The SPECTROGRAM

Newsletter for the Society of Telescopy, Astronomy, and Radio

January, 2003

January's Meeting

The next meeting of S*T*A*R will be Thursday, January 2nd. The meeting will begin promptly at 8:00 PM at the King of Kings Lutheran Church, 250 Harmony Street, Middletown.

Our featured speaker will be Dr. Eddie Guerra of Rowan University. You can learn more about Dr. Guerra's research and teaching activities by visiting his website at http://scherzo.rowan.edu/~guerra/.

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.

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
Canceled due to poor weather

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
Tentative – Dr. Jerry Sellwood
Rutgers University

May 1, 2003
Freeman Dyson
Institute for Advanced Study

June 5, 2003
Annual Business Meeting

President's Corner

by Greg Cantrell

In addition to beginning the New Year, this month's meeting is the mid-point of the 2002/2003 season. Thus far we've had two great presentations by club members, an interesting presentation about our sun by the Associate Director for the Center for Solar Research at NJIT, and a meeting canceled due to poor weather!

There are other activities underway, including a group of club members developing recommendations for a club observatory, another group working on updating the club bylaws, and an outstanding effort by Steve Fedor in developing a packet of information for new members. Frank Loso has been engaged in a search for an observing site in Monmouth County that could be used for beginner's nights or other club activities. And an extremely dedicated group of glass pushers have been meeting nearly every week at Gordon Waite's house to grind and polish and share fun times.

While much is going on, more could be done. Are there other activities you feel would be interesting for club members? Are you interested in bringing your scope for "Scope and Tell" at the January meeting? Or, perhaps, you have other ideas for a club field trip or a short presentation. If so, please contact me at cantrell@optonline.net, or give me a call at 732-308-3488 so that we can discuss your plans.

Dr. Eddie Guerra, faculty member of Rowan University's Department of Chemistry and Physics, will be the featured speaker this month. Dr. Guerra's research activities center around observational radio astronomy. His web site states "Radio astronomy gives us a glimpse of the most distant (and thus oldest) known objects and structures in the universe."

Hope to see everyone at the January meeting!

Markam School Star Party

by Ernie Rossi

Star Parties have become very popular, clubs have them, amateur astronomers have them at all levels, special groups like the boy scouts, girl scouts, campers, and schools with children of all ages. Around the first week of December Dan Pontone called me to tell me he is having a star party for 5 Th. graders at the Markam School in Little Silver and it is scheduled for Dec 12 Th. which falls on a Wednesday. He said he has a few other people willing to help, but I told him I had to work on that day. On Dec 12 Th. it was raining and the date was move back to Thursday, December 13 Th. and now Dan was in a bit of a panic because some of the other people who were going to help couldn't make it. It just happened that I was able to make it.

Beside myself Dennis OLeary also came, and we needed all the help we could get since we had a turnout of over 150 kids, parents and teachers. The Star Party was for 7 PM, but Dan and I came early to setup our telescopes. The sky was clear, the moon was one day passed first quarter, and by 7 PM Saturn was about 30 degrees above the horizon. Dan had his 18" Obsession, Dennis had his 5" Nextstar, and I had a Televiev SDF Genesis refractor. We setup our scopes on different objects so everyone could move from one scope to the other and see different celestial objects. Dan was setup on the Moon, I was setup on Saturn, Dennis I believe was also setup on Saturn, and one of the parents also came and had a telescope. At the beginning of the night I kept the magnification at around 100, using a wide field eyepiece with 20 MM eye relief so it would be easy for everyone to see Saturn even with eye glasses. The seeing was pretty steady, especially as Saturn climbed higher in the sky and Cassini's division could be seen around the entire ring, as well as the shadow of the ring on Saturn, and different tints and subtle colors. Later on I pushed the magnification above 150, so the more interested children and parents could see it even better. Everyone enjoyed it very much by all the comments. Most of the comments were "Neat, Holly Cow I can see the rings, That looks fake, This is just wonderful, Is that Titan next to Saturn" many couldn't believe what they were seeing.

