

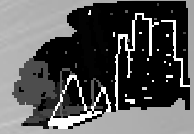


North Central Florida's
Amateur Astronomy Club
29°39' North, 82°21' West

February / March 2007
Issue 54.1/55.1



Member
Astronomical
League



Member
International
Dark-Sky Association

Friends of Paynes Prairie Star Party at Hickory Ranch

On Saturday, February 10, the AAC will be attending the Friends of Paynes Prairie Star Party at Hickory Ranch, a little south of Gainesville. This public party helps provide funding and outreach for FOPP. It's also an excellent outreach activity for the AAC, and we really value our growing relationship with FOPP and the park's staff.

At present, we have only 4 volunteers with 2 telescopes signed up. We really need at least 8 telescope operators. Other exhibits, including mounted binoculars, will be helpful, too. Please let me know if you can attend and what equipment you plan on bringing. If you require electrical power, let me know that as well.

The event runs from 7p - 9p. You may arrive as early as 5:30p to set up your equipment. We'll be expected to depart by 10p or so... but we'll be returning in April for our own private star party.

Please help us make this 3rd annual star party as successful as the former. Thank you.

Mike Toomey

Marian Cohen is presented with a Service Award from the Alachua Astronomy Club by President Bill Helms. Thank you, Marian, for all the years you've contributed to the Club!



FirstLight

Newsletter of the Alachua Astronomy Club



A few weeks ago, several club members and I got into a discussion of science fiction novels set on the Moon. I mentioned three of my favorites, and someone suggested I give a short review of them in my next column. So here goes!

"A Fall of Moondust," by Arthur C. Clarke, is set in the mid twenty-first century. The timing is not actually stated, but there is a good clue in chapter twenty. The book was written in the fall of 1960, before President Kennedy proposed Project Apollo. In the book, the Moon has been settled, and even has a modest tourist trade. A group of some twenty adventurous souls is taking a day trip aboard the Dust Cruiser "Selene," across the fictional Sea of Thirst, to the equally fictional Mountains of Inaccessibility. This fictional sea is filled with a type of lunar dust that flows almost like water, allowing Selene to float on it and propel itself by submerged fans. On their return leg, the Selene falls victim to a lunar cave-in, burying the craft without a trace. The crew and passengers are safe, but buried an unknown distance below the surface, and no one knows where they are located.

Selene's passengers and crew must find a way to survive until they can be found and rescued. A brilliant, but socially maladjusted astronomer on an orbiting observatory develops a way to locate them, using astronomical instrumentation. The Chief Engineer, Earthside, must find a way to rescue them. And the whole thing goes out live and in color, thanks to an enterprising television producer.

This is a typical adventure yarn of the "rescue" genre. The characters are vivid and uncomplicated. Nowhere near as deep as "2001, A Space Odyssey," this is just a fun read.

"Earthlight," also by Arthur C. Clarke, is set two centuries after the first Moon landing. Most of the action takes place in and an astronomical observatory located within the crater Plato. The discovery of heavy metals, and a method to extract them, is threatening a war between the Earth (and Moon), and the federation of colonies on Venus, Mars and satellites of Jupiter and Saturn. A substantial share of the heavy metals are vital to the survival of the colonies. The story is told by Sadler, an intelligence agent sent to discover how vital secrets are being passed to the Federation from the observatory. Disguised as an auditor, he befriends various members of the staff and studies the operations of the observatory. One interesting sidelight is the discovery of a naked eye supernova in Draco. Two of his suspects take an unauthorized trip out into Mare Imbrium, and discover a classified government research facility. They end up witnessing the first interplanetary battle, well told by Clarke. The book climaxes with a most unorthodox, but typical Arthur C. Clark, space rescue.

This book gives one of the best pictures of how it might be to live, work, and travel on the Moon in the future. You can follow the action on any decent Moon map, but remember that east and west were reversed in the late 1960's, just before the first Moon landings. With its astronomical setting, and realistic depiction of life on the moon, this is a very enjoyable book for amateur astronomers. It's just the kind of book to inspire youngsters to want to become astronomers, astronauts, or rocket scientists.

President's Corner - continued

The best novel of this trio is Robert A. Heinlein's Hugo award-winning "The Moon is a Harsh Mistress." Luna, in 2075, is a former penal colony for Earth, much as Australia was for Briton in the 1800's. While no longer prisoners, per se, the Loonies are virtual prisoners due to their adaptation to the Moon's one-sixth of Earth's gravity. They are under the economic domination of earth-based Lunar Authority, forced to raise and ship wheat to Earth at prices dictated by the Lunar Authority. When it is realized this will deplete Luna's resources in less than ten years, four people come together to "declare the revolution." These are Mannie, computer repairman and narrator, Professor Bernardo de la Paz, the lovely revolutionary Wyoming Knott, and Mycroft Holmes, AKA Mike, a newly sentient computer. Mike considers Mannie his only friend and, it turns out, controls all major functions for Lunar Authority, from phones and payroll to air conditioning and launch catapults. This, of course, gives the revolutionaries a leg up in their quest.

Heinlein develops his characters well, as they plot the revolution step by step. Especially interesting is the growth of Mike from a child-like beginning to the confident leader of the revolution. There is a lot of political philosophy, revealing Heinlein's strong libertarian views. His physics and engineering are believable enough that you never think, "That couldn't happen!" Of all of Heinlein's novels, this is my personal favorite.

Good reading,

Bill Helms
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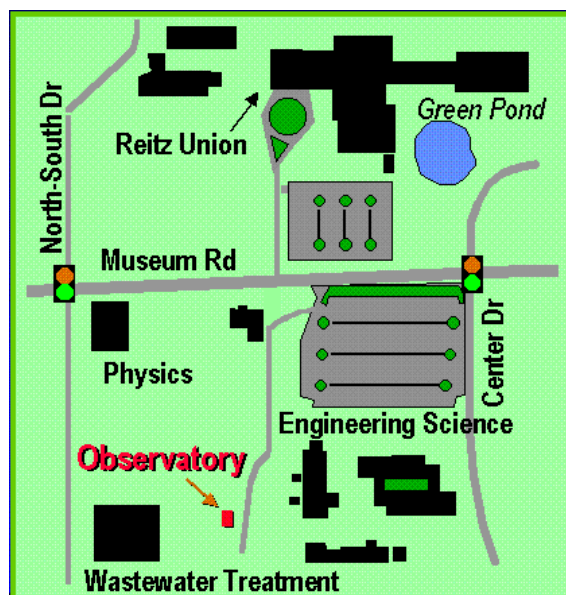
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UF Campus Teaching Observatory Public Night

Join David Clark for the UF Observatory Public Night on Friday nights from 8:30 till 10:00pm at the Campus Teaching Observatory. Recent observing highlights included:



A recent Gainesville Sun article praises the research of a UF professor of astronomy but contains some mistaken and misleading material

The Gainesville Sun (January 18, 2007) reported that University of Florida astronomer, Dr. Stephen Eikenberry and his colleagues, may have found the largest and most luminous star known in our Galaxy and will have their finding affirmed in the 2008 edition of the *Guinness Book of World Records*.

