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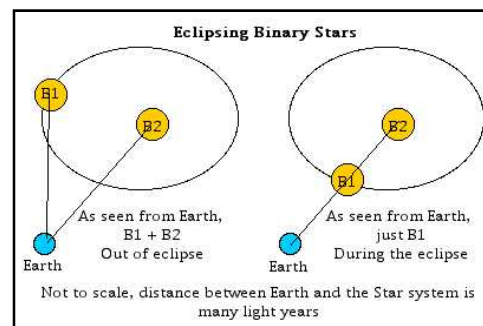
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## The Mysterious Epsilon Aurigae by Jeff Hopkins, Hopkins Phoenix Observatory

Variable stars are stars that we see vary in brightness over time. There are many causes for these variations. One class of variable stars is known as eclipsing binaries. Our Sun is a unique star in that it is a lone star. Many if not most stars have companions. These star systems have two, three and sometimes more stars all revolving in a very complex manner around a common center of gravity. These binary stars should not be confused with double stars. While some widely spaced binaries are indeed seen as double stars, many if not most doubles are only apparent and the stars are not part of the same star system.

### Binary Star Systems

As binary stars revolve around their system's center of mass, some of these star systems have orbital planes that lie in line with the Earth. These systems allow us to make some unique and interesting observations. Because closely spaced binary stars cannot be resolved from Earth, even with largest telescopes, measuring the brightness of the star system as one star passes in front of another yields important data about the star system. When one star passes in front of another star, the combined light from the system is decrease as one star is blocking some or all of the light from the other star. In addition during the ingress and egress of the eclipse, one star's light passes through the outer shells or atmosphere of the eclipsing star yielding more information about the star. Making precise measurements using filters can yield information about the two star's spectral characteristics and which star is occulting which. (see Figure 1)



*Figure 1: Eclipsing Binary Stars*  
**Short Period Eclipsing Binary Star Systems**

Many thousands of eclipsing binary systems have been discovered. The periods of eclipse vary from hours to over a quarter of a century. The shortest period eclipsing binaries have stars that actually touch each other and complete an orbit in hours. One very famous short period eclipsing binary is Algol in Persus. During an evening of an eclipse with just unaided eyes, you can watch the star system dim from 2.1 to nearly 3.3 magnitude in just a few hours. In ancient times this star system caused awe and concern in the world. Many feared it and called it the "Wink of the Demon." On the other end of the scale is a mysterious star system known as epsilon Aurigae.

### Long Period Eclipsing Binary Star Systems

Epsilon Aurigae (Almaaz) is a 3rd magnitude star system that under goes a total eclipse every 9885 days or 27.1 years dimming to nearly 3.8 magnitude and making it the longest known eclipsing binary system. Epsilon Aurigae is located 3 degrees from Capella (alpha

*(Continued on page 3)*



## Stardust Up Close

by Patrick L. Barry and Dr. Tony Phillips

Like discarded lumber and broken bricks around a construction site, comets scattered at the edge of our solar system are left-over bits from the "construction" of our solar system.

Studying comets, then, can help scientists understand how our solar system formed, and how it gave rise to a life-bearing planet like Earth.

But comets have long been frustratingly out of reach -- until recently. In January 2004 NASA's Stardust probe made a fly-by of the comet Wild 2 (pronounced "vilt"). This fly-by captured some of the best images and data on comets yet ... and the most surprising.

Scientists had thought that comets were basically "rubble piles" of ice and dust -- leftover "construction materials" held together by the comet's feeble gravity. But that's not what Stardust found. Photos of Wild 2 reveal a bizarre landscape of odd-shaped craters, tall cliffs, and overhangs. The comet looks like an alien world in miniature, not construction debris. To support these shapes against the pull of gravity, the comet must have a different consistency than scientists thought:

"Now we think the comet's surface might have a texture like freeze-dried ice cream, so-called 'astronaut ice cream': It's solid and can assume odd, gravity-defying shapes, but it's basically soft and crumbles easily," says Donald Brownlee of the University of Washington, principal investigator for Stardust.

Scientists are currently assembling a 3-D computer

model of this surface from the photos that Stardust took. Those photos show the sunlit side of the comet from many angles, so its 3-dimensional shape can be inferred by analyzing the images. The result will be a "virtual comet" that scientists can examine from any angle. They can even perform a virtual fly-by. Using this 3-D model to study the comet's shape in detail, the scientists will learn a lot about the material from which the comet is made: how strong or dense or brittle it is, for example.

Soon, the Stardust team will get their hands on some of that material. In January 2006, a capsule from Stardust will parachute down to Earth carrying samples of comet dust captured during the flyby. Once scientists get these tiny grains under their microscopes, they'll get their first glimpse at the primordial makings of the solar system.

It's heading our way: ancient, hard-won, possibly surprising and definitely precious dust from the construction zone.

Find out more about the Stardust mission at [stardust.jpl.nasa.gov](http://stardust.jpl.nasa.gov). Kids can read about comets, play the

"Tails of Wonder" game about comets, and hear a rhyming story about aerogel at <http://spaceplace.nasa.gov/en/kids/stardust/>.

