

The S*T*A*R *SPECTROGRAM*

The Newsletter for the Society of Telescopy, Astronomy, and Radio

VOL 2, No. 4

December, 2001

December's Meeting

The next meeting of S*T*A*R will be Thursday, December 6th, at 8:00 PM. The meeting will be held at the King of Kings Lutheran Church, 250 Harmony Street, Middletown. **Please note the change in date and time!**

This month's meeting will feature a presentation about the Sloan Digital Sky Survey by Dr. Michael Strauss, Associate Professor, Princeton University's Department of Astrophysical Sciences.

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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.

Calendar

September 6, 2001

What I did on my Summer Vacation

October 4, 2001

David Malin's video, "The Man Who Colors Stars".

November 6, 2001

Ed Collett
STAR Astronomy Club

December 6, 2001

Dr. Michael Strauss
Princeton University

January 3, 2002

TBA

February 7, 2002

TBA

March 7, 2002

Dr. Charles Liu,
Hayden Planetarium

April 4, 2002

Dr. Edward Devinney
Rutgers University

May 2, 2002

TBA

June 6, 2002

Dr. Tad Pryor
Rutgers University

Leonids from BW II

by Joe Cascella

Meteor showers often do not live up to their expectations. The best I can remember seeing had perhaps 100 per hour. Not bad from NJ. But nowhere near the hundreds, even thousands of a "storm". So my excitement was a bit tempered despite the potential of the 2001 Leonids. Wanting to give them a fair shot, I planned on going to a darker location after midnight. I few S*T*A*R members were heading to the Blair Witch II site, so I had a location and company. (It's never fun to be out in the middle of nowhere, after midnight, in the cold, and alone !!)

All bundled up, with lounge chair and video camera in tow, I was off to BWII at about midnight. While driving along Route 70, I saw a huge, bright meteor shoot just above my line of sight. Oh, baby, this could be good! I got to BWII about 1:15 am. Not the darkest sky I have ever seen, but not bad for NJ and only about an hour and fifteen minutes from home. The Milky Way was clearly visible, although not very bright. The sky was clear. No Moon, no clouds, and pretty good "seeing". Couldn't ask for more for a few hours of meteor hunting. A couple of guys were already at the site viewing with telescopes. Saturn and Jupiter looked magnificent under high magnification in Dan P.'s 18 incher. But that's not we were there for. Heck with the scopes, we're here for some fireworks.

I realized we were seeing about 1 to 2 meteors per minute, or 60 to 120 per hour, when I got there, still several hours before the consensus peak. By about two am, we were well into 2 or more meteors per minute, already well past my previous personal best. If it had stayed at that rate, I would have been very happy. But if it improved to even half the predicted hourly rate, well, I figured I might get a little giddy! Many of the meteors were very bright, leaving noticeable smoke trails for a few seconds. I recall thinking I was not seeing many short, dim meteors. Only bright ones. There seemed a little greenish tinge to many of the trails. Several of the brightest ones had an orange-ish glow to the actual meteor, with a lingering trail for many seconds. I was very much into the giddy faze.

A few other S*T*A*R members showed up after me. In all, I think about 10 or 11 people came through. Not bad. The best part was Glen M. showing up with leftover sandwiches from a party he had just left. Clear sky, good seeing, good company, meteors in record numbers, and good food to boot. No one had it better than we did!

By about 3 am, we were up to as many as 5 meteors per minute, maybe more. That's 300 per hour. Outstanding!! The radiant in Leo was now getting pretty high in the sky. Meteors were visible in all directions. There was a constant stream of "wows", and "oohhhs", and "did you see that", and just plain laughter. Apparently I was not the only one getting a little giddy. 5 per minute seemed an understatement. By about 3:30 am, we were up to 5 to 10 per minute, or 300 to 600 per hour. The cold, which someone said was 22 degrees, was hardly noticeable.

