

Event Horizon

December 1998

Volume 6 Issue 2

A Star In The East

by Denise Kaisler
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October's installment of Event Horizon saw the publication of "The Three Wise Men", an article devoted to the accomplishments of ancient Chinese astronomers. But just as the history of Western astronomy wasn't written in one chapter, so it is with the sky-lore of the Middle Kingdom.

Another part of this history -- one which we in the west might find particularly exciting -- is the one in which missionaries versed in European astronomy first journeyed to the far east. This period began at the end of the sixteenth century, a time when the celebrated Ming Dynasty was in decline and much Chinese astronomical knowledge had been lost or forgotten.

Father Matteo Ricci was the man who began this exchange of ideas in earnest. This Jesuit priest was a contemporary of Tycho Brahe and a student of Clavius. Ricci's master was known to be in charge of Gregorian calendrical reform and it's probably for that reason that the Moon's largest crater is named after him.

Like many educated men of his time, Ricci was not only well-versed in the

natural sciences, but also in law, the humanities, and of course theology. His goal in visiting China was not only to disseminate knowledge or learn about a foreign culture. He hoped to win converts to his religion by impressing the Chinese with his "superior" western science.

Soon after his arrival on August 7, 1582, Ricci did indeed begin to impress the scholars of Chao Ch'ing Fu with his new ideas. He resided in that southern city for a number of years, eventually taking on a student who helped him translate Euclid's *Elements* into the Han script. Eventually, the more zealous of Ricci's admirers began calling Ricci the world's greatest savant.

However, what really made the priest's reputation was his calculation of the solar eclipse at Nanch'ang in 1592. To the imperial court, eclipses were of the utmost importance. Court astronomers were required to give precise times for these events so that he necessary rituals (some of which required the presence of the Emperor himself) could be scheduled. But, since they lacked the accurate cosmogony, the court astronomers were often wrong.

Of course, the court astronomers had an ingenious way of covering up. When an eclipse was of different duration, they would say that the heavens were out of order. Deviations from the "true" calculations meant that odd or evil circumstances would follow.

However, Ricci had other ideas. He noticed that the numbers that were being used at Nanch'ang had actually been drawn up for the city of Beijing, far to the north. He explained that the eclipse was "less than had been foreseen" because of the difference in latitude between the two cities. This was an admirable accomplishment,

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Astronomers make a 3D map of the heavens by measuring the angular separations of stars.

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Chair's Report

The HAA general meetings are one of the main activities of our club. Many of the presentations require the use of an overhead projector. In the past we were able to borrow the Hamilton Spectator's projector but they have a new policy which now prevents us from using it. Since the meetings are such an important part of our club the council decided to purchase our own. Come down to the Spectator building on the second Friday of most months and see the new overhead projector for yourself. I'm sure that you will enjoy the talks too!

In keeping with this month's general meeting topic of **Choosing a Telescope** I am recommending that you check out the excellent information on the Celestron web page at: <http://www.celestron.com/tel4ast.htm>. The next web site, <http://>

asteroid.lowell.edu/, is timely since the ecliptic is now high in the sky in the evening making asteroid hunting a worthwhile activity. You should also check out the Near Earth Asteroid Rendezvous (NEAR) home page at <http://near.jhuapl.edu/>. On December 20th the NEAR spacecraft will fire its rockets in preparation for settling into an orbit around the asteroid Eros.

Be sure to make note of the meeting dates in the yearly **Calendar of Events** in this issue since some of the General Meeting dates are not on the 2nd Friday of the month due to scheduling conflicts.

Stewart Attlesey
attlesey@interlog.com

Editor's Report

If you have not yet renewed your membership, you should do it now to avoid missing any issue of **Event Horizon**. This issue is the last issue which will be sent out to members who have not renewed.