Unfortunately, *The Gainesville Sun* story and other articles concerning this discovery contain several errors and misleading statements that may misinform readers. Some mistakes are minor, others more important. For the record, the following is a partial list.

For example, the picture caption in the recent *Gainesville Sun* account reads, "UF professor Stephen Eikenberry poses with a two-pixel infrared camera he built." Two pixels? This means only two picture elements! Consumer digital cameras now on the market, although not infrared (IR) cameras, are typically five *megapixels* or more (mega means a million). Should the caption have said two megapixels? (Flamingos-2, a new IR camera he is helping build, has an array of 2048x2048 pixels or four megapixels.) This error is relatively minor but continue reading.

The star mentioned in the article is LBV 1806-20, an example of a rare, luminous blue variable (also known as *S Doradus variables* after the prototype, S Doradus). These stars are very massive, hot (blue) supergiant stars typically showing slow brightness changes with possible occasional outbursts. These stars are apparently unstable and may produce irregular mass ejections. Other well-known examples of LBV-type stars include Eta Carinae, the Pistol Star and P Cygni.

For some readers *The Gainesville Sun* article may imply that LBV 1806-20 and its remarkable characteristics are a "new discovery." Not so. This star has been known since the 1990s. In 2002 Dr. Eikenberry and his colleagues had already announced that this star might be the most luminous single star in the Milky Way Galaxy (American Astronomical Society [AAS] meeting, January 2002).

And, in January 2004, UF News published a summary of their current work on LBV 1806-20. This research, announced at the January 2004 AAS meeting, was also picked up by many news services. Finally the *Astrophysical Journal* published a detailed study of their research on this star in November 2004.

The latest *Gainesville Sun* article again repeats the acknowledgment of their important work. What was new to their story was not the discovery of this star or its unusual properties but the upcoming inclusion of LBV 1806-20 in the *2008 Guinness Book of World Records*.

Unfortunately, however, some articles, including the recent *Gainesville Sun* story, continue to state that LBV 1806-20 is "the *largest* and brightest ever found." *The Gainesville Sun* further states, "the star, which is *150 times the size of Earth's sun* and 40 million times as bright." Other news articles on the web assert LBV 1806-20 is "A star that may be the *biggest* and brightest in the universe." (For example, see www.spaceref.com/news/viewpr.html?pid=13334.) Emphasis here (*italics*) is mine.

These statements are not quite correct and mislead the reader.

First, the universe is a big place! LBV 1806-20 may be one of the brightest stars so far found in our Milky Way Galaxy but the entire universe? But, much more is wrong with these statements. Some readers might imply from these statements that LBV 1806-20 is the largest *diameter* star ever found, a star 150 times the size of our Sun. Indeed, this star may be 150 times larger *in diameter* than the Sun (value is uncertain), but this diameter is definitely not close to a record. In fact, some stars are possibly one thousand times bigger than our Sun's diameter with radii larger than Jupiter's orbit! (One hundred fifty times larger in diameter is "only" about the size of the Venusian orbit.) For example, Antares has an estimated diameter of about 700 solar diameters and VY Canis Majoris may have a diameter close to 2000 solar diameters!

Instead, these news stories should have stated that LBV 1806-20 might be the most *massive* and brightest star ever found in our Galaxy with a *mass* Possibly 150 times (or more) larger than the Sun's mass. (Again this value is uncertain.) Mass refers to the physical bulk of the object, the quantity of matter contained within, whereas diameter is a geometric measure of *length*, its physical size. This star may be the most massive and brightest ever found but it is not the largest in diameter.

Clarifying a Record About a Supermassive, Luminous Star - continued

Note: Uncertainty in this star's mass depends on possible errors in distance from us (about 45,000 light years) and whether this object is really a single star or is multiple. Dr. Eikenberry is confident that LBV 1806-20 is single but even if this object is a binary star, its components should still rank among the most massive known (not biggest in diameter).

The huge mass of LBV 1806-20 is its most significant property since very massive stars are rare. Unlike stellar diameters that can be hundreds of times larger than the Sun's diameter, few stars have masses greater than ten solar masses. Mass is a star's most important characteristic since, with chemical composition, mass influences a star's luminosity, physical dimensions and evolution. Large masses produce high rates of core energy generation leading to enormous outward radiation pressures that make the star unstable against gravity. So, the star cannot maintain itself and pushes itself apart. Previously astronomers thought stars with masses exceeding about one hundred times the Sun's mass could not form under normal circumstances. Therefore, do stars like LBV 1806-20 defy this thinking?

The Gainesville Sun article also contains a less important flaw when stating, "The nearest star to our planet, other than the sun, is about 3 light-years away, or 17 trillion miles." In fact, the nearest star to Earth (again excluding the Sun) is Proxima Centauri, which has an accurately known distance of not three but 4.2 light years, or about 25 trillion miles.

Note: Proxima Centauri is a member of the Alpha Centauri system consisting of Alpha, its nearby companion Beta (8 arc seconds away), and Proxima (2.2 degrees away). Alpha, a sun-like star, is the third brightest appearing star in the night sky (magnitude 0.0), 4.4 light years from Earth and thus slightly farther than dim Proxima, a cool, dwarf star shining only at apparent magnitude +11.0).

Want to observe LBV 1806-20 for yourself? This star's location is deep within the Sagittarius Milky Way band, roughly in the middle of a triangle formed by the open clusters M21, M23 and M24 and a few degrees from the Lagoon (M8) and Trifid (M20) nebulae. Here are large ionized hydrogen clouds with LBV 1806-20 just one of many unusual, high luminosity stars contained in this nebula.

Some articles imply LBV 1806-20 has an apparent magnitude of about +8 to +9, which puts it well within the reach of small telescopes. However, this is incorrect.

Why? The apparent *visual* magnitude of this star is actually near +35, far beyond the reach of all current telescopes! (Visual magnitudes imply wavelengths of light visible to the human eye.) The eighth magnitude values quoted are *infrared* magnitudes, how the star looks to a near-infrared detector at approximately a two-micrometer wavelength (about three times longer than the wavelength of red light). Since the human eye cannot "see" infrared, the star's brightness in the infrared is irrelevant to the amateur star gazer.

LBV 1806-20 appears much fainter at visual wavelengths because interstellar dust absorbs most of this star's light, dimming the visual magnitude about 29 magnitudes! Without this absorption by dust, this star might be visible to the naked eye at roughly magnitude five or six! (Recall the naked eye limit is about magnitude +6 to +7 for dark skies.) However, interstellar dust dims LBV 1806-20 by only a few magnitudes at a two-micrometer wavelength. Therefore, LBV 1806-20 looks relatively bright in the near-infrared, wavelengths that astronomers have used to observe this star.