The kids loved looking at the moon through Dans big scope, seeing all the mountains and craters. Looking at the moon with a big scope is also very impressive, it gives you a feeling like your flying just over it like the Astronauts did. Dennis was switching his scope back and forth

from Saturn to the moon. As the night wore on Orion was now getting higher in the sky so I turned my scope on M42, the Orion nebula. All through the night the parents, children, and the teachers were asking all of us many questions about what they were seeing as well as other astronomy related questions. Since we had lots of light pollution, the Orion nebula wasn't to impressive, but everyone could see the gas around the stars, especially the trapezium. I also showed them the that Rigel was a double star and had a faint and close companion. At 150x it was very easy to see the separation. The Star Party ending at 8:30, and everyone thanked us for such a wonderful interesting time, and the kids behaved so well. Now off to the diner for some hot coffee and maybe a burger, Dan's treat.

What's Mike Been Up To?

by Michael Lindner

ATM project progress was slow this month, as expected. The unexpected news was that I was laid off! My last day with Sonus Networks is next week, so I haven't had any extra free time because of it. In fact, my life is even busier as I write resumes, cover letters, and try to find *anyone* who's hiring software developers (shameless plug: if you know of any such openings, let me know. A copy of my resume is at http://home.att.net/~mikel/pers/resume.html).

ATM-wise, what I have accomplished this month is the repair of my spherometer (yeah!) and the polishing (about 80% done) of one side of one element of the Lurie anastigmat. Dave Nelson and Steve Fedor are also both polishing, and are almost ready to figure their mirrors. With luck, they'll be sending them to the coater's by New Year's!

In addition, my son's class asked me to give a presentation on astronomy, which I will be giving on January 7th. Having heard about (but never witnessed) Dan Pontone's famous "making a comet" presentation, I decided to do comets. Since they gave me an hour, not only will we be making a comet out of dry ice etc., but I made up a slide show about comets, and in doing so learned a few things about them I never knew before. I'd like to share it with you.

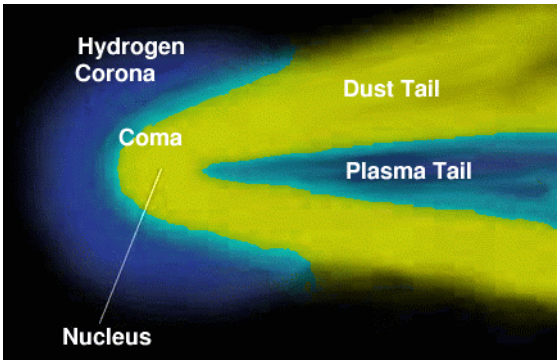
The name "comet" comes from "hairy star", and indeed they do sometimes look like they have long hair flowing behind them. Astronomers have been observing comets since ancient times; the Chinese have records of comet Halley going back to 240 BC.

Comets have often been considered omens, usually of disaster. When Julius Caesar was assassinated in 44 BC, Caesar's nephew, Ocatavian, held games dedicated to Venus in Caesar's honor, and on the first day of those games, a bright comet appeared in the sky. Octavian, in true "carpe diem" fashion, immediately claimed the comet was the soul of Julius Caesar rising to heaven, which led to Caesar being declared a god. This is represented on Roman coins from that era.

Author Mark Twain was born during an appearance of comet Halley, in 1909, Twain wrote, "I came in with Halley's Comet in 1835. It is coming again next year, and I expect to go out with it.... The Almighty has said, no doubt: 'Now here are these two unaccountable freaks; they came in together, they must go out together.'" His prediction turned out to be true. Twain died in 1910 around the appearance of the comet.

On average, there is one naked eye comet every five to six years, including those barely visible ones. The last one was comet Ikeya-Zhang, visible from a dark place in spring 2002. Comets are typically visible for a few weeks to a few months. "Spectacular" comets, with long tails occur once every ten to twelve years on average. We were lucky in 1995 and 1996, with the appearance of two very bright "spectacular" comets, Hyakutake and Hale-Bopp.

Comets are "dirty snowballs". They consist of a **nucleus**, a ball of solid ice and gas with small amounts of other substances. When near the sun, the sun's radiation melts the nucleus, producing the other parts of the comet.