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*



*The Stardust spacecraft used a grid holding aerogel to capture dust particles from comet Wild 2. In this test, high velocity dust particles are stopped unharmed at the end of cone shaped tracks in a sample of aerogel*

(Continued from page 1)

Aurigae) in a small triangular group of stars known as "The Kids." Epsilon Aurigae is the northmost star in the group. Eta and zeta Aurigae are the other two stars in the base of the triangle. During the winter months epsilon Aurigae is nearly overhead around 8 to 9 PM in mid-northern hemisphere latitudes. The distance to the star system is not known very accurately. It is estimated to be between 600 and 1900 light years. (See Figure 2)

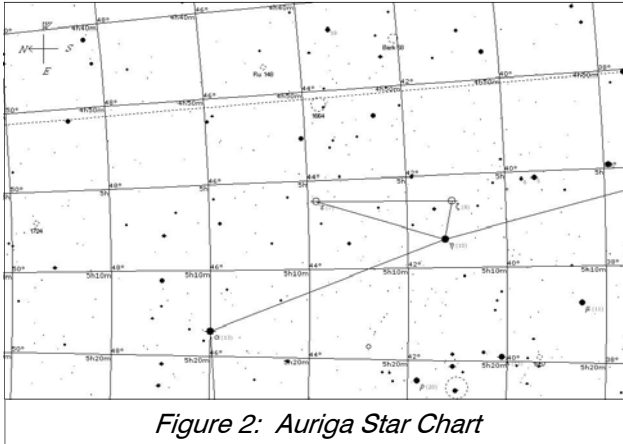


Figure 2: Auriga Star Chart

Holding the record as being the longest period eclipsing binary system is not the most interesting part of epsilon Aurigae. Normally the larger the orbit of an eclipsing star (the longer the period of the eclipse), the shorter the time the eclipsing body spends in line with the Earth and thus the shorter the eclipse duration. The eclipsing binary star system 32 Cygni varies from 4.0 to 4.2 magnitudes every 1148 days or 3.1 years. The eclipse lasts 11 days. Carrying that out to the epsilon Aurigae star system one would expect an eclipse to last less than 11 days, possibly even just hours.

### Something Very Big

Surprise! The epsilon Aurigae star system's eclipse lasts nearly two years or 670 days. This means the eclipsing object is gigantic. The orbit of the eclipsing object is estimated at over 27 astronomical units. By contrast the orbit of Uranus around our Sun is about 20 astronomical units. The main star of the epsilon Aurigae star system is a giant F star with a mass of about 15 times our Sun and a diameter of 200 times. That means if that star were the Sun, Venus's orbit would be 27 million miles beneath the surface. The eclipsing object has an estimated mass of nearly 14 Suns and a radius of around 2,000 solar radii or some 2,000,000,000 miles in diameter making it the largest known single object in the universe.

To further deepen the mystery in the middle of the eclipse the star system's brightness increases significantly for a short time. Many theories have been put forth as to what the eclipsing body is. A black hole or gigantic star are just a few. Most popular is the idea of a large cloud of dust or gas, but if that is true something massive must be embedded to hold the cloud together. Try as they might, astronomers have not been able to detect a star in the cloud. The only star that can be detected in the system is the main F star. One interesting theory is a binary pair of stars in the middle of the cloud going around and sweeping out a hole producing kind of a super large donut. The light going through this hole would produce the mid-eclipse brightening. While this seems to make sense, again, no other stars except the main F giant can be detected, photometrically or with spectroscopy.

### Epsilon Aurigae Campaign

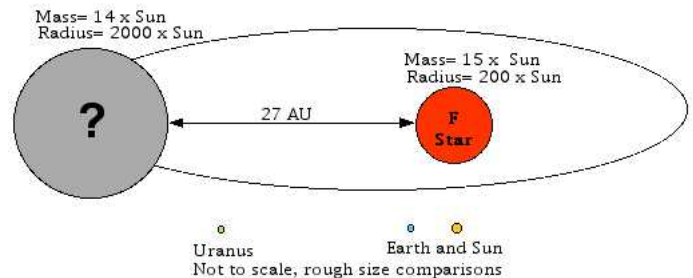


Figure 3: Epsilon Aurigae Star System Model

The last eclipse was 1982 -1984. During that eclipse professional astronomers decided to try to crack the mystery. A world-wide campaign was set up to observe the system during the eclipse. Observations were made at major observatories around the world, amateur observatories and with space-based telescopes. A wealth of information was collected. At the end of the campaign in 1985 a workshop was held at the American Astronomical Society meeting in Tucson, Arizona. Several dozen astronomers presented papers. Despite all the information presented, the mystery still remains. What is the precise nature of the star system? What is the eclipsing object? See <http://www.hposoft.com/Astro/PEP/EAurWS85.html>. (see Figure 4, Page 6) The next eclipse will begin in the late spring of 2009. Another campaign is planned. See: <http://www.hposoft.com/Astro/PEP/EpsilonAurigae.html>

Most astronomers don't get the observing fever for the system until close to the start of the eclipse, however. As such few are interested in observing the system in

(Continued on page 6)

## Last Call For Observations—Canis Major

By A.J. Crayon

As indicated Canis Major, big dog or the Greater Dog, has a nice selection of galaxies, an interesting fact since it is in the middle of the winter Milky Way. As one would expect, it also has its normal attraction of clusters. Note the belt stars of Orion point to Sirius, also known as the Dog Star. Has anyone from SAC seen Sirius's companion, the Pup, recently. It is often said the Greater Dog is chasing the rabbit – Lepus!

### NGC2207 and IC2163

This is a pair of interacting galaxies with magnitudes of 10.8 and 13.4 respectively. The center of IC2163 is east of NGC2207's center. Check out this site - <http://antwrp.gsfc.nasa.gov/apod/ap041121.html> for an image of these galaxies from the Hubble Heritage Team.

**8" f6, Newtonian 80X**; AJ Crayon: 12m 2'X1', diffuse with bright star in field, use of hood is a must and slightly jiggle scope helps determine an easterly position.