Note: Many articles are indifferent to the use of magnitudes or brightness, often not distinguishing *apparent magnitudes* (what we observe from Earth) from *absolute magnitudes* (a measure of true brightness or luminosity), or by not specifying the wavelength range such as visual, infrared or bolometric which means all wavelengths.

Finally, *The Gainesville Sun* story discusses Dr. Eikenberry's efforts to build a new infrared tool, "Flamingos-2." Unfortunately, this article persistently calls Flamingos-2 a *telescope*. *The Gainesville Sun* also says this "telescope will be the most powerful in the world." In fact, this instrument is a sophisticated near-infrared multi-object spectrograph and imager—an *infrared camera* to be attached to the 8-meter optical/infrared Gemini North and South telescopes in Hawaii and Chile, respectively. This new, advanced camera may very well be the "most powerful instrument of its type in the world" but do not confuse it with telescopes from which the camera must hang. Still, Dr. Eikenberry hopes this new, advanced infrared camera system will help resolve the question of LBV 1806-20's multiplicity and help firmly establish this star in the *Guinness Book of World Records*.

Can you find other errors in the news stories about LBV 1806-20? Fortunately, the flaws in these news stories do not markedly detract from the marvelous, frontier science being done by Dr. Eikenberry and his colleagues.

We had a solid turn out for the January star party at Bob Jacob's residence: 18 members and their guests. I don't remember all the new faces but I recall the pleasure of meeting Kevin, Jake and Mireille. We look forward to seeing each of you at future star parties!

The evening's highlights included a Molniya satellite slowly tumbling across the sky, Chuck's bino-viewers provided dazzling views of Saturn, Howard's 60mm refractor afforded stunning, wide-field views of star clusters, Tandy's Schmidt-Cassegrain split all three components of Beta Monoceros with relative ease and the aptly named StarBlast telescope made a few converts.

Several members have dipped their toes into the celestial waters while others are now fully immersed in the Messier target list. That can only mean one thing: it's time to add more lists!

I highly recommend the double star list: it's somewhat easier to accomplish than the Messier list, especially for those with small-aperture telescopes, and for those who frequently observe from suburban skies. I have completed nearly half this list in 3 sessions with a dirty 4.25" Newtonian reflector set upon an shaky house deck from a light-polluted neighborhood nestled among trees 60 degrees high in all directions. Hopefully I'll complete the task before the trees get all of their leaves back.

On some occasions, members haven't brought any equipment beside a lawn chair and a planisphere: there's an observing club for those stargazers, too! It's called the Constellation Hunter Club and it's divided into Northern and Southern Sky checklists. The Northern list includes 39 constellations (there are 88 in all). Most of the observing log includes a simple sketch of each constellation.

Sketch?! Honestly, how hard is it to draw a few dots on a piece of paper? As always, you're encouraged to use whatever tools I have on hand including clipboards, pencils, star atlases, planispheres and so on. I also have H.A. Rey's "The Stars" which should be handy as well. We'll help you along any way possible... except that we will not outline the constellations with our laser pens once it's time to get down to business.

There's sufficient interest in binocular observing as well, so I will gather materials for those activities in the future. You can begin any list at any time; just walk up to the tent for further instructions.

Sometimes it may take 45 minutes to an hour to find a single Messier object, as most of our observers can attest to. This should not be discouraging. There is a lot of information to synthesize in order to "star hop." You must know what resources to apply; not all star atlases are alike. You must sift through considerable data before distilling what your target is. You must be able to identify stars and constellations while becoming master of your own optics, in whatever condition they may be in. You will need to employ strategies that enable you to recognize blurry little faint fuzzies, such as wobbling your telescope, using averted vision, finding a more comfortable position, burying your head beneath a cape and so forth. Some objects challenge the limits of our vision while most test our imaginations. Don't get frustrated if you get stuck on an object or two: it wouldn't be as much fun if it were too easy!

Star Parties - continued

Our February 17 star party is at Gary Cook's residence, southeast of Gainesville. Gary is the custodian of club's Celestron 8-inch Schmidt-Cassegrain telescope. We are welcome to arrive in the afternoon and take the canoe out for a spin or drop a line from the dock.

On March 17, we will visit Moondance Hill, the residence of Randy and Gwen Palmer. Located adjacent Rosemary Hill Observatory, Moondance has superb dark skies.

There are also two major outreach activities coming up:

On February 10, the club will attend the Friends of Paynes Prairie star party. We've had a great amount of enthusiasm from the guests at these star parties. If you haven't already signed-up, please let me know. We need about 8 telescope operators; we have only 4 so far.

Then on March 24, we'll be sending members to help out at the Villages Star Party. Please watch for sign-up opportunities as the date approaches.

Available at most star parties: Orion red beam flashlight (new; \$20); NightWatch: A Practical Guide to Viewing the Universe (new; \$20); Rigel Quikfinders (new; \$40 ea).

STAR PARTY SCHEDULE: Upcoming Events - 2007

Star Party	Date 2007	Location Check the website for directions and map	Start/End Time
Friends of Paynes Prairie	Saturday, February 10th	Hickory Ranch See website for more details	7:00 pm to 9:00 pm EST (Sunset 6:15 pm EST)
AAC February Star Party	Saturday, February 17th	Gary Cook's Residence	Sunset 6:20 pm EST
AAC March Star Party	Saturday, March 17th	Moondance Hill	Sunset 7:39 pm EDT
Starry Night at The Villages	Saturday, March 24th	The Villages	8:00 pm EDT (Sunset at 7:41 pm EDT)
AAC April Party	Saturday, April 14th	Hickory Ranch (Dues-paying AAC members and their guests ONLY)	7:00pm - midnight EDT (Sunset 7:56 pm EDT)

Monthly Club Meeting:

Tuesday, February 13, 2007, 7:00 p.m. EST

PARKING ALERT! The Phillips Center for the Performing Arts will be having an event the night of this meeting (starting 7:30 p.m.). People attending the AAC meeting should arrive early enough to avoid parking hassles with those attending the CPA event.