Be sure to remove the 1999 Calendar or Events (the last page of this issue of *Event Horizon*) and place it in a prominent location in your home so you don't miss any of next year's exciting events. All the possible Binbrook observing nights are marked on the calendar, as are General meetings, star parties, and other special events.

Proposed Binbrook observing nights are also listed in the monthly calendar of events, so if you don't want to wait until 1999 to do some observing

check out the December nights. What better way is there to celebrate the holidays than to observe the night sky with friends. But, don't forget to **dress warmly** (see November's Rob's serving Report for helpful hints), and **call one of the contacts** before heading out.

Rosa Assalone
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Don't forget to renew your membership!

HAMILTON AMATEUR ASTRONOMERS

Event Horizon is a publication of the Hamilton Amateur Astronomers (HAA).

The HAA is an amateur astronomy club dedicated to the promotion and enjoyment of astronomy for people of all ages and experience levels

The cost of the subscription is included in the \$15 individual or \$20 family membership fee for the year. Event Horizon is published a minimum of 10 times a year.

HAA Council

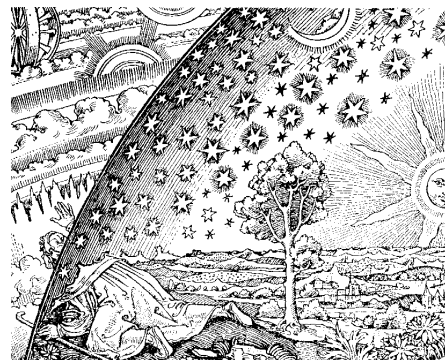
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Constellation of the Month - Auriga

Margaret Walton

The brightest star in Auriga, Capella, is the closest star to the pole and is visible at some time during the night all year at our latitude. The constellation's midnight culmination is in mid-December, so this is the best time to view this constellation. There are several fine open clusters in Auriga, many of them visible in binoculars.

Many stories are attached to the constellation of Auriga. One story says that Auriga is a shepherd holding a she-goat. The goat raised Zeus when he was an infant, saving him from his father Cronus.

Auriga may also represent Erichthonius, the fourth king of ancient Athens, who was lame and invented the chariot. Auriga is also said to be another charioteer, Myrtilus, the charioteer of King Oenomaus. The king had a daughter,

Hippodameia, and the King set a challenge for all her suitors. They would have to race him in a chariot race. If they won, they would marry his daughter; if they lost, they forfeited their lives. Oenomaus' horses came from the god Ares and were swifter than the North Wind, so unbeatable. The Gods intervened when it came to Pelops, the son of Hermes. Poseidon gave Pelops a gold chariot drawn by winged gold steeds. To ensure his victory, Pelops plotted with Myrtilus to replace the lynchpins from the axles of the king's chariot with wax. He was promised half the kingdom and a night with the bride. Pelops was victorious, but during their celebration, Hippodameia resisted the advances of Myrtilus. On the ride home, Pelops kicked Myrtilus off the chariot, killing him. Hermes paced Myrtilus in the stars in appreciation of his trickery.

There is yet another chariot story connected with Auriga. Phaethon was the son of the sun god Helios and Clymene. Phaethon begged permission to drive the sun-chariot

through the heavens for a single day. His father gave in to him, but Phaethon soon realized that the chariot was harder to handle than he had imagined. He lost control and in order to bring order back to the world, Zeus hurled a thunderbolt at Phaethon. He died and fell into the river Eridanus.

Objects

M36 (NGC1960) - Bright, rich open cluster of magnitude 6. Can be seen through binoculars.

M37 (NGC2099) - Rich, condensed open cluster of magnitude 5.6. Another binocular object.

M38 (NGC1912) - Bright, large rich open cluster of magnitude 6.4. Can also be seen through binoculars.

In 7X binoculars, all three of the above clusters can be seen in the same field.