**10" f10, LX200, 200X**; Joe Goss: NGC2207 - Fairly small, fairly faint, irregular shape, slightly brighter on East end caused by IC 2163. IC2163 - Very small, slightly brighter area on East end of NGC 2207

**14.5" f5.2 Dobsonian, 220X**; AJ Crayon: NGC2207 is large slightly elongated, faint due to low surface brightness; in contact with IC2163 to east. IC2163 is pretty bright, large, very elongated with one stelling in center and another to west, perhaps belonging to NGC2207.

### NGC2217

This is a barred spiral with a very faint polar ring. I doubt there's any visual observation from SAC members, owing in part to the lack of decent observing conditions the past several months.

**8" f6, Newtonian**; AJ Crayon: very faint and amorphous.

**10" f10, LX200, 88X**; Joe Goss: Small, faint, fairly round, gradually brighter to center.

**14.5-inch f5.2 Dobsonian, 140X**; AJ Crayon: 4' 11<sup>th</sup> mag, little elongated to east of southeast, suddenly much brighter middle with a stellar nucleus near 2 stars to west. Presumably the elongation is the bar.

### NGC2325

This is another fairly bright, fairly large elliptical galaxy that is a little brighter in the middle.

**10" f10, LX200, 88X**; Joe Goss: Small, very faint, irregularly elongated, 3x1, even brightness.

**In the 14.5-inch f5.2, Dobsonian, 140X**; AJ Crayon: 11<sup>th</sup> mag 6'X3' in position angle north, pretty elongated,

slightly brighter middle 3'X2' and has a bright star at south end. Located in a pretty nice Milky Way field.

### NGC2354

Here we have a pretty rich galactic star cluster. Steve Coe has seen 40 stars in his telescope and is just seen in 10X50 binoculars.

**8" f6, Newtonian, 38X**; Charlie Whiting: this is a very small, dim and sparse open cluster. There were six 10<sup>th</sup> to 11<sup>th</sup> mag stars resolved. The outline of the stars reminds me of an upside-down Greek lower case letter, mu the symbol for micro-something. There is a group of 4 stars on the east side of the figure and another group of 5 stars on the west side of it. These may or not belong to this cluster. Excluding these 2 groups the diameter is 30'. At **96 X** there are 10 more faint stars resolved, 12<sup>th</sup> mag or fainter. There is also some granularity indicating some unresolved stars.

**8" f6, Newtonian 100X**; AJ Crayon: I see a mirror image of Scorpius here. The head includes 3 stars of 9<sup>th</sup> mag to northeast, the body includes three stars of 10<sup>th</sup> mag to east of southeast and making up the tail six stars from 9<sup>th</sup> to 11<sup>th</sup> mag and loops counter clockwise to the south.

**10" f10, LX200, 88X**; Joe Goss: Large, fairly bright, fairly loose, several dark spots, brighter stars look like Scorpius.

**14.5" f/4.9 reflector, 66X, 200X**; Jack Jones: Mag 6.5 open cluster, Many stars in circular chains but no stars stand out from the others. Two interlocking circles or heart-shaped rings of stars.

**14.5-inch f5.2, Dobsonian, 90X**; AJ Crayon: 20', 25 stars of 10<sup>th</sup> and 11<sup>th</sup> mag forming a closed irregular figure in southeasterly position and 50 additional stars filling out the figure. The northern 1/3 is almost starless. This one is probably not bright enough to be seen naked eye from Arizona but I wonder about a more southerly position being able to spot it without optical help. Brian Skiff does not list it as being visible to the naked eye.

**16" f4.4 Newtonian**; Rick Rotramel: OC - L, pB, vRich, ~90 bright & dim stars.

### NGC2362

This cluster is about one degree north east of our last one, NGC2354. It is also on the Ancient City Astronomy Club's Herschel 400 list. It also includes **Tau (τ) Canis Majoris**, which is also a nice double.

**8" f6, Newtonian, 120X**; Charlie Whiting: this is a small, bright and dense open cluster of 20-25 stars that seem

*(Continued on page 5)*

(Continued from page 4)

to buzz around tau Canis Majoris like bees at a hive. Some of the counted stars may be outside of the 15' diameter of the cluster. But they look like they belong to it. At **240 X**, counting only the stars closest to tau, there are 16 stars of 10th and 11th mag.

**8" f6, Newtonian, 80X**; AJ Crayon: 30 stars in a 10' area and includes very bright tau almost circled by stars forming a C or D. At 115X two chains form semi-circles to south of tau. One semi-circle has 10 stars from 9th to 12th mag, another has 8 stars from 9th to 10th mag and the rest of the cluster has 10 stars from 9th to 11th mag. This cluster is also visible as a knot of stars in an 8X50 finder.

**10" f10, LX200, 140X**; Joe Goss: fairly large, very bright, fairly compressed, one very bright star, several strings and arcs of stars.

**14.5" f/4.9 reflector, 66X, 200X**; Jack Jones: Mag 3.8 open cluster, tight and bright, surrounding tau CMA, an 8" double of 4.5 and 10th mag, 3 degrees north of NGC 2367.

**14.5 inch f5.2, Dobsonian, 90X**; AJ Crayon: also known as the tau Canis Majoris cluster; mag 4 star in center, mag 5 star to west, mag 6 star to east and about 30 others from 9th to 12th mag. Note that tau is a multiple star. Very nice cluster to ogle!