Speaker: Justin Crepp, Department of Astronomy, University of Florida
E-Mail: jcrepp "at" astro.ufl.edu

Title: ***Gamma-Ray Bursts and the SWIFT Space Satellite***

Location: Powell Hall, Florida Museum of Natural History
(*Lucille T. Maloney Classroom*), UF Campus, Gainesville FL



Justin Crepp, UF
Department of
Astronomy

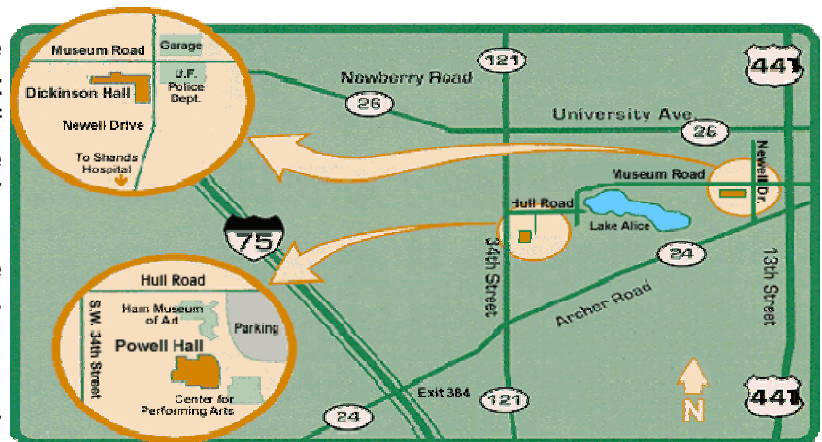
Preview: With exception only to the Big Bang, cosmic gamma-ray bursts are the most energetic explosions ever to be detected in the knowable universe. There exists a rich history in our understanding of their true nature. Justin will tell the tale of the Gamma-Ray Bursts, and will also describe the space satellite that has provided recent key insights to the physical mechanisms that lead to such astonishing events.

About the Speaker: Justin Crepp received his Bachelor's degree in Physics from the Behrend College at The Pennsylvania State University - Erie in 2002, and a Master's degree in Astronomy from the University of Florida in 2005. Justin's previous work includes the study of chaos using numerical simulations and its relationship to solar system dynamics and the stability of satellites. Currently, Justin is a fourth-year graduate student working on imaging and radial velocity exoplanet detection techniques. This is Justin's second presentation to the Alachua Astronomy Club. In March 2005, he gave a presentation on Direct Imaging of Extrasolar Planets.

AAC Meeting Location

AAC regular meetings are held on the second Tuesday of each month **at 7:00 p.m.** at the Florida Museum of Natural History, **Powell Hall**, in the Lucille T. Maloney Classroom, on UF campus, unless otherwise announced. All meetings are free and open to the public. Join us for some great discussions and stargazing afterwards.

Please visit our website for more information (floridastars.org).



See a Star “Go Out,” A Startling Event

— Howard L. Cohen

Don't miss an exceptional opportunity to see a naked-eye star wink out for several seconds as an asteroid passes in front of a star

Early Tuesday evening, April 17, 2007, at approximately 8:56 p.m. EDT, stargazers in Florida might see a naked-eye star do a disappearing act for several seconds. Furthermore, reliable observations of this event create an opportunity to contribute to astronomical research. The cause of this momentary disappearance is the passage of a main-belt asteroid between Earth and the distant star.

To witness this event observers must place themselves within a narrow path on the Earth's surface currently predicted to stretch through North Florida. Depending on your position within this narrow but long occultation path (roughly 47 miles or 76 km wide but stretching for thousands of miles), the occulting asteroid, 411 Xanthe, should cause the star 48 Iota-1 Cancri A (magnitude +4.0) to wink out for up to approximately 8.3 seconds. (See end of article for more on the nomenclature and properties of Iota Cancri and 411 Xanthe.)

Asteroid occultations occur when an asteroid, a small solar system body, moves in front of a star as seen from Earth momentarily hiding (“occulting”) the star from view. These events occur infrequently for a given location on Earth but can give astronomers valuable information about the size and shape of the occulting asteroid. Moreover, sometimes occultations may reveal that the occulted star is also a *binary star*. Usually, the asteroid is too faint to see so the star simply “disappears” from view as the asteroid passes over the star, a truly startling phenomenon!

This April event is notable because the brightness of the occulted object, Iota Cancri, may allow observers to spot this star without a telescope from suburban areas free from glaring lights. (The naked-eye limit under *dark skies* is about magnitude +6 to +7.) *However, be sure to see “caveats” below.* In any case, binoculars or small telescopes should make the star visible. In addition, because Xanthe is too faint to see in most amateur telescopes, Iota Cancri will apparently drop 10.5 magnitudes to +14.7, the asteroid's magnitude, making the star invisible to the eye as it vanishes from view. Thus, Iota Cancri will seem to disappear from the sky!

Asteroids also usually occult faint stars since they are more numerous often making the event a challenging experience even with larger telescopes. So the occultation of Iota Cancri is an unusual and exciting opportunity to see a naked-eye star snap out of view only to reappear several seconds later. (For example, Xanthe also occults a star on January 30, 2007 for observers in western North America but the star's magnitude is only +11.1.)

Finally, this event occurs at a convenient hour, about 8:56 p.m. EDT, with the star high in the evening sky. Fortunately, too, no moonlight will interfere since the Moon's phase that evening is virtually new.

However, several caveats can thwart your attempt to view this occultation.

The occultation for North Florida occurs only one hour after sunset (about 7:57 p.m. EDT). Therefore, skies will not be completely dark. So, finding this star will be more difficult than usual. In fact, *nautical twilight* (about 8:51 p.m. EDT) ends shortly before this event occurs with the Sun about 13 degrees below the horizon at the time of the occultation. (*Astronomical twilight*, when the Sun contributes negligible amounts to sky illumination, is defined for the Sun 18 degrees below the horizon.)

Because of lingering sky brightness you will have precious few minutes to find, positively identify, and acquire the star in your instrument before the occultation begins.

Practice finding this star near the end of nautical twilight without moonlight. And you must be able to do it quickly. (The Sun is 12 degrees below the horizon at the end of nautical twilight.) For convenience, **Table 1** gives Eastern Times for the end of nautical twilight in Gainesville, Florida for February through the April event date. (Notice that we now change to Daylight Time beginning the second Sunday in March.) Times should be similar for other locations in North Florida that do not differ substantially from Gainesville's longitude.

Table 1. 2007 Eastern Times of Nautical Twilight (Gainesville, Florida)

Day	February	March	April
1	7:01 p.m.	7:20 p.m.	8:40 p.m.
5	7:04 p.m.	7:23 p.m.	8:43 p.m.
10	7:07 p.m.	7:26 p.m.	8:46 p.m.
15	7:11 p.m.	8:29 p.m.	8:50 p.m.
20	7:14 p.m.	8:32 p.m.	8:53 p.m.
25	7:18 p.m.	8:35 p.m.	
30		8:39 p.m.	