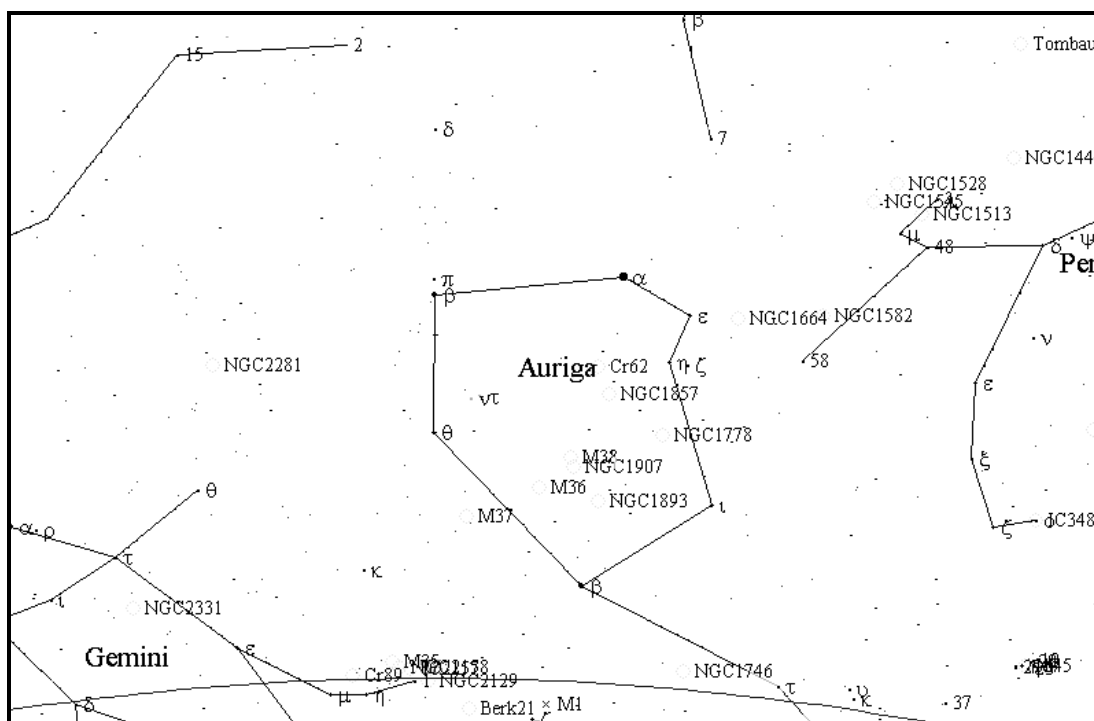
NGC1857 - Rich open cluster of magnitude 7.

NGC1893 - Large rich cluster involved in large emission nebula.

NGC1907 - Rich open cluster of magnitude 8.

NGC1931 - A bright, large open cluster with nebulosity.

IC405 - Flaming Star Nebula - very large, very faint nebula. Need to use an OIII or nebula filter.



Rob'serving Report

This month's Binbrook observing nights are scheduled for Dec. 12/18/19. Call Rob Roy (692-3245), Bret Culver (575-9492), or John McCloy (523-4359) at 7pm for local weather conditions and to confirm. Your December Event Horizon contains the HAA 1999 Calendar of Events. Remove it and put it in a prominent place to check meeting and observing dates.

If you missed the Leonids (and who didn't around here), December holds prospect for another good meteor shower, the Geminids. For some it is their favourite because it reliably puts on a decent show. The slow-moving, graceful "shooting stars" appear to emanate from near Castor, a point about as far as you can get from the Sun in mid-December.

The Geminid meteor shower is quite different from other meteor showers in that it appears to get its dust and debris not from a comet but from an Earth-crossing asteroid, Phaeton. Some astronomers argue, however, that Phaeton is the dead nucleus of a burned-out comet that got captured in a tight orbit. Apparently, the jury is still out on this one.