**16" f4.4 Newtonian**; Rick Rotramel: OC - pS, B, Rich, compressed, ~50 stars. Nice! A stunning site with the cluster surrounding a bright double star, Tau CMA.

## NGC2359

Next is a bright nebula that seems to respond well to **UHC filters**. It has been called the Duck Nebula or Thor's Helmet.

**8" f6, Newtonian 100X**; AJ Crayon: with a UHC filter I estimate 12th mag and 15'X15'. Considering this to be the Duck Nebula, the head is 15'x10' in a northerly position with stellarings to south. The beak is 10'x15' in an easterly position and a 10th mag star marks the eye. Without the UHC there are about 15 stars involved from 10th to 13th mag, the brightest roughly in a northern position. In summary I'd call it very faint, very large and very irregularly shaped.

**13.1" f4.5, Dobsonian, 83X**; Charlie Whiting: Wow! At 83 X this object was a lot of fun. Faint nebulosity was visible without any filter. Put in a broadband filter, and the nebulosity becomes slightly better defined. Put in a narrowband filter, and it gets even better, more defined and slightly larger. With both filters I could still see stars within the nebula. Put in an OIII filter, and it changes character altogether! The background stars disappear and the object changes into a puffy, cloudy object, almost 3D! It has a much harder boundary. It has bright and brighter areas. It looks like something in a lava lamp. Weird, huh?

**14.5" f/4.9 reflector, 100X**; Jack Jones: Lumicon UHC filter, diffuse nebula, round filamentary bubble with a flame off to the west. Dimmer and larger nebulosity as a background on the NE side. This is Thor's Helmet, looks like a rabbit to me, not a duck as they say. 8-10 minutes in diameter.

**14.5-inch f5.2, Dobsonian, 140X**; AJ Crayon: with the UHC (better than the O III) contrast is dramatically improved, use one if you have or can borrow one! This bright nebulosity has been called by two names, Duck Bill or Thor's Helmet (whatever seems reasonable to you). It is pretty large, pretty bright (with the UHC) and elongated. I estimate its size at 10'X5' almost in a northerly position. It looks like a bust of head and shoulders, hence Duck Bill. The head is a roundish 5' and the brightest shoulder, located on the south side, is 10'X3' long in a southwesterly position. The other shoulder on the north side is in a northwest position is fainter and a little longer. There are 7 stars involved in the head with the brightest 3 at the very top, 2 stars are in the southern shoulder. Another pretty faint streamer, hence Thor's Helmet, is on southeast side and gradually curves 90 degrees to the southwest. This streamer is NOT part of the Duck's Bill. Who the heck is Thor and where did he get the helmet? The elongated knot on the west side is NGC2361.

**16" f4.4 Newtonian, 90X**; Rick Rotramel: EN - fL, fB, c-shaped nebulous glow between stars. A 1986 observation from Buckeye Hills!

## NGC2374

This is a pretty large galactic cluster containing about 25 stars.

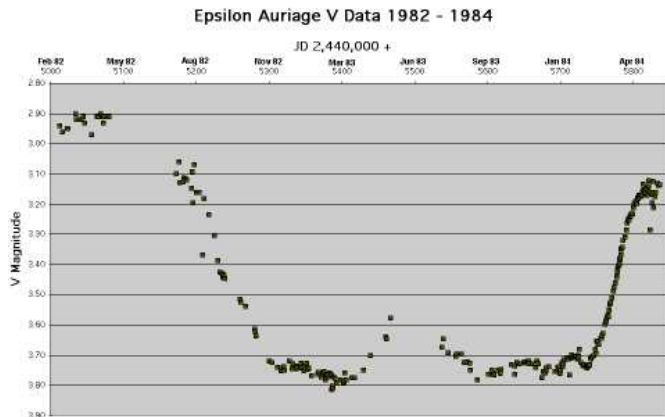
**8" f6, Newtonian, 38X**; Charlie Whiting: this open cluster is small and pretty sparse. 8 stars resolved. One bright star, maybe 8th mag, is at the southwestern boundary. It appears to be faintly blue in color. Just north of it, at separation about 60", is a star that may be its double. This 2nd star is about 10th mag and is bluer than the first star. Running along the northern boundary are 8 or 9 stars forming a fishhook or scorpion's tail. These are 10th and 11th mag stars. At **75 X** there are now a total of 16 stars resolved. The cluster is about 15' in diameter. At **96 X** an additional 9 stars of 12th mag or fainter are resolved.

**8" f6, Newtonian 120X**; AJ Crayon: there are 20 stars in 15' unresolved haze; also seen in 8X50 finder.

**10" f10, LX200, 88X**; Joe Goss: Fairly large, fairly bright, slightly compressed, not well defined.

**14.5-inch f5.2, Dobsonian, 140X**; AJ Crayon: 20' 40 stars, 20 stars of 9<sup>th</sup> and 10<sup>th</sup> mag and 20 stars 11...13<sup>th</sup> mag. Some of the brighter stars form two straight lines perpendicular to each other towards the northeast part

(Continued on page 9)



*Figure 4: Band Light Curve of 1982-1984 Eclipse of Epsilon Aurigae*

detail between eclipses. The Hopkins Phoenix Observatory (HPO) has been actively observing the system photometrically in the ultraviolet, blue and visual (UBV) bands for many years since the last eclipse. While HPO made no observations during the 1990's several dozen observations were made after the eclipse in the 1980's. At HPO an intense observing program of the star system started in the fall of 2003. Plans are to continue this program through the next eclipse with hopes of

adding longer wavelength observations, in particular the J and H bands.

