with the bearings instead of 4. This makes the scope more stable.

"*Fewer* supports makes the scope *more* stable," you say? Yes. The reason is that three points define a plane. No matter how inaccurately the pads and bearings are made, the bearings will be in firm contact with all three pads at all times. With four points of contact, the scope actually sits on three and the fourth is redundant. As the scope moves in altitude and azimuth, if the bearings aren't perfectly round and aligned in all three dimensions, or if the rocker box or mirror box or ground board flex, the scope can wobble instead of moving smoothly.

In addition to these features, Mel notes that the mirror box can be made lower, since it doesn't have to support side bearings, and the center altitude bearing actually stiffens the mirror box, giving support to an area that's typically open. Likewise, the rocker box reduces to a ring, with three pads on top directly over three pads on the bottom, making that stiffer and supporting the scope better.

Shown below is a picture of Mel's 6" tridob prototype.



History of Astronomy in New Jersey - Overview
by Barry Malpas

Following is a 3-5 year project to document the history of astronomy in New Jersey. The idea is to obtain group of amateurs and others interested in the project (two dozen or more) to research various NJ astronomy topics, and write about them, with proper bibliography. And photo sources, etc. Each article would be produced as a Word Document by the writer including the authors

name with any names of contributors. The end result would be a publication of a few hundred copies by 2005-2007. Each contributor would receive a copy as well as area libraries and observatories. Extras would made available for sale to offset printing costs.

So far people who have expressed interest in the project are:

- Wayne Augenstein (AAI);
- Trudy Bell [editing, 1800s observatories];
- Lloyd Blank [editing, grants];
- Gordon Bond (AAI);
- John Church (AAAP) [Hastings telescope];
- Kevin Conod (NJAG) [Robert Van Arsdale];
- Bart Fried (ATS);
- George Helmke (AAI) [Lord Stirling];
- Karl Hricko (AAI);
- Barry Malpas (AAI) [Bouvier, Martin, Tuthill];
- Peter Serrada (AAI) [Mogey];
- Dr. Lou Thomas (AAI);
- Dr. Mary Lou West (Montclair U., NJAG);
- Thomas Williams (Willingboro) [WAS];

Once we get a complete list of topics and at least two dozen people from around the state, we will:

1. Set up the format of the publication as well as the types of materials that should be includes (photos, drawings, bibliography, etc.)
2. Set up a time table for all reports.
3. Assign topics to individuals. Hopefully individuals would be interested in their area or specific topics.
4. As articles are submitted they will be reviewed by a group of editors.

Suggested Topics

Please do not construe these as the only topics. I am sure there are many that did not come to mind since most of us are not familiar with all of the NJ area groups, planetariums, observatories, topics, etc.

Observatories: Schank Observatory (Rutgers ca. 1854); Princeton Observatory (Late 18-Early1900s); Princeton Observatory (current, Peyton Hall); Sperry Observatory (1967, AAI); Paul Robinson Observatory (Voorhees, NJAA); John W. H. Simpson observatory (Washington Crossing S.P., AAAP); UACNJ Observatory (Jenny Jump); Observatory in Westfield (Private home of a Dr. Hall in the 1950s probably earlier); Observatory in Basking Ridge (Home of Otto Naegele .7-meter (28-inch) Newtonian-Nasmuth/Cassegrain); Observatory in Morristown (Private - Historical Society has Clark instrument). Also, at least six observatories from the mid 1800s.

Astronomy Clubs: Rutgers Astronomy Club; Camden Astronomy Club (now Rittenhouse ca. 1888); Bergen County Astronomy Club (early 1930s); Amateur Astronomers Inc. ; Amateur Astronomers Assoc. of Princeton; North Jersey Astronomical Group; Hopatcong Area Amateur Astronomers; Willingsboro Astronomy Club; United Astronomy Clubs of New Jersey; Astronomical Society of Toms River Area; STAR Astronomical Society; Sheep Hill Astronomical Association; Skyland Star Gazers; Concordia Astronomy Club; Montclair Telescope Club; New Jersey Astronomical Association; South Jersey Astronomy Club; Morris Museum Astronomy Club .

Planetariums: Newark Dreyfuss P.; County College of Morris P.; Ocean County College P.; Trenton Museum P. Raritan Valley College P.; Trailside Nature and Science Center P.

People/Companies: (Those who have contributed in a major way to astronomy by leading, discovery, or promoting ... lesser contributors could be included in a table with a short paragraph or two about their contributions such as director of xyz planetarium from 19nn-19nn, etc.) Robert Van Arsdale (ca. 1850s) - see Sperling; "When Comets Were Discovered >From Newark." S&T, 8/79; Roger Tuthill (Astronomy entrepreneur & astronomy promoter late, teens to 2000); Mary Bouvier (Astronomy writer ca. 1850); Martha Evans Martin (Writer 1907, 1912); Arno Penzias (Bell Labs - 3-degree background, ca. 1930-pres); Robert Wilson (Bell Labs - 3-degree background, ca. 1930-pres); Albert Ingalls (Scientific American Editor/Writer, ca 1930-60s); Karl Jansky (Bell Labs - Radio Astronomy, ca. 1930s); William Mogey (Telescope maker - Plainfield, NJ, late 18-early to mid 1900s); Lord Stirling (ca. 1700s), Edmund Scientific, … (I am sure there are many more here).