The shower lasts from Dec. 7-17, peaking on the night of the 13/14th between 10pm and 4am. Expect to see at least 60-70 meteors per hour against a dark sky, five days ahead of December's New Moon. If you wish to see them from a reasonably dark site at the Binbrook Conservation Area, give me a call around 9pm on Dec. 13.

Another strong winter meteor shower is the Quadrantids. The only major shower not named after a modern constellation, this one emanates from the site of an obsolete constellation known as Quadrans Muralis, which

appears on nineteenth-century globes and atlases. It was probably dropped in 1932, when the names and boundaries of the 88 current modern constellations were adopted. These meteors radiate from the area between the Big Dipper's handle, Draco's head, and the head of Bootes. It is sometimes called the Bootids.

Interestingly, this is the only major shower whose source is not known for sure. It might have originated about 500 years ago from a defunct comet. Although the just-past full Moon isn't co-operating, the best time to view them is between midnight and dawn of Jan. 3/4.

By the way, if you purchase only one astromag a year, it should be the January "Sky and Telescope" (in my humble opinion.) The January issue includes the "Sky Gazer's Almanac". This invaluable two-page insert contains for the entire year the times of rising/transit/setting of the planets and major stars in addition to sunrise/sunset/twilight, moonrise/moonset as well as the latter's phases. Once you learn to how to read and use it, you won't leave home without it.

Jupiter's Satellite Phenomena

There are only a couple of months left for good Jupiter observing before it gets too close to conjunction with the Sun. Get out and have a look. Possibilities are: a TRANSIT of a satellite or its SHADOW across the face of the planet, an OCCULTATION as it passes behind the planet, or an ECLIPSE by Jupiter's shadow.

Shadow transit times which occur between evening and morning twilight are listed below. Times are converted to Eastern Standard Time (EST). The first time is the start of the shadow crossing (ingress) and

the second is the end (egress). *- only one of the shadow's ingress and egress times may be listed when the other occurs before evening twilight or after Jupiter has set.

A window of UT (Universal Times) is given below so you can search in "Sky and Telescope" and in the "RASC Handbook" -1998 & 99 for other events you may wish to observe. Events on either side of this window occur either before evening twilight or after Jupiter has set. To get your local EST subtract 5 hours from the UT shown for each event.

Dec. 15 Io 22:38 ---> 00:51 (16th)
 ? 16 Europa 23:24 ---> *
 ? 17 Io 17:07 ---> 19:20
 ? 24 Io 19:03 ---> 21:16
 ? 27 Europa * ---> 17:55
 ? 31 Ganymede * ---> 18:21
 ? 31 Io 20:59 ---> 23:12

Jan. 2 Io * ---> 17:41
 ? 3 Io 17:55 ---> 20:32
 ? 7 Ganymede 19:25 ---> 22:23
 ? 9 Io 17:24 ---> 19:37
 ? 10 Europa 21:32 ---> 23:08

For other events, search the table in the "RASC Handbook"- 1998, page 167 and the 1999 edition, page 182 between 22:30-04:00 UT. Jupiter is setting earlier each night. "Sky and Telescope" also includes Jupiter's satellite phenomena in its monthly issues.

Jupiter's Red Spot

(Continued on page 5)



(Continued from page 4)

You can check the list below to see when the Great Red Spot is likely to be visible on Jupiter. After each date the meridian transit time is given in EST to the nearest hour, so you will see it near but not necessarily on the centerline of the disk at that time. Because Jupiter's day is less than 10 hours, you often may have two transits in one day (morning then evening) or two per night on consecutive days (evening then morning). If you want exact transit times, "Sky and Telescope" lists them in Universal Time for each day of the month.

Dec. 12(12am)(8pm), 14(10p), 16(11p), 17(7p), 19(9p), 21(10p), 22(6p), 24(12a)(8p), 26(5p), 28(11p), 29(7p), 31(1a)(9p).