See a Star “Go Out,” A Startling Event - continued

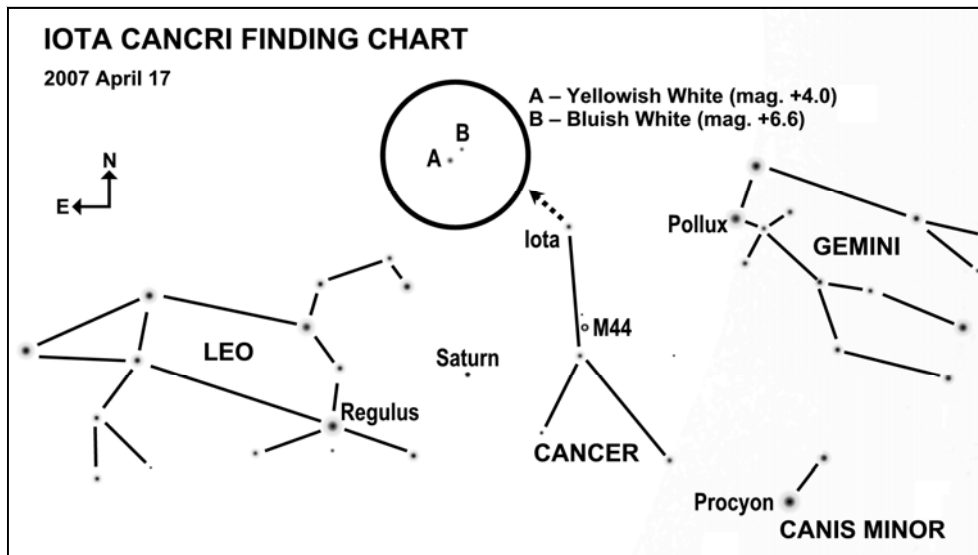
Identifying the right star is vital. Obviously, observing the wrong star guarantees observers will see a “null event” Fortunately, Iota Cancri is an easy, colorful *visual double star* as seen through a small telescope! (See notes below about Iota Cancri.) This will help insure you have found the right star.

Iota Cancri is a classic example of a *wide double star*. Xanthe will occult its brightest appearing component (**A**), a fourth magnitude (+4.0), yellowish-white star. The second and fainter appearing component (**B**) is a +6.6 magnitude bluish-white star lying 30.7 arc seconds away. (This fainter star will *not* be occulted.) The combined light of both stars (mag. +3.9) makes this “combined star” the second brightest appearing star in Cancer. In small telescopes, the pair presents a glorious sight—a brighter pale yellow star attended by a fainter bluish star, reminiscent of colorful Alberio in Cygnus! (At the January star party some enjoyed a fine view of the Iota Cancri pair.) For more on this star see notes at the end of this article.

The disappearance of the brighter component of Iota Cancri leaving the fainter component still visible will make this occultation even more dramatic!

Cancer is not one of the more conspicuous constellations so use a good star chart to identify this star pattern and Iota Cancri. In fact, Beta Cancri is its brightest appearing star, shining only at magnitude +3.5, while Iota Cancri’s combined light makes it second brightest at magnitude +3.9. Cancer lies between Gemini and Leo and contains the well-known and beautiful open star cluster, M44 (the

“Beehive”), which lies 9.2 degrees almost due south of Iota Cancri. But, be careful, bright Saturn (near zero magnitude) now lies on the border of Cancer and Leo and will add a “spurious star” to Leo’s pattern for the next few years. However, Saturn should also help you find Iota Cancri in April. Use a finding chart like **Figure 1** to locate Iota Cancri and Iota Cancri



should also locate Iota Cancri in a finding chart like Figure 1.

Figure 1. Finding chart showing location of Cancer and the positions of Iota Cancri A and B. Saturn now lies near the western edge of Leo and will continue to move slowly eastward through Leo over the next few years.

At the time of the occultation Iota Cancri will be almost overhead, only 5 degrees from the overhead point. Although astronomers like to observe celestial objects high in the sky to reduce problems with air clarity and turbulence, overhead objects can be challenging to see with binoculars or telescopes. Neck muscles may complain, the observer may be in an awkward position and some telescope mounts cannot point to objects near the *zenith* (the overhead point). Hence, you must determine if you and your instrument can conveniently observe stars near the zenith.

The width and location of the occultation path on the Earth's surface are narrow and uncertain. Consequently, unless you are within this path, you will not see the occultation. The occultation path is the asteroid's shadow on the Earth with the occulting star as the source of light. (The path width is essentially a projected "diameter" of the asteroid.) Uncertainties in the actual path result from uncertainties in the dimensions and shape of the asteroid, and uncertainties in the asteroid's orbit. Xanthe has an estimated diameter of 47 km or 76 km but its precise size and shape are unknown, which is why asteroid occultations are important.

The current predicted path for this occultation (width 47 miles or 76 km) crosses North Florida moving approximately through Live Oak, Lake City, Starke and Palm Coast with the southern limit near Gainesville. Nevertheless, the path error could put the actual path south of Bronson or north of Live Oak. Nevertheless, the path error could, for example, put the south edge of the path south of Bronson or north of Live Oak.

See **Figure 2** current predicted path through North Florida. (The path could change due to future observations of the Xanthe's position.) The solid line is the center and the long dashed line northern and southern limits. An approximate 70 percent chance exists that the path limits should lie within the boundaries shown by dashed lines.

for a map showing the predicted path through North Florida. (The path could change due to future observations of the Xanthe's position.) The solid line is the center and the long dashed line northern and southern limits. An approximate 70 percent chance exists that the path limits should lie within the boundaries shown by dashed lines.

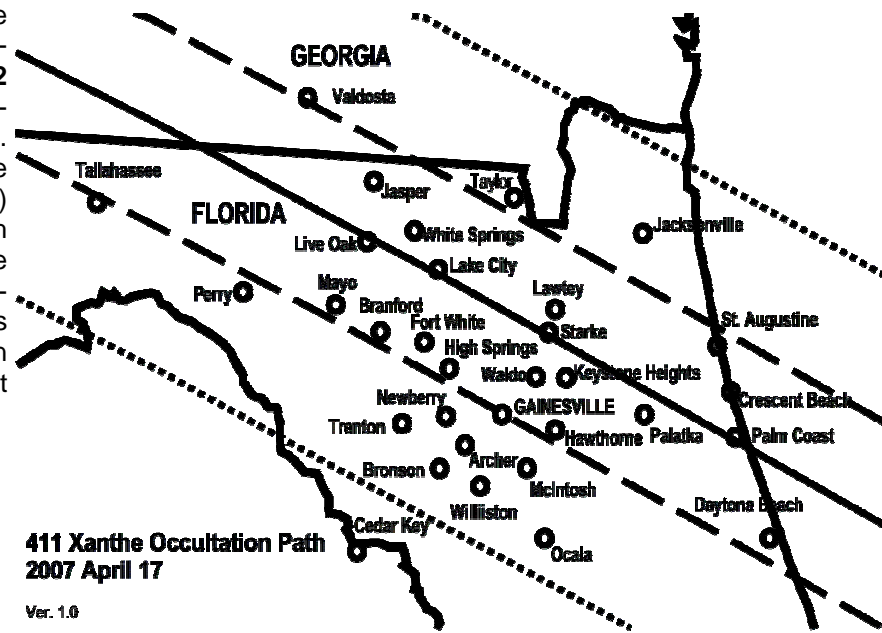


Figure 2. Occultation path through North Florida for the occultation of Iota Cancri A by asteroid 411 Xanthe on 2007 April 17. The center line is the solid black line with long dashed lines showing the northern and southern limits. Short dashed lines indicate that an approximate 70% chance exists that the path limits should lie within these limits. Future observations of Xanthe could change the predicted limits.