By about 4 am, the rate clearly had accelerated. We were seeing a meteor every few seconds on average. Now I noticed seeing more short, dim ones, adding to the totals. I don't recall going more than about 20 seconds without seeing at least one meteor. But we were also seeing multiple meteors in a row. Sometimes two or three at a time. A few were extremely bright, lighting up the observing field for a split second, like a dim flash bulb. Some smoke trails lingered for a while. We timed a few that stayed visible for several minutes! Not just seconds. The Leonids were clearly living up to their billing. And the rate just kept increasing. By 4:30, we were estimating at least 20 per minute, or 1,200 per hour. Incredible! As we got closer to 5 am, the rate still seemed to be increasing. We decided to test the giddy-factor by doing a one-minute time trial. Looking in different directions, we all counted meteors while timing 60 seconds. The counts were from the high teens to over 30! We did it again a few minutes later with similar results. We were truly seeing an impressive show of as many as 2,000 meteors per hour.

A little before 5 am, I got up to grab some hot chocolate. While taking a few sips, I counted 22 meteors in what seemed like only a few seconds. I was looking at only a small portion of the sky. When looking overhead, soaking in a large portion of sky, meteors were visible everywhere. We were all way beyond giddy. Our count was over 30 per minute. We were not going more than five sec-

onds or so without seeing a meteor. We were seeing multiple meteors at once, in all directions, as the norm. They were shooting everywhere. Many of us saw as many as four, five, six, seven meteors at once. Followed by several more just a second or two later. And a few more a second or two after that. Laughingly, we were saying, "it's raining meteors"!!

Our peak estimate was somewhere between 35 to 45 meteors per minute. That's from 2,100 to 2,700 per hour. Even as the sky was brightening with morning twilight, we were still seeing 10 to 20 meteors per minute. Just before we left, with the sky very bright only minutes from sunrise, we could STILL see several meteors per minute

How To Purchase Your Own Dark Sky Site

by *Ernie Rossi*

Many amateur astronomers in the Northeast would like to purchase their own dark sky site but aren't sure of how to go about it. I have been to many dark sky sites and besides the distance to the site it can be very uncomfortable. Many of the darkest sites that you visit have no lavatories, electricity, running water, shelter, and no place close you can buy food. To visit such a site you must be prepared to bring many items to keep you as comfortable as possible. You may need a tent, sleeping bag, food, plenty of water, all your lavatory articles, and extensive outdoor gear. When you have your own dark site place you have all the comforts of home. A warm place to sleep, your own bed, kitchen, shower, refrigerator, oven, washing machine, toilet, TV, VCR, telephone and many other comforts which makes observing a joy. The problem is how to find such a place, how far away is it, can I afford it, these are some of the questions you must ask yourself. The next question if you are ready is how to find this place. You may ask yourself what alternative things you can use this place for other than astronomy. Here are some of the steps that I used in finding my dark sky site.

1. Ask experienced observers where they go to find a dark sky.
2. Check dark sky surveys like Phil Harrington's dark sky site on the web.
3. International Dark sky Association (IDA) have a

dark sky map that you are able point to, and click on any area of the country to show how dark it is.

4. Check to see where astronomy clubs attend for deep sky viewing. Once you decided how much you can spend, what type of place you would be satisfied with, and the distance you would be willing to travel, here are the next steps. In my own personal situation I decided 3 hours of driving was the furthest I was willing to go. I figured this out roughly in miles and I made a circle starting from my house to the surrounding area with 3 hours or 200 miles being the furthest distance.

5. Get on the Web and locate real-estate brokers-many will have listing, some will have pictures of the dwelling and land. Pick up the newspaper like the New York Times and check the real estate section. Some supermarkets have free real estate books when you enter.

6. Take a ride out and check the area out; do some homework on the topography and facilities around you. Some places are so far off the main road that you may need a four wheel drive vehicle.

7. Check the light pollution in that area, or where you want to buy the land or house. It took me an entire year, several weekends out of every month before I found the house and land I wanted and could afford.

8. Even stay over in a motel in that area overnight on a clear and moonless night to get an idea of the sky conditions.

9. Check the zoning area out in case you want to buy land and build a house.

10. I made sure that my area was agriculture zoned, and I was backed up to a state forest. The closest large town is 30 miles, and the closest small town is 14 miles and I am surrounded by mountains and forest for dozens of miles. Besides astronomy, I use the land for snowmobiling, all terrain vehicles, and target practice with rifle and bow. However, if I like to go fishing, swimming, hunting, boating, skiing, birding, gardening, or go hiking I could do this too.