Jan. 2(10p), 3(6p), 5(8p), 7(10p), 8(5p), 9(11p), 10(7p), 12(1a)(9p), 14(10p), 15(6p).

Monthly In-Sights

December

11 - Mira is at maximum brightness.
13/14 - Geminid Meteor Shower- best after midnight.
19 - 11pm Mercury at greatest western elongation (22 deg.)
21 - 8:56pm Winter Solstice.
22 - 1pm Ursid meteors peak.
25 - 6am Jupiter 1.2 deg. N of the Moon.
30 - 4:56-5:40pm Occultation of Aldebaran by the Moon.
 - Saturn stationary then resumes its direct eastward motion for the next 9 months.

January

3/4 - 6pm Quadrantids meteor shower peaks. Only two days after full Moon.
5 - Regulus 0.2 deg. S of Moon.

The Planets

Mercury is a morning "star", Dec. 11 (1/3 crescent), Dec. 16 (1/2 lit), Dec. 20 (2/3 lit).

Venus is too close to the Sun for observation until early Jan. 1999, when it will become an evening phenomenon.

Mars rises at about 1 am in Virgo. Very small size- not much of a telescope object, but steadily increasing in apparent diameter.

Jupiter starts in Aquarius moving into Pisces and shines brightly until about 11pm. You can't miss it as the brightest object to the south at dusk.

Saturn is visible until about 1:30am in Pisces. Its fairly large disk and the appreciable tilt of the rings continue to make it a nice fall object! Try to find the Cassini Division close to the outer edge of the rings. The smaller satellites Rhea, Dione and Tethys are challenges for small telescopes. Enceladus is a little more difficult again.

Neptune & Uranus are rather low in the evening sky.

Rob Roy,
Observing Director
royrg@mcmaster.ca



Did you know that...

it is estimated that upwards of 100 million "shooting stars" hit the earth's atmosphere every day.

Rob Roy

HAA E-mail Checklist

On Mon., Oct. 5, an e-mail notice was sent out so we can check and update our membership's e-mail address book.

If you DIDN'T get this notice it's because:

- a- you're not on our list
- b- you're on the list but we don't have your correct address
- c- you don't even own a computer and furthermore you don't give a hoot!

If you fit into a or b and want to be included in notices sent out for events such as BCA observing nights or meeting dates and speakers, please send a message to royrg@mcmaster.ca and he will add you to the address book.

Rob Roy

A Star In The East (continued...)

(Continued from page 1)

especially considering that Ricci was a pre-Copernican. He still thought the Sun went around the Earth.

Ricci's explanation of the eclipse gained the attention of the Emperor and after a few years, the Jesuit was summoned to Nanjing, the Ming capital. Ricci carried with him many gifts for the emperor, hoping to win favour with the son of heaven. Naturally, most of his reasons were diplomatic, yet a few were science-related.

By gaining the emperor's trust, Ricci hoped to be allowed to calculate an ephemeris -- a long table showing eclipses and positions of the planets. He had to be sure of where he stood because in Ming China, a man could be beheaded if he tried to calculate an ephemeris without the permission of the imperial court. The Chinese believed that events on earth were directly caused by celestial

phenomena and accordingly, took their astronomy very seriously.

When Ricci arrived with his gifts, both the emperor and his court were amazed. Clocks that ran seemingly of their own accord! Crystal prisms that made rainbows out of ordinary light! No one had ever seen such wonders.

However, when Ricci was given a tour of the observatory at Nanjing, it was his turn to be astounded. In his memoirs he wrote that "we certainly had never seen or heard of anything in Europe like them." With something approaching reverence, he proceeded to describe four great bronze instruments atop the giant stone platform.

The first of these was a celestial sphere. It had a diameter exceeding six feet and was set into a box which hid whichever part of the sphere was below the horizon. The box also concealed the gears which drove it. Around the bronze sphere were several bamboo hoops, representing the ecliptic (the path of the Sun) and the orbit of the Moon.