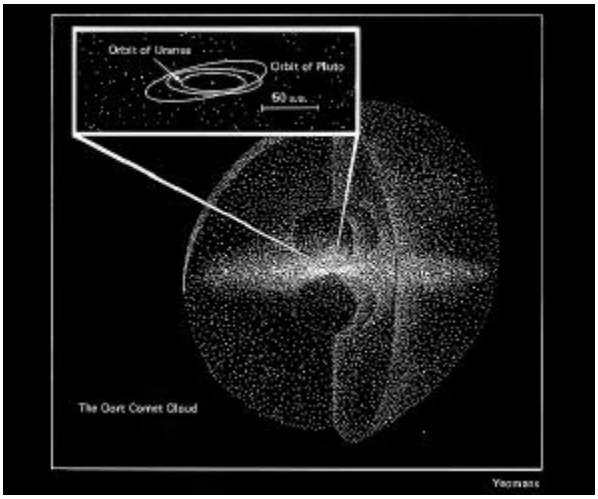
The **coma** is a dense cloud of water, carbon dioxide and other gases from the nucleus. The **hydrogen corona** is a huge cloud (millions of km in diameter) of sparse, neutral hydrogen gas. The **dust tail** is a trail, up to 10 million km long, of smoke sized dust particles driven off by escaping gases. This is the most prominent part to the naked eye, and follows the orbit of the comet. Even though it is huge, and visible, the dust tail is sparse; the material in it would fit inside a book bag! The gas or **plasma tail** is a stream, up to several hundred million km long, of plasma with rays and streamers from solar wind. The plasma tail always points away from sun, due to interactions with the sun's magnetic field.

Since the dust tail follows the comet's orbit and the plasma tail points away from the sun, they can be far enough apart to be visible as two distinct tails, and they may even appear to go in opposite directions! This image of comet Hale-Bopp shows the two tails separated

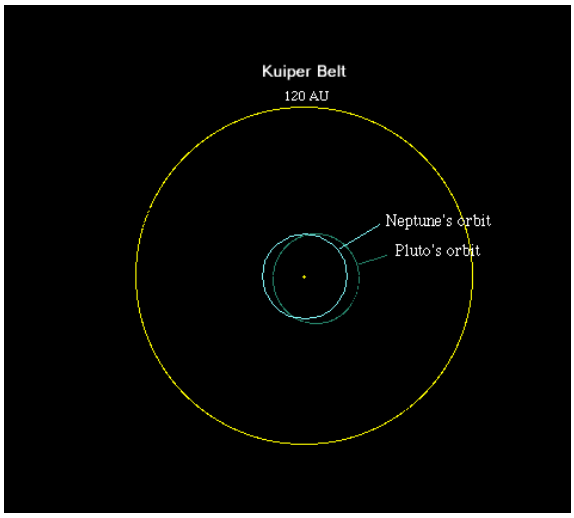
This image shows the nucleus of comet Borrelly, taken by Deep Space 1. The albedo of this comet was surprisingly low, less than half of that of the moon (which is as dark as asphalt). Comet Halley's nucleus has an even lower albedo (0.03, which is darker than coal). Comet Halley is the darkest known object in the solar system.

This image is of the head of comet Halley, taken by the Giotto spacecraft when the comet was last active, and shows material being thrown out from the side heated by the sun.

Comets enter the solar system from all directions. Most of them have orbits that are so eccentric that they are only seen once in many thousands of years. Only a relatively few short period comets (such as Halley) appear more than once in a human life span.



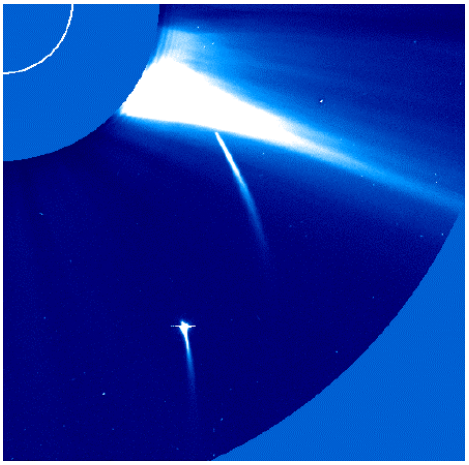
Comets are believed to originate from two different sources. Most are though to originate in the Oort cloud, named for Jan Oort, who proposed its existence in 1950. The Oort cloud is a sphere, 100,000 AU in radius (one AU is 93,000,000 miles). Nobody has "seen" the Oort could, its existence is inferred by the orbits of comets. There may be as many as one trillion comets in the Oort cloud.