Anyone interested in providing photometric observations, single channel UBV photon counting, analog BVRI photodiode (e.g., the Optec SSP-3) or BVRI CCD photometry, please contact Jeff Hopkins at [phxjeff@hposoft.com](mailto:phxjeff@hposoft.com).

The pre-eclipse data should provide a good baseline as to what the main star is doing. So far it turns out the star system is not quiet out-of-eclipse, but has significant variations and an apparent periodic increase in brightness. There may be a significant burst in brightness that occurs about every 625 days. The next burst should be in the late summer of 2005. There are also smaller periodic variations. Much more data are required to better understand and determine precise periods for these variations. If all goes well, the Hopkins Phoenix Observatory and any others interested in helping will provide a detailed baseline of data over multiple bands for the next eclipse.



*Jeff Hopkins poses in his Hopkins Phoenix Observatory with the C-8 with HPO UBV Photon Counting Photometer.*

*All Photos' & Diagrams in this article by Jeff Hopkins*

# March 2005

| SUN | MON | TUE | WED | THU | FRI | SAT |
|-----|-----|-----|-----|-----|-----|-----|
|     |     | 1   | 2   | 3   | 4   | 5   |
| 6   | 7   | 8   | 9   | 10  | 11  | 12  |
| 13  | 14  | 15  | 16  | 17  | 18  | 19  |
| 20  | 21  | 22  | 23  | 24  | 25  | 26  |
| 27  | 28  | 29  | 30  | 31  |     |     |

## Schedule of Events for February & March 2005

|                |   |
|----------------|---|
| Feb. 22nd      | ATM & Astro-imaging Sub group Meeting at Thad's Shop. See Page 10 for directions                                    |
| Feb. 24th      | Moon is Full at 0454 mst  |
| Feb. 25th      | SAC General meeting at Grand Canyon University at 1930; Speaker: Chris Watson is tentative Topic: The SkyGX Project |
| Mar. 3rd       | Moon is at Last Quarter at 1736 mst.  |
| Mar. 5th       | SAC Star Party at Flat Iron, Sunset 1831, Ast Twilight Ends 1954, Moonrise 0434                                     |
| Mar. 10th      | Moon is New at 0910 mst.  |
| Mar. 12th-13th | 2005 All Arizona Messier Marathon at Farnsworth Ranch, See Page 8 for details.                                      |
| Mar. 17th      | Moon at first quarter at 1919 mst.  |
| Mar. 20th      | Vernal Equinox at 0533 mst.   |
| Mar. 22nd      | ATM & Astro Imaging Subgroup Meetings at Thad's Shop 1930   |
| Mar. 25th      | SAC General Meeting at Grand Canyon University at 1930. Speaker TBA   |
| Mar 25th       | Moon is Full at 2058 mst.   |

## Future Planning

|                    |   |
|--------------------|---|
| April 16th         | Thunderbird Public Star party at Thunderbird Park in Glendale   |
| May 4-8th          | 2005 Desert Sunset Star party at Caballo Loco RV Ranch southwest of Tucson. Goto: <a href="http://www.chartmarker.com/sunset.htm">http://www.chartmarker.com/sunset.htm</a> for more details. |
| Jun 4-11th         | Grand Canyon Star Party. Go to: <a href="http://www.tucsonastronomy.org/gcsp.html">http://www.tucsonastronomy.org/gcsp.html</a> for more information.   |
| Sep. 29th-Oct. 2nd | Lowell Star Party. Go to: <a href="http://kraken.lowell.edu/lsp3/">http://kraken.lowell.edu/lsp3/</a> for more information.   |

## 2005 All Arizona Messier Marathon

### March 12, 2005 - Arizona City

It is time again for our yearly exercise in speed observing, a Messier Marathon! Maybe finding all of the Messier objects in one night is a little crazy, but it is also a lot of fun. A great exercise for old and new observers. This allows you to practice skills such as learning the sky, recognizing magnitudes, starhopping and using your equipment.

It looks like it will be possible to do 108 or 109 objects this year with the tough ones being M77, M74, M39 and M29 with M30 being next to impossible. Since the new moon is early in Messier season this year the evening objects should be well up at twilight, but a setting moon will increase the challenge.

|          |                             |
|----------|-----------------------------|
| Sunset   | 6:37pm                      |
| Twilight | 7:55pm                      |
| Moonset  | 9:19pm and is 2.68 days old |
| Twilight | 5:18am                      |
| Sunrise  | 6:36am                      |