The predicted time of the occultation can also be wrong by several minutes. Therefore, you must *continuously* observe Iota Cancri for at least three minutes before and after the predicted time or you may miss the occultation. Furthermore, the occultation will last only for a maximum of 8.3 seconds, much less if your location is near the edge of the path. In fact, the asteroid's shadow sweeps over the Earth's surface at approximately 9.2 km/sec (nearly 21,000 mi/h)! And, if you do not see the event, the actual occultation path may not have crossed your location. Yet, even observers who report no occultation help astronomers constrain the size of the asteroid. Of course, this is why identifying the correct star is mandatory.

Often new observations of the asteroid's position just days before the event can lead to changes in the calculated path by hundreds of miles. Therefore, observers may need to relocate in the final days or hours before the event. However, recall that even observers who report no occultation provide valuable information because null events help set upper limits to the asteroid's dimensions (assuming you have identified the correct star).

Observers must know their precise geographical location. This is necessary if you want to make useful observations, even if a null observation results. GPS devices now make determining your location (latitude and longitude) simple and precise enough for asteroid occultations. Otherwise accurately noting your position from identifiable landmarks can pinpoint your location (within 200 ft.) if you use accurate and detailed topographic maps, or can later return to the observing site with a GPS unit.

See a Star "Go Out," A Startling Event - continued

Observers who fail to see an occultation (barring inclement weather) usually do so because of poor planning or lack of practice. Also, rehearse with your instrumental setup under the same conditions as the occultation. If you wait until a few days or weeks before the occultation, cloudy weather or moonlight can thwart your attempts to find Iota Cancri and use your equipment for this event. (Use fresh batteries and tapes.) Be sure to find an observing location that is safe, secure and free of distractions and glaring lights. If possible, visit your proposed observing location beforehand and do not use private property without first getting the owner's permission.

Finally, asteroid occultation observations can be done at different levels of sophistication including the use of visual, photographic, photometric or video methods. In addition, various means can be used to time the events from simply noting if the event occurred, timing the duration of the event or, better, timing the beginning and end of the event. (If possible time the event to at least an accuracy of 0.1 to 0.2 sec, probably the limit of careful visual timings.)

Everyone needs to decide for themselves how they want to observe or time this event, a decision dependent on your available equipment, experience and inclination. Serious occultation observers should consider attending future **ATM Meetings** (third Tuesdays of the month), especially the February 20, 2007 meeting, 7:00 p.m. ET. (Contact Chuck Broward, ATM coordinator, for meeting information and location at ATM@floridastars.org.)

At this meeting we will provide more information on how to observe this event, including pitfalls, resources and reporting results. We will also arrange to coordinate our observing efforts. Observers should be spread out over the width of the occultation path since each observer's location yields only one chord through the asteroid's silhouette and many chords are needed to assess the asteroid's size and shape.

Finally, subscribers to the AAC e-mail lists (AAC-L and especially ATM-OBSERVERS-L) should stay alert for future messages about this occultation. Readers who want more information and details about occultations and how to observe and time them, should see the references listed at the end of this article.

NOMENCLATURE AND FURTHER NOTES ON THE STAR AND THE ASTEROID:

Iota Cancri:

Coincidentally, the occultation of the star **Iota** in Cancri is synonymous with the acronym for the **International Occultation and Timing Association, IOTA!** Technically Iota Cancri (ι Cancri) should be designated 48 Iota Cancri-1 (ι^1 Cancri, magnitude +3.9) because 57 Iota-2 Cancri (ι^2 Cancri, magnitude+5.4) is a dimmer looking star located 2.4 degrees to the northeast of Iota-1. *However, in this article we call Iota-1 just Iota.* In addition, the numerical designation for each star's name is the Flamsteed number whereas the Greek letter indicates the star's Bayer designation, which is used throughout this article. (Often either the Bayer or Flamsteed label is used by itself to name the star.) Finally, the designation "Iota A" refers to the "A" component since Iota Cancri is a double star (more fully described previously in this article). It is interesting and noteworthy that Bayer's method does not conform here to the more usual practice of labeling stars in a constellation by descending order of apparent brightness using the Greek letters alpha, beta, gamma, etc.

It is also interesting that W.T. Lynn published a short correspondence over a century ago (*The Observatory*, 1891, Vol. 14, pg. 201) that speculates past observations show Iota Cancri A was a variable star.

Distance measurements of Iota Cancri A and B suggest these two stars are separated in space by approximately 300 and 190 light years respectively. This would make the two stars unrelated—just a coincidental, line-of-sight dou-

ble (also called an *optical double*). However, their distances are uncertain. Motion studies show the two stars may be moving together in space not having changed relative positions in a century. This, and their close apparent separation of about one-half arc minute, strongly suggest the two stars may be gravitationally bound and make up a *binary star system*.

Iota Cancri A is probably an evolved *giant star* (technically classified G7.5 III) with a luminosity of about 200 Suns and with a surface temperature cooler than the Sun's by 800 K (1,400 F degrees). So, this produces its yellowish-white color. In contrast, Iota Cancri B is an ordinary *main sequence* star (technically A3 V) like the Sun but with a larger diameter, shining with a luminosity of about 16 Suns and *hotter* by 3,000 K (5,400 F degrees). This gives "B" its slightly bluish hue.

The Iota Cancri system is young compared with the Sun, perhaps only 200,000 to 300,000 million years old. (The Sun's age is estimated to be nearly five billion years.) However, the larger mass of "A" (approximately 3.5 times the Sun's mass) has apparently caused "A" to evolve faster changing this star from a very hot main sequence star into a cool giant with an inert helium core. Meanwhile component "B" (with a mass of approximately two solar masses) is evolving more slowly than "A" and may still have about a billion years left to fuse all its core hydrogen into helium.

411 Xanthe:

The designation for asteroid *411 Xanthe* (pronounced Zan-thee, a Greek name meaning yellow or fair hair) includes both a permanent sequential number (which does not necessarily indicate order of discovery) plus a name accepted by the International Astronomical Union, usually proposed by the discoverer. Sometimes either the number or name is used by itself to designate the asteroid.