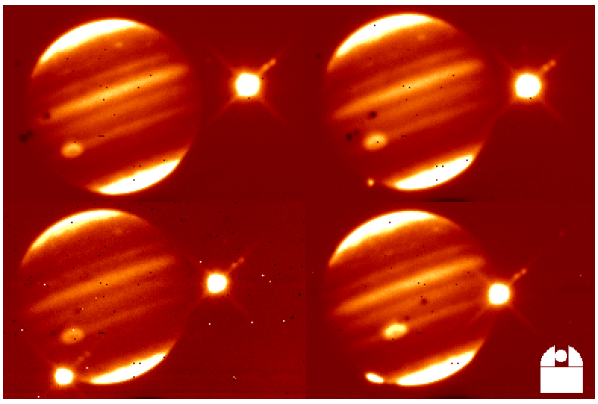
Short period comets may originate in the Kuiper belt, named for Gerard Kuiper who proposed it in 1951. The Kuiper belt is a disk in the plane of the solar system, extending from about the orbit of Neptune/Pluto to 120 AU. The first object in the Kuiper belt was detected in 1992, and since then many other objects have been detected there. There may be up to one hundred billion comets in the Kuiper belt.

What happens to comets? Obviously, they can't lose material forever. The dust and debris they do lose remains in orbit, and can cause meteor showers when they impact the Earth. The Leonids are the result of comet Temple-Tuttle, and the Perseids are the result of comet Swift-Tuttle.

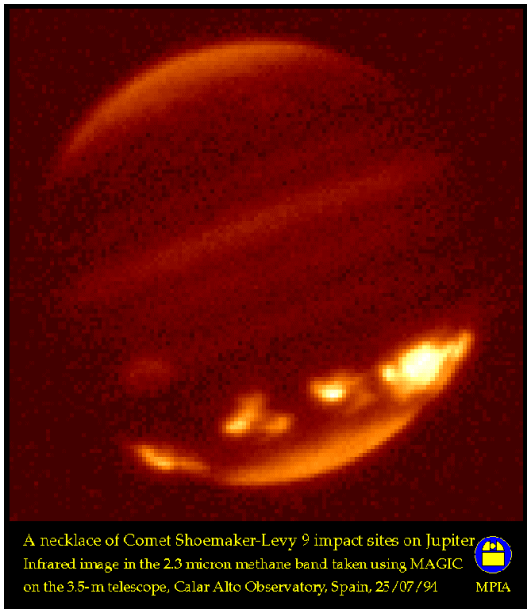
Most comets pass close to the sun at perihelion. After about five hundred passes close to the sun, most of the gas and dust have been driven from the nucleus, and the comet becomes a dim ball of debris. It is thought that most near Earth asteroids are actually old comets.



Other comets may be thrown out of the solar system entirely by a planet's gravity, or may pass close enough to the sun or a planet to impact it. This image is taken from a movie taken by SOHO of *two* comets impacting the sun! The complete movie can be found at http://sohowww.nascom.nasa.gov/hotshots/2000_02_07/



Of course, no comet presentation would be complete without mentioning the spectacular fate of comet Shoemaker-Levy 9, which struck Jupiter During July of 1994! The bright circle to the right of Jupiter is Io. The impact occurs in the lower left.



The comet broke up into over 21 pieces, which rained down on Jupiter for 7 days. The results are shown here. Note that these image of Jupiter were taken in infrared to give better contrast to the impact sites.