Next was also a large gnomon mounted on a marble slab. Father Ricci described with delight how a groove had been cut into the base. The groove could be filled with water, allowing for very precise levelling of the instrument. With this giant bronze finger, court astronomers could observe to a high degree of precision the time of a solstice or equinox.

Also present was an armillary sphere, a double set of rings mounted one

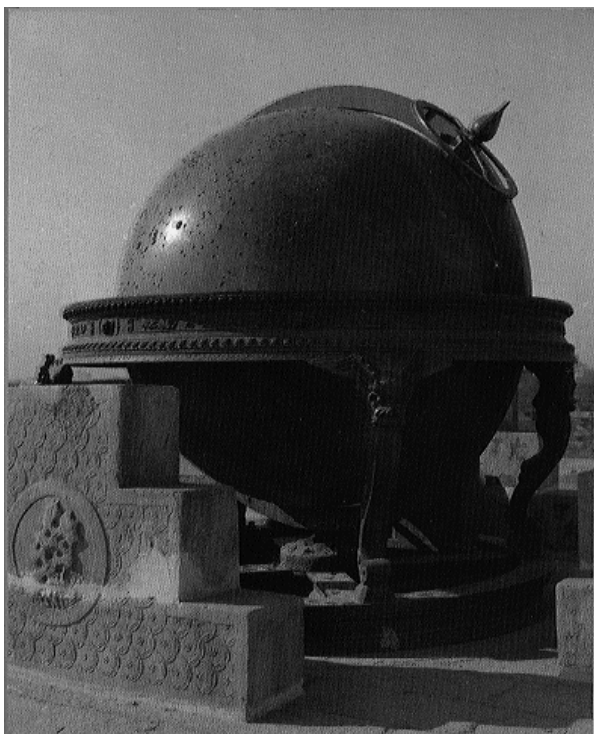
within the other and free to swivel about. It was used to determine the altitude or azimuth of heavenly bodies and so differed greatly from the European armillas, which were models used to describe the universe, not to observe it.

The fourth device at Nanjing apparently did not have a proper English name. Ricci described it as a "compendium instrument, consisting of three or four huge astrolabes in juxtaposition, each of which having a diameter greater than one geometrical pace [one armspan]". Further, he described how the graduations had been ingeniously marked by iron studs. Anyone familiar with the device could line the instrument up with a star read off its coordinates by touch alone. There was no need to ruin one's night vision by using a light.

Later on, Ricci travelled to Beijing, the northern capital and saw other instruments so similar to those he had seen earlier that he was convinced both sets had been made by the same artisan.

Once Ricci had gotten over his awe, he wrote to Europe, requesting that another missionary be sent -- one with real training in astronomy. Despite the good impression he had made, Ricci felt as if he was out of his depth.

So, although it was years later, Ricci's request allowed Fathers Ferdinand Verbiest and Adolf Schall to journey to China and have their own adventures -- some of which, as we'll see next month, put them in fear of their lives.



This star globe in modern-day Beijing is similar to the one seen by Ricci.



Magazine Discounts for HAA Members

As a member of the Hamilton Amateur Astronomers you are eligible for subscription discounts for the following magazines:

Sky and Telescope: \$37 U.S. funds per year (12 issues)



Astronomy Magazine: \$35 U.S. funds per year (12 issues)

The regular rates for Canadian subscriptions are:

Astronomy Magazine: \$50 US

Sky and Telescope: \$ 46.95 US

That's a savings of \$10-15 US or \$15.50-23.25 CDN!!

If you are interested in subscribing to either of these magazines or wish to renew an existing subscription at club rates, please contact Ann Tekatch at 575-5433. You need to fill our your subscription form with either an enclosed US money order, or with your VISA number filled in. All orders must be given to Ann, who will send them on to the appropriate magazine.

More T-shirts and Sweatshirts!