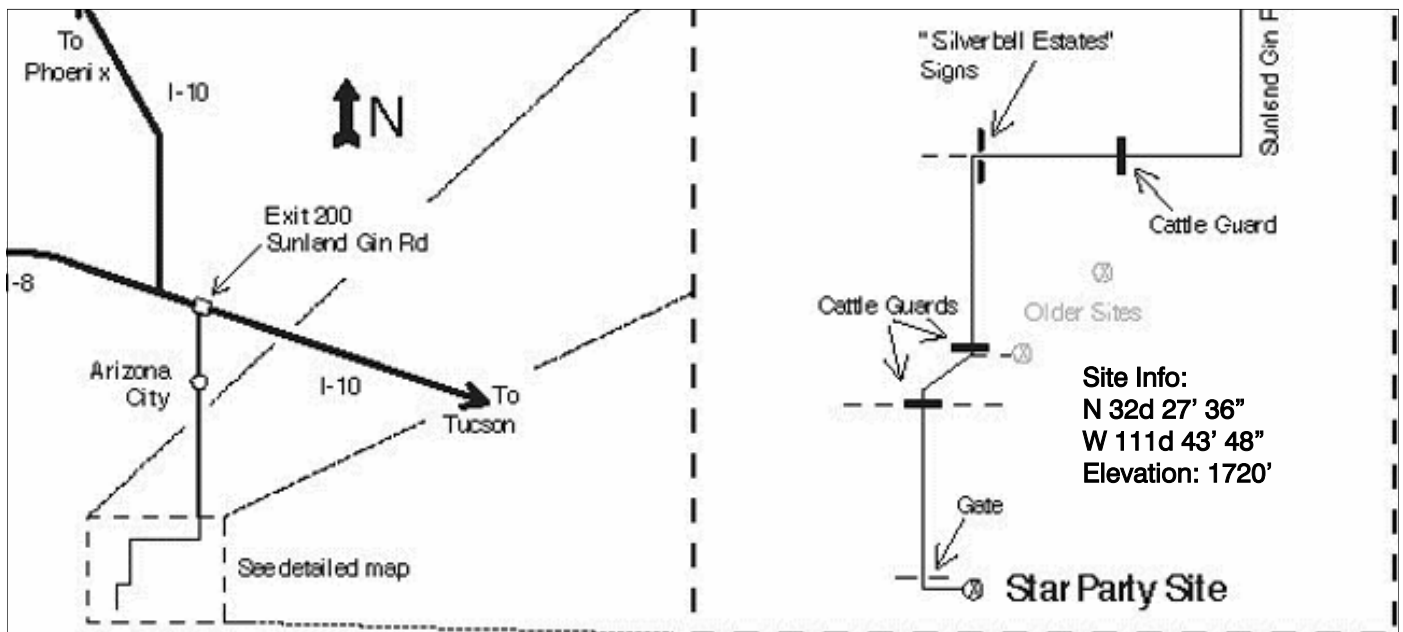
If you don't want to MM, and only about half the participants do, it is still a great start party with good company, dark skies and lots of scopes. Either way come and join us at the Farnsworth Ranch south of Arizona City. I suspect that with all of the recent rains the site will be less dusty than normal.

Complete information and map at:

<http://www.saguaroastro.org/content/messier.htm>.  
Site information and directions can also be found at <http://www.siowl.com/ObservingSites/html/obsarizonacity.html>

I enjoy reading Charles Messier's original descriptions of these objects and comparing them to the view in my own scope as I go. Even a small modern scope (like my MM veteran 6" RFT newtonian) will put shame to the descriptions. The text of Messier's original article as published in 1784 (with the additions) can be found at <http://www.seds.org/messier/xtra/history/m-cat.html>. Print them out, its only a few pages, and bring them with you.

*(Ed Note: This announcement was written By Andrew Cooper of Tuscon. Covers everything and more, so why write a new one?)*



**Directions:** Take I-10 to exit 200 (Sunland Gin Road). From here it is about 29 miles to the site. Turn right (south) after exiting the freeway. After about 15 miles, the pavement ends and about one mile further, the road turns sharply to the west. After another four miles, the main road will turn south just after the "Silverbell Estates" signs. Three miles past the signs, the road will veer off to the west, and five miles further, the road will pass through a gate. Turn left immediately after the gate and continue for another 2/3 of a mile, driving over a fence. The site is to the right.

*(Continued from page 5)*

of the field of view. The southwest part of the cluster has an accumulation of stars almost forming the letter M with the brighter of this association towards the middle. Located in rich Milky Way field and is difficult to determine the clusters border.

## NGC2367

This is another interesting galactic star cluster with about 30 stars in a 3.5 arc-minute area. The seven brightest stars, ranging in magnitudes from 9.2 to 12.5 and forms the letter "Y" positioned in a northerly position.

**8" f6, Newtonian, 38X;** Charlie Whiting: this is a very tiny cluster of 4 stars in a kite-shaped figure. At **120 X** there are 8 stars resolved of 10th to 12th mag. At **240 X** only a couple more very faint stars are resolved.

**10" f10, LX200, 88X;** Joe Goss: Fairly small, fairly bright, compressed, well defined.

**14.5" f/4.9 reflector, 66X, 200X;** Jack Jones: Mag 7.9 open cluster, wedge-shaped, pointing south, 15 stars, tight double on west side, 3 degrees south of NGC 2362.

## Tau ( $\tau$ ) Canis Majoris

This is our double star for this month and a favorite of many double star observers. The fact that it is in the cluster NGC2362 adds to the enjoyment.

**8" f6, Newtonian, 120X;** Charlie Whiting: this is a bright blue star, 4.4 mag. Skymap data says its a double. The components are almost the same mag, and, in 1994, were separated by 0.1". I tried to split them by going to **240 X** and **400 X**, but did not succeed. Due to poor seeing, tau and the surrounding stars were just too mushy to see the duplicity. A day later I discover that tau is one of SAC's Best Multiple Stars. According to SAC's data list of 1994, tau has one secondary, 10th mag, 8" separation, PA = 79. Just for fun I looked in Burnham's. There tau is listed as having a secondary and a tertiary: 10/11 mag, 8.2"/14.5", PA = 90/79. Skymap does not show either of these secondaries.

**8" f6, Newtonian 120X;** AJ Crayon: one yellowish and two bluish stars, in cluster NGC2362, a superb field!

**16" f4.4 Newtonian;** Rick Rotramel: A stunning site with the cluster surrounding a bright double star, Tau CMA. I saw them as White and Blue.