Try and find a piece of property that has good horizons and that you don't have to cut down hundreds of trees or move mountains to get unobstructed views. Find out how close the next neighbor is, and find out if they have outside lights on all the time. You can find your dark sky paradise without having to travel thousands of miles across country if you take the time to look. We do have some very dark skies in the Northeast. Maybe they don't quite rival the West and southwest but we will be able to stay

near our friends and families. If you would like to talk more about finding or purchasing dark site real estate, you can contact me via the discussion board, or EROSSI140@aol.com

Testing Telescopes Part 2: The Foucault Test

by Michael Lindner (some figures by David Harbour)

The Foucault (pronounced FOO-KOH, named for its inventor Léon Foucault) test is probably the most widely used test by amateur telescope makers. It is extremely simple to build the equipment, and the test is reasonably accurate for the types of mirrors typically made by amateurs (spherical or "medium" focal ratio parabolic mirrors). There are a number of similar tests, but the Foucault test is the simplest version, so we'll study it first.

Imagine a hollow sphere, silvered on the inside. Place a tiny light source at the center, radiating light in all directions. Each photon emitted by the light source at the center hits the mirror straight on and bounces right back to the center. Now imagine cutting a disk out of the side of that sphere. That disk is the mirror under test. See Figure 1.

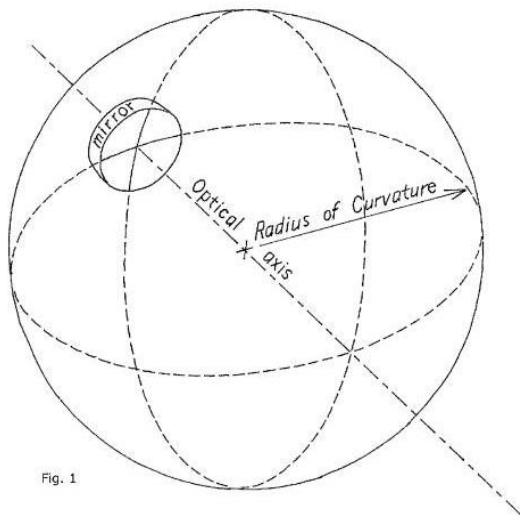


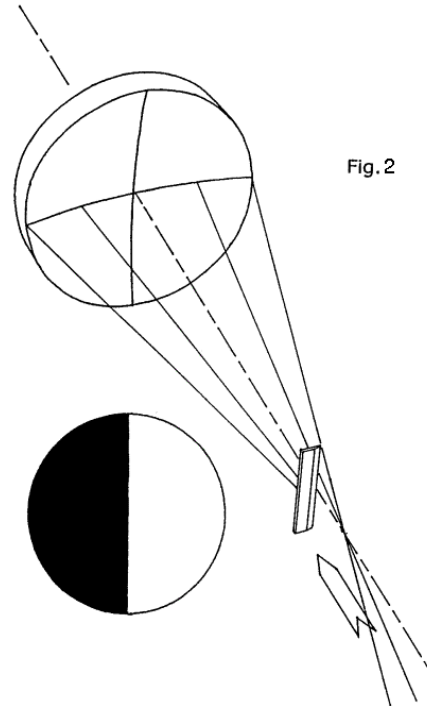
Fig. 1

At the center of curvature (which is twice the focal length) you place a small light source and your eye. Photons from the light source strike the mirror and

bounce back into the pupil of your eye. As you look at the mirror, it appears brightly lit, since light is reaching your eye from every part of the mirror.

Of course, there are some slight problems to overcome. The light source has to be shielded so it isn't shining directly into your eye. It also has to be placed slightly away from the exact center so that there's room for your eye. Your eye doesn't have to be at the exact center either, as long as it's close enough so that the entire cone of photons reflected back from the mirror is small enough to fit into your eye's pupil. Finally, it is hard to make an infinitely small point source of light. Typically a pinhole or slit is used. The slit has the nice property that it acts like a series of tiny points, so that the system can be misaligned slightly up or down along the slit without changing the way the test works.

Now, let's move a straight edge (the edge of a knife or razor blade will do) into the cone of light in front of your eye. It blocks the light from the mirror as it crosses the cone of photons heading toward your eye, and your eye sees a black shadow move across the face of the mirror (Figure 2).