Seeing Saturn's Rings And Divisions

by Ernie Rossi

This article will discuss about visually viewing Saturn's rings through a telescope of different sizes, what the author himself has been able to see, and some history of previous astronomers viewing and discovering Saturn's ring system. Galileo was one of the first people to observe Saturn through a telescope and the most he could ever see was two lobes as he described it on each side of the planet. Galileo's telescope had a poor objective of only about 30 mm, which had a magnification of 30x. Galileo until his death in 1642 never realized Saturn had rings. Astronomer Christian Huygens improved on the telescope, and in 1655 is now able to resolve the lobes around Saturn and see that a ring is present.

Huygens telescope had a single convex objective of about 2", and had a small tube that held the objective with no tube in the middle but was pulled straight with a line while the upper part of the telescope hung on a pole and would swivel so he could aim it, as he remained on the ground looking through an eyepiece. This telescope was called an Aerial telescope. In 1675, astronomer Giovanni Domenico Cassini with a much better telescope then Galileo and Huygens, but only 2.5" in diameter and 20 feet in length sees a space or gap between the rings. Telescopes of the day had very long focal lengths due to a problem called Chromatic Aberration which is the spectrum of light not focusing at the same point, which causes objects to be out of focus. Today we know it as Cassini division which separates rings A and B. I have seen this division with my 70 mm Teleview Pronto refractor using around 75x. It would be interesting to find out if anyone has seen it with less aperture, and at what magnification. The amazing thing is that Cassini could see this division with such a small telescope and even today we can't do much better in terms of telescope size.

The next ring to be discovered was the C ring, also known as the Crepe ring. Astronomers were seeing this ring before the actual discovery but didn't realize it. They thought its brownish tint, (also described as blue gray and even other colors) was the ring shadows, or an optical illusion. Harvard Observatory astronomers were finally given credit for recognizing this ring in 1850 using a 15" refractor. Once everyone realized that this was a separated ring made up of much less dense particles of dustier and darker material, it was now seen in smaller telescopes. I have seen it myself in 6" f/8 reflectors at around 200-300x under excellent conditions, and thought I glimpsed the ring with an excellent 4" refractor.

One of the most difficult divisions to see with an amateur size telescope is the Encke division; some call it the Encke gap. This division is located in the middle of the A ring, and it's dustier and much thinner and fainter than the Cassini division. Johann Franz Encke discovered this ring in 1837 with a 9.6 refractor. Even much larger telescopes have problems seeing this division unless the rings are spread apart and the seeing conditions are exceptional. I have seen the gap with an excellent 10" f/6 reflector, and exceptionally well through a 12.5 f 6.3 optimized reflector, as well as an 18" f/5 & 25" f/5 reflectors. The key to seeing this division is excellent seeing conditions and high magnification. I have seen it well at 220x with a 12.5-inch scope at even better with magnifications up to 575x.

Beyond the Encke gap at the very edge of ring A lies an even thinner division known as the Keller Gap. which was finally confirmed on Jan 7, 1888 under excellent conditions with the Lick 36" Clark refractor. The gap has been seen with telescopes as small as 10", however I have never seen it myself, but will certainly be on the lookout for it this year since the rings will be opened to maximum. Again, the key to seeing this division is the seeing conditions and very high magnification, at least 400x. With even a small telescope you can see at times the shadow of Saturn's rings on Saturn, but 1-4 months before or after you can see at times Saturn's shadow on is rings with a 4-6" scope under ideal conditions. Different colors in Saturn's A ring have been reported from time to time since 1942, showing brightness and color variations from one side of Saturn to the opposite side. Most of these sighting have been seen through color filters. These color variations have been seen with telescopes as small as 6". For more about Saturn's ring A color and brightness changes, refer to Sky and Telescope, January 2003 issue titled "A Colorful Mystery In Saturn's Rings".

An even more difficult ring to see is the F ring which lies past the edge of the A ring. This ring is very difficult to see with earthbound telescopes; it's very dusky and tenuous, but was first glimpsed by Emile Schaer with a 16" Cassegrain telescope in 1908. The ring was seen on and off until 1979 when the pioneer spacecraft flew by and saw that the ring really existed and was designated ring F since ring D and E were already assigned. Ring D extends from the C ring down to the edge of Saturn's disk and was discovered in 1980 by the spacecraft Voyager. Ring E was discovered by astronomer W.A. Feibelman in 1966.