## Call for Observations

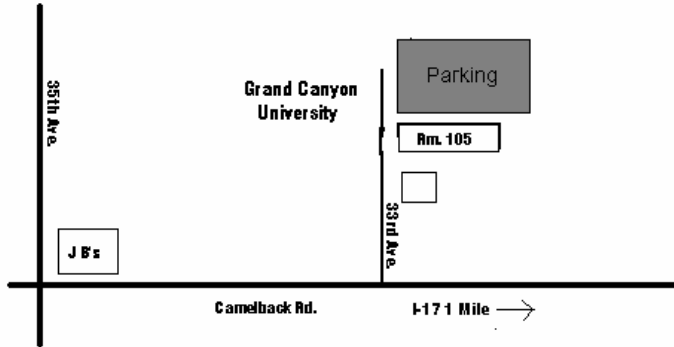
The following objects in Gemini will be for the March column. Starting at the feet, find the open cluster check out **NGC2129**, then hop about 1° to the northeast and find the open cluster **IC2157**, for an IC cluster it shouldn't be difficult to find. Next let your scope drift to **NGC2158**, almost 0.5° to the east. Finally, in the same 1° field is **M35** (I just couldn't resist)! Note the difference amongst these four clusters in size, richness and beauty. Next is **NGC2266**, a nicely compressed open cluster about 2° north of 3<sup>rd</sup> magnitude Mebsuta ( $\epsilon$  Gem). Instead of a double star I'm adding something that might be a challenge – **NGC2371/2372**. There seems to have been some confusion with this object in the past but it is now clear these two are a double lobed planetary nebula. Do you see both of them? Last on the list is **NGC2392** and is also known as the Eskimo Nebula. Try as much power as the night permits to see as much detail as possible, don't forget your filters and also report color seen. Don't let prior reports taint your results.

Monoceros is for April; we can do at least one more winter Milky Way constellation prior to the spring ones – and galaxies galore. Yes we did Monoceros in last year, let's do it again because there's enough to go around without repeating. The candidates begin with **NGC2261** a diffuse nebula with the name Hubble's Variable Nebula. Second is **NGC2264** an open cluster named the Christmas tree that is involved in some nebulosity. Can you see this cluster without optical aid? Also, about ½ degree south is more nebulosity named the **Cone Nebula**. Note the similarities between these nebulosity's. Next is **NGC2282** a diffuse nebula, followed by the open cluster **NGC2286**. Next, swing south to **M50** an often-overlooked open cluster. Finally, swing northward to a planetary nebula I have yet to observe, **NGC2346**. Look for color and any blinking effect. Don't forget to try filters. I am purposely leaving out the Rosette Nebula and saving it for a future study. Perhaps an entire column can be devoted to this magnificent object. Let me know your thoughts on this.

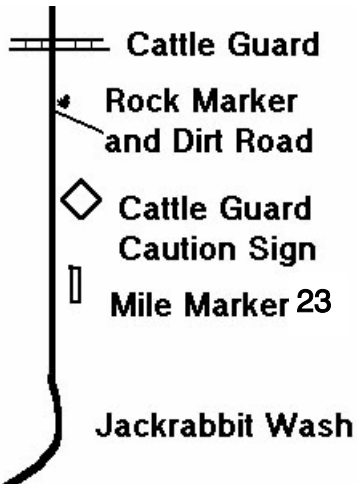
# SAC Meeting and Observing Sites

## General Meetings

7:30 p.m. at Grand Canyon University, Fleming Building, Room 105: 1 mile west of I-17 on Camelback Rd., North on 33rd Ave., Second building on the right.



## Flatiron Star Parties

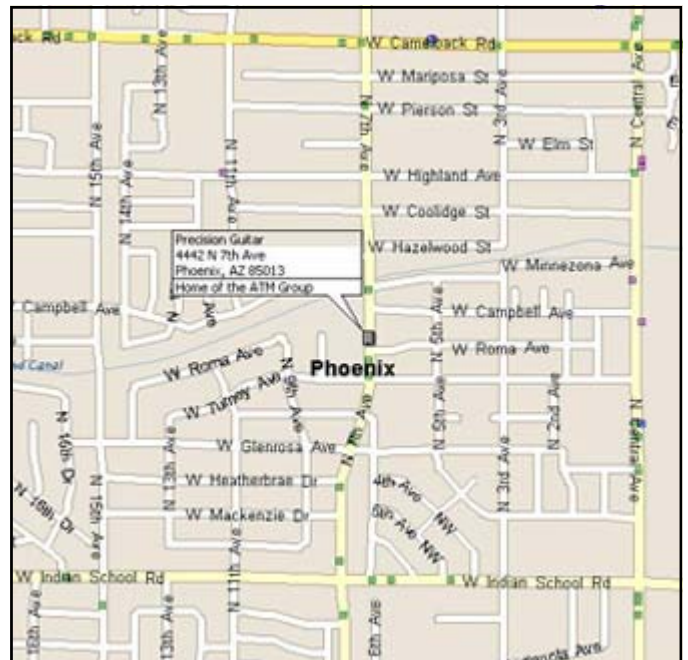


Head west on I-10 to the 339th Ave exit (exit 103). Turn North (right) and go two miles to Indian School Rd. Turn West (left) on Indian School and go 2 miles to 355th Ave. Turn North (right). This will turn into Wickenburg Rd. Follow this road for about 12 miles. Just after mile marker 23 you will go through Jackrabbit wash and pass a cattle guard sign. There is a dirt road just after the sign, marked by white painted rocks. Turn on to this road and follow it about .9 miles. Just after you pass through a wash, you'll see the field on your left. If you hit the cattle guard, or the dirt road your on is next to a fence, you've missed the correct road. Go back and look for the white rocks. (see detail map above).