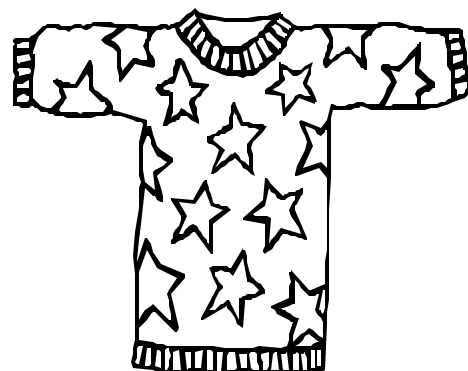
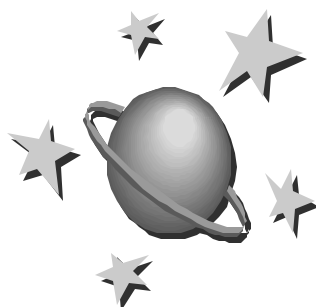
Good news! The technical problems we had with Doug Welch's graphic t-shirt design have been resolved and we are now accepting orders for shirts with the "To infinity and beyond!" design.

Prices have been tentatively set at \$28 each for the sweatshirt and \$14 each for a t-shirt.

The shirts are oatmeal in colour with a large scenic design on the front. (I will try and have a copy of the graphic at the November and December meetings.)

Before we can go ahead, we need 20 confirmed orders. If you are interested in getting one of these beautiful shirts, fill out the order form below and either mail it or hand it to me. Make your cheque payable to Hamilton Amateur Astronomers.

Ann Tekatch
575-5433



Mail Orders to:

Ann Tekatch
19 Pheasant Place,
Hamilton, ON
L9A 4Y4.

NAME:

PHONE:

EMAIL ADDRESS:

SWEATSHIRT

| | |
|-------------|---------|
| SIZE: SMALL | LARGE |
| MEDIUM | X-LARGE |

T-SHIRT

| | |
|-------------|---------|
| SIZE: SMALL | LARGE |
| MEDIUM | X-LARGE |

RASC Calendars and Observer's Handbooks

The Observer's Handbooks and RASC calendars have been ordered and will be available at the November and December meetings. Handbooks will cost \$14 and calendars \$8. At these prices, they won't last long! Buy yours early!

1998 Leonids Meteor Shower

The following image shows the 1998 Leonids meteor shower.



The image was obtained at the Astronomical Observatory Modra (Astronomical Institute of the Faculty of Mathematics and Physics, Comenius University Bratislava) through Zeiss Distagon (fish-eye) objective 3.5/30 mm.

This equipment is used in Slovak part of the European Fireball Network which is coordinated by the Astronomical Institute of the Slovak Academy of Sciences and Astronomical Institute of the Academy of Sciences of the Czech Republic .

Exposure in the guided mode begun on November 16th 23:33:00 UT and lasted more than 4 hours till November 17th 3:37:10 UT. About 150 bolides brighter than -2 mag can be seen. The brightest fireball is about -8 mag. Zenithal hourly rate of the shower estimated from visual observations was about 400.

http://www.uniba.sk/~ago_modra/

CALENDAR OF EVENTS

- December 12, 18, 19, 8:00pm
- Friday, December 18, 7:30pm
- **Thursday**, January 14, 7:30pm
- January 15, 16, 22, 23, 8:00pm
- 4359.
- Tuesday, January 17, 7:00pm

BINBROOK OBSERVING NIGHTS - For confirmation or directions call Rob Roy at 692-3245 or Bret Culver 575-9492 or John McCloy 523-4359.

HAA COUNCIL MEETING - At the home of Rosa Assalone.

HAA GENERAL MEETING - At the Spectator Building auditorium

BINBROOK OBSERVING NIGHTS - For confirmation or directions call Rob Roy at 692-3245 or Bret Culver 575-9492 or John McCloy 523-

HAA MEETING - McMaster Burke Science Building, room B148.