If you move your eye and the knife edge back slightly, so they are further away than the radius of curvature, the shadow will appear to cover the mirror from the side opposite the side it's really on (see figure 3).

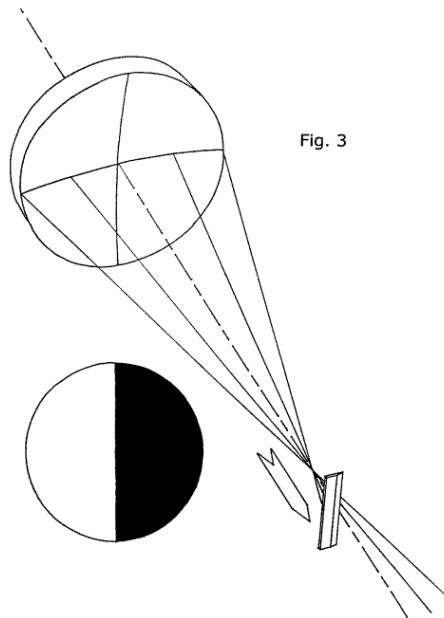


Fig. 3

If the knife edge is exactly at the radius of curvature a funny thing happens. If the light focused to an exact point, the knife edge would cut it off instantly. However, since the point of light forms an airy disk, it is not really a point, but a disk. Furthermore, each part of the airy disk is getting photons from every part of the mirror, so as the knife edge cuts across the airy disk, the entire surface of the mirror gradually gets darker, from white to gray, until it is completely dark (see figure 4).

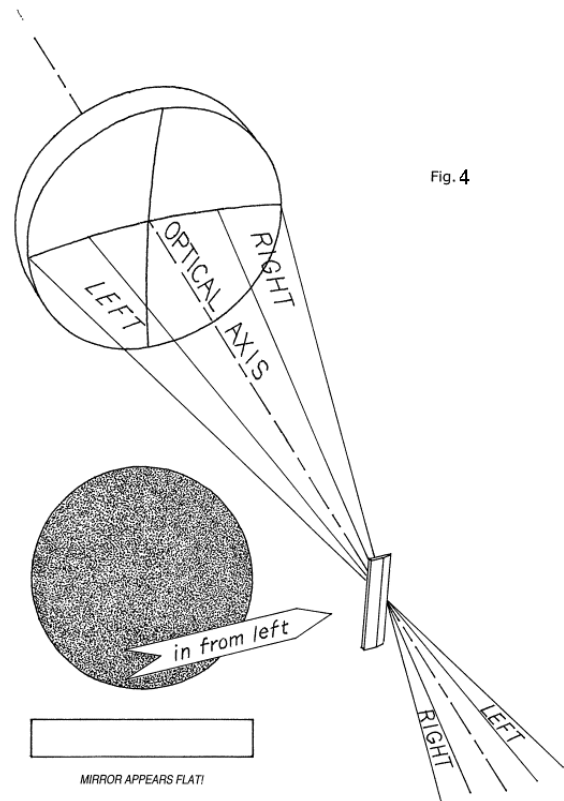
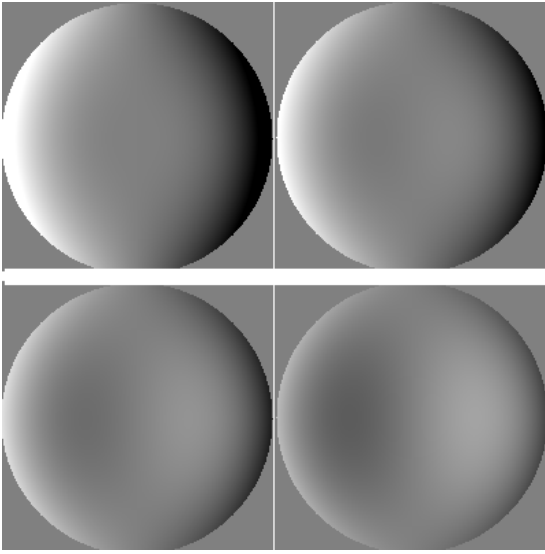