## ATM & Astro-Imaging Subgroup Meetings

The ATM (Amateur Telescope Making) and Astro-Imaging sub groups meet at Thad's Shop, Precision Guitar, on the Tuesday before the General meetings. The address is: 4442 N. 7th Ave, Phoenix. To get there:

Precision Guitar, is located at 4442 N. 7th Ave, suite # 6. Specifically, this is the SOUTHWEST corner of the STOPLIGHTED intersection at 7th Ave and Campbell. (Campbell is 1/2 mile SOUTH of Camelback, and 1/2 mile NORTH of Indian School) The suite on the end sports a large "Allied Cabinet Refinishing" sign on the front of the facade. We are further in (west) at suite 6. Please see <http://www.precisionguitar.net/ShopSatPhotoA.jpg> for a bird's eye view map.....



## SAC Membership Services

**Membership**– Memberships are for the calendar year and are pro-rated for new members as follows: Jan– Mar: 100%; Apr– Jun: 75%; Jul-Sep: 50%; Oct-Dec; 25%.

- \$28.00 Individual Membership
- \$42.00 Family Membership
- \$14.00 Newsletter Membership
- \$ 7.50 Nametag for members  
(will be mailed to address below)

### Magazine Subscription Services

The following magazines are available at a discount to club members. Check the magazines you wish to subscribe to or renew, and pay the club treasurer. Please allow 3-4 months for the order to be processed.

- Sky & Telescope \$33.00/yr
- Astronomy \$29.00/yr

Please Print

**Make Check Payable to : SAC**

**Name:** \_\_\_\_\_

**Bring completed form to a meeting or mail it with your remittance to:**

**Address:** \_\_\_\_\_

**SAC Treasurer  
c/o Al Stiewing  
16210 Desert Holly Dr  
Sun City, AZ 85351**

**City:** \_\_\_\_\_ **St:** \_\_\_\_\_ **Zip:** \_\_\_\_\_

**Phone:** \_\_\_\_\_

Check here if this is an update of information already on file.

**E-Mail:** \_\_\_\_\_

### SAC on the Internet

**SAC has several E-mail mailing lists. To subscribe, send an email to the email address and put **Subscribe** in the subject box.**

**SAC-Announce@freelists.org:** SAC-Announce is a mailing list for just club announcements, Typically 3-5 messages per month.

**SAC-Forum@freelists.org:** SAC-Forum is a general discussion mailing list. Topics should be related to Astronomy or SAC

**SAC-Board@freelists.org:** SAC-Board is a mailing list for discussions of club business. If you'd like to see how the club is run (or not run), or have a question about the club, this is the list to read. Typically month to month matters are discussed.

**AZ-Observing@freelists.org:** AZ-Observing while not a Sac list , is well attended by SAC members. This is the list to with observing places around Arizona. Find out where people are going and what they saw.

### Printed Newsletter

Sac can save a lot of money if you download the PDF version of the newsletter. PDF files are readable by both PC's and Macs. When the newsletter is published, a message will be sent to the address indicated above with the URL of the newsletter. Check the box below if you don't have access to the internet or if your prefer a printed copy.

**Please send me a hard Copy of the newsletter**

# SAGUARO ASTRONOMY CLUB

February 2005

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*Videmus Stellae*



## SAC Schedule of Events 2005

### SAC Meetings

|                       |                |
|-----------------------|----------------|
| Jan 28th, 2005        | Jul 22nd, 2005 |
| Feb 25th, 2005        | Aug 19th, 2005 |
| <b>Mar 25th, 2005</b> | Sep 16th, 2005 |
| Apr 22nd, 2005        | Oct 14th, 2005 |
| May 20th, 2005        | Nov 18th, 2005 |
| Jun 17th, 2005        | Dec 16th, 2005 |

### ATM & Astro-Imaging Group Meetings

|                       |                |
|-----------------------|----------------|
| Jan 25th, 2005        | Jul 19th, 2005 |
| Feb 22nd, 2005        | Aug 16th, 2005 |
| <b>Mar 22nd, 2005</b> | Sep 13th, 2005 |
| Apr 19th, 2005        | Oct 11th, 2005 |
| May 17th, 2005        | Nov 15th, 2005 |
| Jun 14th, 2005        | Dec 13th, 2005 |

### SAC Star Parties

| Date                 | Sunset      | Astronomical<br>Twilight Ends | Moonrise    | Site     |
|----------------------|-------------|-------------------------------|-------------|----------|
| Jan 8th, 2005        | 1740        | 1908                          | 0706        | F        |
| Feb 5th, 2005        | 1807        | 1931                          | 0549        | F        |
| <b>Mar 5th, 2005</b> | <b>1831</b> | <b>1954</b>                   | <b>0434</b> | <b>F</b> |
| Apr 2nd, 2005        | 1853        | 2018                          | 0319        | F        |
| May 28th, 2005       | 1918        | 2053                          | 0532        | C        |
| Jun 25th, 2005       | 1945        | 2131                          | 2313        | C        |
| Jul 30th, 2005       | 1932        | 2108                          | 0126        | C        |
| Aug 27th, 2005       | 1901        | 2029                          | 0009        | C        |
| Sep 24th, 2005       | 1822        | 1946                          | 2253        | C        |
| Oct 29th, 2005       | 1742        | 1946                          | 0428        | F        |
| Nov 26th, 2005       | 1724        | 1851                          | 0312        | F        |

F= Flat Iron; C= Cherry Road