Ring spokes have been seen by several astronomers, myself being one. Ring spokes seem to be dark shadows seen in the rings. They were never confirmed until robotic spacecraft flew by. The spokes don't always show, but they seem to come and go and it is still not known why, and what causes them to appear and disappear. One evening under excellent conditions about 2 am while Saturn was at opposition several years ago, I was viewing Saturn with an excellent 12.5" F 6.3 reflector at 440X and all of a sudden the spokes popped out very clearly. I still see them in my mind but it only lasted several seconds and just disappeared. The next day I checked what I saw out with a Voyager image to confirm it. I also know of another amateur astronomer Dan Pontone, who has seen this with his 18" Obsession.

Saturn of course has probably hundreds of rings, many other divisions and gaps but this can only be seen with robotic spacecraft. Having been at Opposition on December 17, 2002, the ring tilt as of January 2003 is 26.7 degrees as seen from Earth. The widest the tilt will get will be April and May 2003, and will be at its maximum of 27.0 degrees. The tilt remains above 24.8 degrees for the rest of 2003, an excellent year for examining the divisions and structural subtleties of the rings.

So everyone with a telescope, get out and start looking at Saturn, probably the most beautiful planet to observe. I will have a coming article on observing Saturn's moons, and which moons can be seen with different size telescopes.

Messier Objects - January

by Greg Cantrell

January's cold, cloudy nights challenge even the most dedicated observer. According, this month's Messier list (like December's) is relatively short and could be accomplished during a single observing session.

M 1 (NGC 1952) -- Known as the Crab Nebula, this 8.1 magnitude supernova remnant in Taurus is a difficult binocular object, and requires a large aperture telescope to resolve some detail.

M 35 (NGC 2168) – This wonderful open clusters, found in Gemini, is easily visible to the naked eye from a dark location. Binoculars reveal a line of fuzzy patches, while low power telescope views resolve a rich open cluster.

M 45 (Mel 22) – Known since ancient times, the Pleiades, a 1.2 magnitude open cluster in Taurus, are easily visible to the naked eye even under moderately light polluted skies. Best viewed through binoculars or telescopes under low powers.

M 50 (NGC 2323) – This 5.9 magnitude open cluster in Monoceros appears as a small hazy patch in binoculars. Due to the richness of the surrounding area, this cluster can be challenging to locate telescopically.

M 79 (NGC 1904) – A small, dim globular cluster in Lepus, this 8.4 magnitude object is a difficult binocular object, and is best view telescopically.

Upcoming Events

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

January 11 – 12 The **New Jersey State Museum** hosts the 23rd annual **Super Science Weekend**. You can find more information at http://www.state.nj.us/state/museum/public/family.html

January 25 The **Rutgers University Geology Museum Open House** includes two presentation of interest to amateur astronomers. Visit http://www.rci.rutgers.edu/~geolweb/museum.html for more information

January 29 – February 2 The **Orange Blossom Special Star Party** will be hosted by the St. Petersburg Astronomy Club. Visit http://home1.gte.net/hoffmanc/index.html.

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

February 23 – March 1 The **Cedar Key Star Party** will be hosted by the Cedar Key State Museum. For more information, visit http://members.aol.com/bemusabord/cedarkey.html.

February 27 – March 2 The **Mid-Florida Stargaze** will be hosted by Astronomical Society of the Palm Beaches. For more information, visit http://www.palmbeachastro.org.

February 28 – March 2 The 3rd annual Mid-Atlantic Mirror Grinding Seminar hosted by the Delmarva Stargazers. For more information, visit http://www.delmarvastargazers.org/.

April 18 The **Astronomical Society of Greater Hartford** holds its annual **Starconn**. Visit http://www.asgh.org for more information.

April 27 – May 4 The 25th annual **Texas Star Party** will be hosted by the Southwestern Region of the Astronomical League. Visit http://www.texasstarparty.org/.

May 17 – 18 The **Northeast Astronomy Forum and Telescope Show**. More information at http://www.rocklandastronomy.com/neaf.htm

Jan 2 Jan 10 Jan 18 Jan 25

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