Xanthe was discovered on January 7, 1896 by Auguste Charlois, a French astronomer who discovered 99 asteroids! Xanthe travels in a slightly noncircular orbit (eccentricity 0.12 or about seven times larger than the Earth's orbital eccentricity). The asteroid's mean distance from the Sun is 2.9 times the "Earth-Sun mean distance" (called an astronomical unit or AU, about 93 million miles or 150 million km). The asteroid's orbit is also tilted 15 degrees to the plane of Earth's orbit. Xanthe orbits the Sun every 5.0 years with its distance from the Sun ranging from 2.6 to 3.3 AU. This keeps Xanthe within the solar system's main asteroid belt between Mars and Jupiter. Infrared observations suggest a diameter of 76 km (47 mi), a rotation period of 7.5 hours, and a low reflectivity (under ten per cent?) like some areas of the Moon.

REFERENCES

2007 April Occultation of Iota Cancri, Steve Preston (path map & detailed information) at http://www.asteroidoccultation.com/2007_04/0418_411_8470.htm .

A Simple Portable Video Occultation Setup, Richard Nugent at <http://lunar-occultations.com/iota/video/rvideosetup.htm>

Design and Application of a Fast Computerized CCD Camera System for Recording of Astronomical Events, Beisker, W. et al., at <http://www.iota-es.de/ioc/ioc-sys.htm>.

Drift Scan Imaging, Christoph Flohr at <http://www.driftscan.com>.

Drift-Scan Timing of Asteroid Occultations, John Broughton at <http://www.users.bigpond.com/reedyckr/driftscantiming.htm>.

How to Observe an Occultation, Paul Maley at <http://www.eclipsesetours.com/occultationc>.

International Occultation Timing Association, Inc. (IOTA) at <http://www.occultations.org>.

Observer's Handbook 2007, (Royal Astronomical Soc. Canada), pp. 197 ff.

Portraits of Stars and their Constellations: Iota Cancri, James B. Kaler at <http://www.astro.uiuc.edu/~kaler/sow/iotacnc.html>.

Monthly Club Meeting - March

Tuesday, March 13, 2007, 7:00 p.m. EST

Speaker: TBA

E-Mail: TBA

Title: TBA

Location: Powell Hall, Florida Museum of Natural History (*Lucille T. Maloney Classroom*), UF Campus, Gainesville FL

Executive Council Meeting Minutes

November 7, 2006, New Century Buffet Restaurant

Attending: Tandy Carter (TC), Bill Helms (BH), Chuck Broward (CB), Thomas Olmsted (TO), Andy Howell (AH), Bob O'Connell (BO), Mike Toomey (MT), Howard Cohen (HC), Marian Cohen (MC), Scott McCartney (SM)

The meeting was called to order by the president BH at 7:00 p.m. ET.

TO gave the treasurer's report. There is \$1,367.23 in the checking account and \$6,008.34 in the savings account. We received \$82.00 in dues this month and \$39.00 in donations. We have 19 paid members for 2007.

TC moved to approve the minutes of the last meeting. SM seconded and the minutes were approved.

Status of Club Telescopes:

8"Dob - Rich Russin
Museum Scope (6" Equatorial Newtonian) - Don Loftus
Celestron C8 - Gary Cook
4.5" Reflector - Marianne Gamble
8" Parks Equatorial Newtonian - Don Loftus (mount)
Davis Liles (telescope)
RLT - Warehouse

Star Parties - MT reported that he working on the schedule for 2007. There is a possibility of a Friends of Paynes Prairie event.

MT reported that board email should be for internal use only. There will be new board addresses. They are board@floridastars.org and chairs@floridastars.org.

Web site - SM reported that he is updating the officers' list, star parties and meetings.

Transit of Mercury - MT reported that he met with Kendra at the Museum. HC showed the posters that he prepared for the event.

Shirts and Hats - MC reported that the shirts and hats are here. Board members can pick them up tonight. They will also be available at the Mercury Transit and the next regular meeting. Lynn Christensen who did the work donated \$50.00 to the club. A thank you note will be sent by BH. CB moved to put a free ad for Lynn's company in one issue of the newsletter. TC seconded and it passed. BH will send a business card to Jackie Owens for the newsletter.

Nominating committee - MT presented the following slate:

President - Bill Helms
Vice President - Howard Cohen
Secretary - Andy Howell
Treasurer - Larry Friedberg
Board Members - Bob O'Connell, Tandy Carter, Thomas Olmsted

Warehouse Status - The blinds are up.

Holiday Party - Annie Welch will do the decorations, Mark Barnett will provide beverages, Pam Mydock will coordinate children's activities and Scott McCartney will do the astro quiz. Bob O'Connell will donate the prize.

Brochures - They are done.

Retreat 2007 - There will be board retreat in 2007. MT will search for a suitable site and date. One possible topic is the bylaws.

There will be more discussion at the December board meeting.

Solar Telescope - There was a discussion about the purchase of a telescope for solar viewing. The issue was not resolved and will be continued at the December board meeting.

TO will become the librarian for the books in our storage cabinet. He will provide a list of books for the web site.

MC moved for adjournment and TC seconded. The meeting was adjourned at 8:45 p.m. ET.

Respectfully submitted,

Marian Cohen

Secretary

Executive Council Meeting Minutes

December 5, 2006, Grill Masters Restaurant

Attending: Tandy Carter (TC), Bill Helms (BH), Charles Broward (CB), Bob O'Connell (BO), Scott McCartney (SM), Larry Friedberg (LF), Andy Howell (AH), Mike Toomey (MT), and Thomas Olmsted (TO)
The meeting was called to order by the president BH at 7:31 p.m. ET.

TO gave the treasurer's report. There is \$1,757.23 in the checking account and \$6,013.28 in the savings account. We received a \$50 donation from the t-shirt company, and we have 33 paid members for 2007. There was a motion to approve the minutes of the last meeting. TC seconded and the minutes were approved.

Status of Club Telescopes:

8"Dob	- Rich Russin
Museum Scope (6" Equatorial Newtonian)	- Don Loftus
Celestron C8	- Gary Cook
4.5" Reflector	- Marianne Gamble
8" Parks Equatorial Newtonian	- Don Loftus (mount)
Davis Liles (telescope)	
RLT	- Warehouse

Star Parties - MT reported that the first half of next year is set up. We have Hickory Ranch in April for ourselves. We are waiting to hear about a Friends of Paynes Prairie star party on Feb 11 or 12. There is a Museum Night on Jan 18. 2-4 volunteers are requested to bring telescopes and participate. MT will introduce the movie "Contact" that night, and the audience will have a chance to ask questions.

MT reported that everyone appears to be getting the board emails.

Web site - SM reported that the officer page is set. A picture of LF is needed. BH has some ideas for the web page, including school liaison.

Debrief of Mercury Transit – BH said that the debriefing with Kendra went well. Publicity and setup of chairs and tables were two areas of discussion. We are communicating well now with the museum as a result of the lessons learned. There should be a document posted on the web site that describes what arrangements are needed for special events.

Thank you letters – BH passed around a copy of the thank you letter for the \$50 donation by Lynn Christensen. On a related note, SM will draft a thank you letter for the club's use of the warehouse space.