Discoveries: Comets (Van Arsdale); Asteroids; 3-deg Background radiation (Penzias & Wilson); Radio Astronomy (Jansky). Know of any others?

Notes:
1.) We need a source from each club to submit a history of their organization.

2.) There needs to be a hub of 3-4 individuals to act as nudges over a period of time so the articles will get completed within a reasonable period of time.

3.) Consider the following as a straw man for the format.

Preface - written by one or several of us, or someone of some astronomy or historical notoriety, possibly Trudy Bell.
Table of Contents.
Overview - Written after all the reports are done. Will tie together the main contributions, etc.
Topic sections - People, Observatories, Discoveries, Clubs, Planetariums, etc.
Appendices - Lesser contributing people. NJ Location map of facilities, Resource list (including web sources), Bibliography, etc.
Index by subject.

Once enough people come on board we will set up a kick-off meeting, to set time-frames, formats and assignments, probably in the Fall of this year (2002). If you are interested please contact me with your name, contact information, as well as ideas, suggestions and specific topics interests.

Thanks.
Barry Malpas
UACNJ Observatory Chairman
(908) 755-6932
njastro@erols.com

Messier Objects - November

by Greg Cantrell

During November, we say good-bye to daylight saving time and hello to longer nights. This extra observing time comes with noticeably cooler weather. Time to dig out the cold weather observing gear as we prepare for this month's Messier selection, which includes galaxies, open and globular clusters, and a planetary nebula.

M 52 (NGC 7654) –This rich magnitude 6.9 open cluster is found in Cassiopeia. Binoculars reveal a small fuzzy patch, while a small telescope resolves the cluster into a triangular patch of stars. Right Ascension (RA) 23 24.2, Declination (Dec) +61 35

M 103 (NGC 581) – This 7.4 open cluster in Cassiopeia is fairly small and sparse. Though observable with binoculars, this cluster can be somewhat challenging to locate among several nearby open clusters. RA 01 33.4, Dec +60 39

M 77 (NGC 1068) – A magnitude 8.9 galaxy residing in Cetus, this object is very difficult to find in binoculars. A medium sized scope reveals a small fuzzy patch, somewhat brighter toward the center. RA 02 42.7, Dec –00 01

M 15 (NGC 7078) – Very similar to M 2, this magnitude 6.4 globular cluster in Pegasus is a very easy binocular object. M 15 also provides impressive telescopic views. RA 21 30.0, Dec +12 10

M 76 (NGC 650) – An 11.0 magnitude planetary nebula in Perseus, the Little Dumbbell is one of the dimmest (and difficult) objects in the Messier catalog. RA 01 42.3, Dec +51 35

M 34 (NGC 1039) – At magnitude 5.2, this large bright open cluster in Perseus can be glimpsed naked eye as a fuzzy patch of light. RA 02 42.1, Dec +42 47

M 74 (NGC 628) – A smaller, fainter version of M 33, this magnitude 9.4 galaxy is perhaps the most difficult object in the Messier catalog to locate. Dark, clear skies are essential to locate this faint, face-on spiral galaxy. RA 01 36.7, Dec +15 47

M 33 (NGC 598) – This very large, magnitude 5.7 face-on spiral galaxy in Triangulum is about the size of the full moon. Also known as the Pinwheel Galaxy, its low surface brightness makes this a challenging telescope object. RA 01 33.9, Dec +30 39

Upcoming Events

Star parties are an important part of the amateur astronomy experience. Listed below are several events offering dark skies and astronomical fellowship.

October 28 – November 4, The **8th annual Mid-Atlantic Star Party** will be held at a central North Carolina site that boasts mag 6.5 skies and southern sky objects that cannot be viewed from New Jersey. For more information, visit http://www.masp.org/maspindex.htm.

November 2 – Jersey Astronomy Conference & Showcase (JACS) 2002 will be held at Union County College, Cranford, NJ. More information at http://www.asterism.org/.

November 3 – 10, The **Chiefland Star Party 2002** will be hosted by the Chiefland Astronomy Village, Florida. For more information, visit http://www.c-av.com/.

February 3 – 8, 2003 The **Winter Star Party** will be hosted by the Southern Cross Astronomical Society. For more information, visit http://www.scas.org/wsp.html.

Nov 4 Nov 11 Nov 20 Nov 27

Are You a S*T*A*R Member?

Memberships: ( )Individual....$25
( ) Family...$35 ( ) Institutional $25

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E-mail_____

Make checks payable to: STAR Astronomy Society, Inc and send to P.O. Box 863, Red Bank, NJ 07701