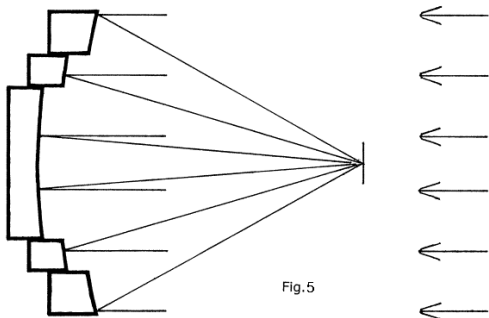
Fig. 4

At this point the test is an extremely sensitive way to measure a sphere. Any deviation in the mirror's surface large enough to cause light to focus outside the airy disk will show up as a black or white spot on the grayed-out mirror. Depending on the exact conditions, it is possible to see deviations in the mirror's surface on the order of 0.0000001"!

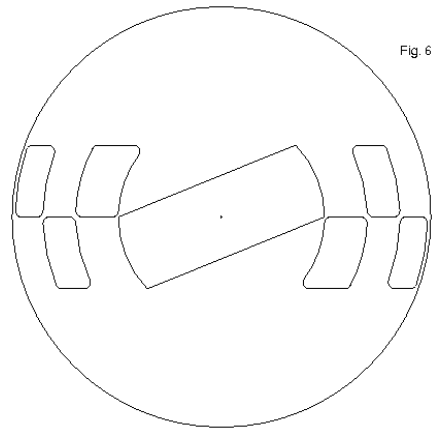
There is only one drawback; most telescopes have mirrors that are not spheres, but paraboloids. While a sphere will focus light from a point back to the same point, a parabola will focus light from infinitely far away to a single point. If you move the knife edge across the cone of light from a parabola, you will not see the mirror go dark all at once, but will see a "doughnut" form as the light from different parts of the mirror comes to focus at different places (see picture 1).



There is a solution, however. The paraboloids used by most telescope mirrors are very close to being spheres, and it is possible to get a very accurate determination of the shape of the mirror by approximating the parabola with a series of rings cut out of spheres of slightly different distances (see figure 5).



A mask, called a Couder mask (KOO-DAY, named for its inventor, André Couder) is placed over the mirror (see figure 6), so that one section at a time can be measured as a section of a sphere. The distance between the radii of curvature is measured by means of a micrometer to an accuracy of 0.001". Note that you don't have to measure the radius of curvature to that accuracy, just the tiny differences that the knife edge has to move from measuring one section to the next. A simple test stand can perform this easily. The resulting data (the difference in the radii) are fed into a few simple equations and the profile of the mirror relative to a parabola can be determined with good accuracy.



You can find out more about Foucault testing on the web at

- <http://www.atmsite.org/contrib/Carlin/couder/>
- <http://members.gotnet.net/bald/atm/foucault.htm>
- <http://home.att.net/~n7vk/foucault.htm>
- <http://tlepage.home.mindspring.com/Foucault.html>
- <http://www.geocities.com/CapeCanaveral/9601/ftester.htm>
- <http://users.uniserve.com/~victorp/testing.htm>
- <http://www.jlc.net/~force5/Astro/ATM/Foucault/FoucaultTester.html>
- <http://victoria.tc.ca/~rasc/foucault.html>
- <http://www.atmpage.com/foucault.html>
- <http://www.alltel.net/~microsys/astro.htm#FOUCAULT>
- <http://home.worldnet.att.net/~mikel/foucault.html>
- <http://home.att.net/~mikel/>
- <http://www.fred.net/bdavy/FoucaultTester.htm>
- <http://www.kolumbus.fi/pulliy/fouc.html>
- http://www.stellafane.com/atm/atm_foucault_tester/atm_tester_main.htm

Summer Star Parties

by Ernie Rossi

During the summer I did observing at many places in New Jersey and out of state. Observing can be for one evening, a weekend, or for an entire week. To do deep sky observing you need a dark site with minimum light pollution, clear transparent skies, and no moon. Since this only happens a week or so every month, and we usually do this on a weekend, this doesn't give us much time especially if we have bad weather and cloudy skies. Sometimes when I observe all night it affects me for several days after, since I have a hard time trying to sleep in the day. Star Parties come in all sizes and forms. It can be