Elections – BH led a discussion of when to hold elections. A quorum consists of 25% of members in good standing. The suggestion is to hold the election at the regular meeting in January rather than at the December party meeting. The incoming officers would be appointed as provisional until confirmed by election.

Warehouse Status – MT said there is nothing new to report.

ATM Report – CB reports there will be a meeting in January. The warehouse is a possible location. MT says he doesn't want to publicize the warehouse location on the web. Members should be informed of the meeting by e-mail and given directions.

Holiday Party – SM indicates that 40 people are signed up, and there is a good selection of food. Annie is handling the decorations.

Brochures – Changing the list of officers is all that remains to be done. Revisit this with Howard at the January meeting. Do we need to order more?

Retreat 2007 – There was significant discussion about the venue, specifically the pros/cons of holding the meeting locally versus off-site. The consensus is that the retreat should be held at the warehouse. The date would be set in mid-January or possibly in February. Pizza will be ordered in for the lunch, and comfortable seating will be arranged. BH requested that he be sent suggestions about items to include on the agenda.

Club Librarian - TO will become the librarian for the books in the storage cabinet. BH has two stacks of books to give to TO that were donated by an individual in Ocala. TO will establish a library at the warehouse and will develop plans and procedures for managing the collection. He will provide a list of books on the web site, so that when a member wants a book, TO can bring it to the next meeting. BO proposed that the public library might manage the book collection. This idea was set aside when TO pointed out that the library often discards special-interest books at sales because of lack of shelf space.

School Liaison – BH deferred the end of year report until next month when all chairs and committees are due to report.

Unscheduled Items – SM will get together with Jackie about coordinating the publication schedule of First Light. A suggestion was put forth about posting the submission deadlines on the web site along with meeting dates. This would remind all of the due dates. If Jackie gives SM the raw Publisher file, then SM can take it from there.

The untimely loss of Howard's brother was discussed. There is a proposal to make a memorial contribution early next year.

Next month's board meeting will be held Tuesday, Jan 2 at Grill Master. This time only, the meeting will start at 6 p.m.

A motion to adjourn was made and seconded. BH adjourned the meeting at 8:45 p.m. ET.

Respectfully submitted, Andy Howell, Acting Secretary

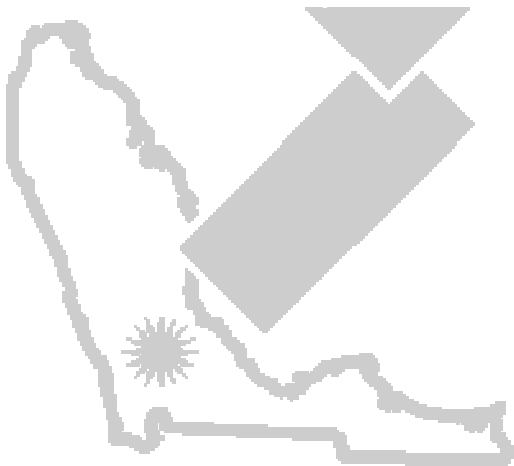
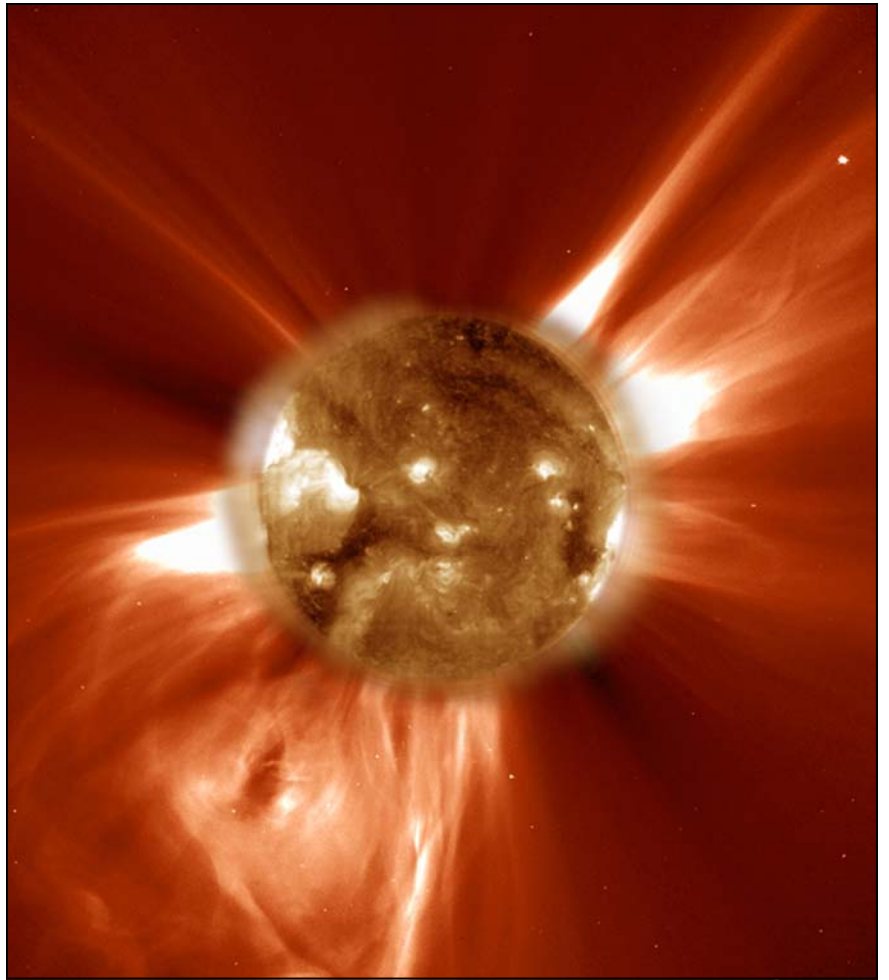
FirstLight

February / March 2007

Sun Storm: A Coronal Mass Ejection

Credit: SOHO Consortium, ESA, NASA

Explanation: What's happening to our Sun? Another Coronal Mass Ejection (CME)! The Sun-orbiting SOHO spacecraft has imaged many erupting filaments lifting off the active solar surface and blasting enormous bubbles of magnetic plasma into space. Direct light from the sun is blocked in the inner part of the above image, taken in 2002, and replaced by a simultaneous image of the Sun in ultraviolet light. The field of view extends over two million kilometers from the solar surface. While hints of these explosive events, called coronal mass ejections or CMEs, were discovered by spacecraft in the early 70s, this dramatic image is part of a detailed record of this CME's development from the presently operating SOHO spacecraft. Near the minimum of the solar activity cycle CMEs occur about once a week, but near solar maximum rates of two or more per day are typical. Strong CMEs may profoundly influence space weather. Those directed toward our planet can have serious effects.



FirstLight
Newsletter of the Alachua Astronomy Club, Inc.
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