your own, a friend, or your club, or other clubs that may have one. Some star parties have several people, and some have more than a thousand. This summer I attended so many, Blaire Witch south Jersey, NJAA Highbridge, NJ, Jenny Jump Hope, NJ, Stellafane, Springfield, Vermont, Rome, Maine, Sanford, NY, and several other locations like Cape Cod, Ma. August 17-19 Stellafane the largest astronomy star party/convention on the East coast, and probably in the country. I don't know the exact count, but probably 1500 to 2000 people attended. I took my 18" Tectron this year instead of my 25" Obsession because I had so many things I needed to take. After Stellafane I was headed to Maine to continue my observing. Due to space I will only be reporting about Stellafane. The largest scope at Stellafane was a 36" Obsession monster which took a whole crew to assemble. Even though the owner came with a 12' ladder you had to be very tall to reach the eyepiece at zenith. If anyone is interested, the owner is selling the scope for 16,000, a real buy. Another fellow John Vogt had a 32" DOB he built, and someone else had a 25" Obsession. The homebuilt scopes for this year was just amazing in design and workmanship, and it took some of their builders hundreds of hours of labor to complete. So there was many scopes around to look through, look at, and ask questions about. This is the place to find the best homebuilt telescopes any where. Friday night August 17, the sky was at first cloudy and I didn't think it was going to clear, so I didn't set my scope up. At around 9 PM the sky cleared and I looked through other peoples scopes. Everyone was very friendly and don't mind you looking through their telescopes. By midnight we were clouded out again and the fog started to roll in. Saturday night it began to clear again, but this time I had my scope ready. The sky was pretty good around 6 Th. magnitude at zenith, and the milky way stretched across the entire sky. I have seen the conditions better at Stellafane, but 6 Th. magnitude skies are still very good, certainly better than New Jersey. I stood up to around 1 am when the sky clouded over again. I did get the chance to see such objects as M8, M13, M15, M16, M17, M20, M22, M31, M32, NGC205, M57, M27, NGC884 & 869 the double cluster, and many other objects. Some of these objects I named for those who are new to astronomy are Globular Cluster, Open Cluster, Emission Nebula, Planetary Nebula, and Galaxies. Stellafane is located on top of a hill called breezy point at over 2,000 feet and contains the history of very famous people and innovative telescope designs.

The facilities are rather primitive, portable toilets, very little running water, no electricity except for a few outlets, food is brought in by vendors. You also need a tent, sleeping bag, and all the necessary gear to sleep, eat, and wash in the field. During the day swap tables are open and you can purchase someone else's equipment, or sell some of your own. Attending different star parties you get a chance to see different observing sites, learn about the club or people who sponsored it. If you want to learn about the sky, or look through other types of telescopes, meet knowledgeable and interesting people attend your next star party and it will give you a whole new insight of what astronomy is all about.

STAR Meeting Minutes October 4, 2001

Colts Neck Firehouse (between the trucks)
STAR held its second meeting of the 2001-2002 year at 8PM on Thursday, October 4, 2001. The meeting was fairly well attended with about 30 to 40 people in attendance.

Main Program:

There were two main events in this night's program. Steve Walters led both activities

1. Scope and Tell

In a marked contrast with last month's meeting, Steve's astronomical observing device this month was considerably simpler and cheaper. Steve showed us his "barn door" photography mount, used to take pictures of the night sky with just a camera (i.e., without a telescope). The device was very simple, and Steve described how he made it.

Basically, the device is two small sheets of wood (or metal) connected by a hinge that could connect a barn door to a barn (hence the name). Of course, in Steve's case, the hinge was a little bit more complicated. One sheet mounts to a tripod; the other to a camera. At the beginning of the exposure, the sheets of wood are together. As the exposure is being taken, the sheets unfold at the hinge, to compensate for the earth's rotation. The mechanism to force the hinge to unfold is a bolt attached to one sheet, going through a nut attached to the other. A small motor turns the nut. As the nut turns, the bolt moves (screws) through the nut, pushing the other sheet away. The bolt was curved into a circular

arc to keep the motion uniform. Steve said that this device was suitable for taking exposure up to about 15-20 minutes. He usually uses Kodak E200 (color positive?) film, but is now looking at Agfa ASA 200 film. He said that he uses lenses like 35mm to 50mm for 35 mm film, although I think I heard him say that he has used a 200mm lens.

2. David Malin

Steve also showed us an interesting video of David Malin, and astrophotographer at the Anglo-Australian Observatory in Australia (Sydney?). David Malin has been pioneering color astrophotography for about 25 years. Many of the techniques, which are very common today, were initially investigated by David Malin. From an aesthetic point of view, his images are marvelous. However, these images, and the processing that David Malin used on them, were able to discover new things in astronomy. For example, he found the largest galaxies that we know about; and also found evidence of the remnants of galaxies colliding to form elliptical galaxies. Because of the time involved in taking these images and the limited time he had available with the observatory, he produced less than about 200 images. This is a case of quality winning out over quantity.

Short announcements and discussions:

1. Randy Walton had discount coupons to the Ocean County Camera Club show on October 20, where some optical instruments like binoculars, etc., are available. He is also collecting potential orders for Orion equipment, so that a dealer can be established as an Orion distributor. Interested parties should talk to him about it. He said that he has about \$2K of the \$5K minimum order
2. Greg Cantrell has graciously accepted the post of editor of the Spectrogram. In an unusual request (ha ha), he asked members to contribute anything they feel would be of interest to other members of the club. At this point, the Spectrogram is in a rebuilding phase, and he is especially interested in suggestions, comments, and constructive criticism about what the Spectrogram should actually have in it.

The Spectrogram will generally be available only on the web; however, any member who wants a paper copy should just ask Greg, and the club will arrange to have them sent out.

3. Members should verify their address, phone numbers, and email (especially their email addresses) with Paul Nadolny. A large fraction of emails may not be getting through.
4. We had a brief discussion about our next meeting place. Because of the very difficult situation with the Colt's Neck Firehouse, we will definitely want to have our next meeting someplace else. Some schools are being looked at, but one guaranteed open place was the Red Back Women's Club. Unfortunately, the first Thursday of the month is taken, so we will have our next meeting on a Tuesday. Only two of the members present were not able to make that day, so we decided to go ahead with that plan: 8PM on Tuesday, November 6, at the Red Bank Women's Club at 164 Broad St., in Red Bank, just across from the Post Office. This location is just a little south of the intersection of Reckless or Harding with Broad.
5. Andy Zangle (I think) mentioned the possible speakers we have lined up for the rest of the year. In November (we hope), we will have Dr Guerra from Rowan University to talk about observational radio astronomy. In December, we hope to have Dr Strauss from Princeton to talk about the Sloan Digital Sky Survey. And in April, we hope to have Dr. Devinney from Rutgers, to talk about binary stars. As a show of interest in having an optics cleaning and testing night, there were about 15 people who raised their hands. (I don't know if that means we'll have such a night or not.)
6. We plan to have a "Beginner's Night" (well, all members, new, old, and still thinking about it are welcome) of astronomy. The date will be November 16 or 17, at a nearby location to be determined.
7. Andy also brought up that we are the recipients of an 8" f/6 mirror. He said that the board wanted to put together another loaner scope for new members, and needed authorization of the club membership to spend not more than \$200 to put

the scope together for the "Beginner's Night" star party. Randy Walton made such a motion, seconded by Larry Campbell. The motion passed unanimously. Andy said that information would be posted on the web site when our Amateur Telescope Making group would be getting together (probably at Mike Lindner's place?) to work on it. Assistance gladly accepted!

8. Larry Campbell (maybe?) mentioned that there will be a star party at the Indian Hill School in January or February. Volunteers are requested.
9. Mike Lindner said that the International Space Station (ISS) will make a visible pass (did make a visible pass?) on Saturday October 6, at about 6:49 PM. An Iridium flash can be seen that night, as well. A good place to find out about these things is at www.heavens-above.com, and also at skyshow.com
10. Paul Nadolny mentioned that he has spare red acetate to make night-vision-preserving lights from flashlights.
11. Chris Olszewski asked for interested parties to borrow the club's 8" f/8 scope. He will need to retrieve it from the current borrower. Similarly, Randy loaned out a 4" Edmonds Newtonian (to Taffy Notarcola).
12. New members and faces were welcomed to the meeting.
13. Andy Zangle said that if anyone wants to help out the New York Fireman's Fund for Widow's and Orphans, after the awful events of September 11, he has the contact information. Interested parties see him.

The meeting ended about 10:00 PM, or thereabouts.
Respectfully submitted,
Chris Olszewski

Astronomy Word Search

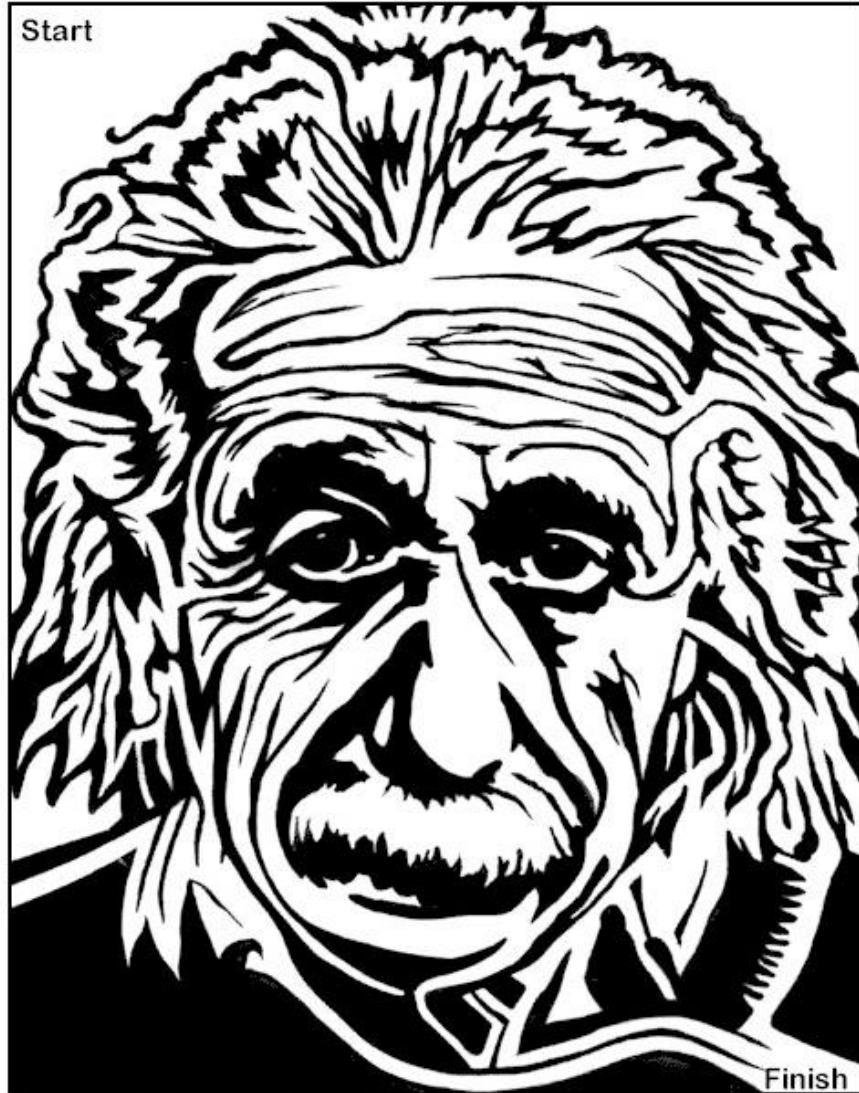
Submitted by Michael Lindner

APUS	JUPITER	PLUTO
ARIES	LIBRA	PULSARS
ASTEROID	LYRA	QUASARS
CETUS	MARS	REVOLUTION
COMET	MERCURY	ROTATION
CORONA	METEOR	SATURN
COSMOS	MOON	SIRIUS
DRACO	NEBULA	SKYLAB
EARTH	NEPTUNE	SPACE
ECLIPSE	NOVA	SUNSPOTS
FACULAE	ORBIT	TAURUS
GRUS	ORION	URANUS
HERCULES	PARSEC	VENUS
HYDRA	PAVO	VIRGO
INDUS	PLANET	ZODIAC

S D E N U T P E N O I T U L O V E R
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L P F A I L G R O N M C R C U X O B
U A F E S O H S E K O N S Q E T W Z
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O E R U A L X Q B A E H R K B D N R
C Q T W A Z D S R A M G A I J M Y T
P S A V O N R U T A S E L O C R E H

Mazed™ "Einstein"

by Isaac Thayer



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