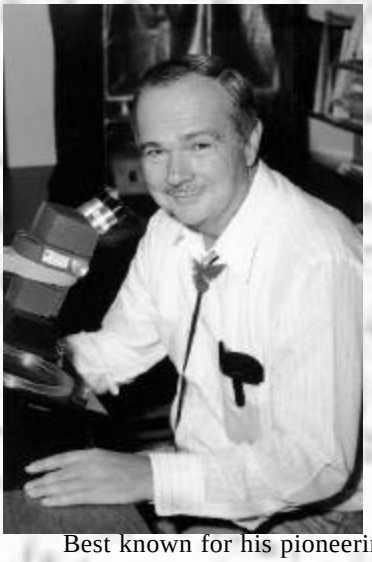
Hamilton Amateur Astronomers

Event Horizon

Summer 1997 Volume 4 Issue 9

Eugene Shoemaker

The world has lost one of its most renowned scientists with the death of Eugene Shoemaker at age 69. On the afternoon of July 18th, Gene and his wife, Carolyn, were involved in a car accident in central Australia. He was fatally injured; Carolyn suffered broken ribs but is expected to recover. The pair had arrived in Australia just six days before to study some of the continent's numerous impact craters -- an annual trek Down Under that they'd made a habit in recent years.



Best known for his pioneering work in elucidating the mechanics of impacts and in the discovery of Earth-crossing bodies, Gene gained worldwide fame in March 1993 for his discovery, with Carolyn and colleague David Levy, of a comet that would strike Jupiter 16 months later. Comet Shoemaker-Levy 9 was just one of the finds that made this husband-wife team the leading comet discoverers of this century. They are also credited with discovering more than 800 asteroids. But the one research interest he never tired of was Meteor Crater, the kilometer-wide pit east of Flagstaff, Arizona.

While still in his teens, Gene realized that someday astronauts would walk on the Moon, and from that point forward his whole professional life would be directed toward becoming one of them. But a medical condition prevented him from ever being selected for the Apollo program. “Not going to the Moon and banging on it with my own hammer has been the biggest disappointment in life,” he said last year. “But then, I probably wouldn't have gone to Palomar Observatory to take some 25,000 films of the night sky with Carolyn -- she scanned them all -- and we wouldn't have had the thrills of finding those things that go bump in the

Ann's Excellent Observing Table

Ever since I built my 12.5" telescope, I've been looking for a small table to hold my star charts and other essential astronomy bits and pieces.

It's not that the larger telescope requires any more charts or accessories, it's just that my old telescope (an 8" reflector) fit into the hatchback of our Daytona. The car's long hood functioned very nicely as an observing table. I would throw a towel on it to protect the paint and to keep things from sliding around and “voila” I would have a table. The new 'scope won't fit in the car and must be carried in our minivan. Unfortunately, the van's hood is too small to be used as a table, so I've been laying my charts and things on the van's floor and working from there. But stooping over to read charts on the van's floor causes too much back strain. I needed a table!

I decided that the perfect table would have:

- three legs to prevent it from rocking on uneven ground
- adjustable legs to allow the table top to be kept level regardless of how uneven the ground was
- to be high enough so I wouldn't have to stoop over it
- to be light, small and easily stored in the van.

(Continued on page 3)

inside...

Editorial

I hope everyone has been out observing this summer because we have finally had some excellent skies and lots of great star parties.

On page 4 is an article entitled "UFO Scope" which describes a really interesting project. When I contacted Bill Beaty to get his permission to print his article he had the following additional comments:

"I've been hoping that some amateur astro people would build a high-gain version and check out various sources. A friend said that comets sound like rushing wind, and that aurorae make some sort of noise. My version can't pick up star twinkle, but I suspect that it might have interesting sounds, since starlight is coherent, and if it forms interference fringes. Motion of the fringes across a small scope aperture might cause more than just rumbles and thumping."

He has since expanded his article but I was unable to include the changes due to time and space limitations. I recommend taking the time to explore all of his science pages at:

http://www.eskimo.com/~billb/

I have recently had an interesting time observing NGC6888, the Crescent Nebula. This object is located in Cygnus and requires a filter like an O III plus as much aperture as possible. This is the object that forms the background for page one of the newsletter. I only hope that it survives the photocopying process.

Stewart Attlesey
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Rob'serving Report

Jupiter's Satellite Shadow Transits

The first time is the start of the shadow crossing (ingress) and the second is the end (egress). Because of the large number of shadow crossings for a two month period, I have included only those that begin and end during viewing hours and the double shadow transits. All times are Eastern Daylight Savings. There are two double shadow transits in August and one in September.

Aug. 9 Europa 23:08 ---> 02:00 Aug. 10
Aug. 10 Io 22:32 ---> 00:50 Aug. 10
Aug. 16 Ganymede 22:40 ---> 02:19 Aug. 17
Aug. 17 Europa 01:43 ---> 04:34
!!! Double transit visible Aug. 17 01:43 ---> 02:19 !!!
Aug. 24 Ganymede 02:41 --->*
Aug. 24 Callisto 04:18 --->*
!!! Double transit visible Aug. 24 04:18 to dawn !!!
Aug. 25 Io 02:22 ---> 04:40
Aug. 26 Io 20:51 ---> 23:09
Sep. 2 Io 22:46 ---> 01:04 Sep. 3
Sep. 3 Europa 20:10 ---> 23:01
Sep. 4 Io 21:11 ---> 01:01 Sep. 5
Sep. 10 Io 00:42 ---> 03:00
Sep. 10 Europa 22:45 ---> 01:36 Sep. 11
Sep. 17 Io 02:37 ---> 04:55
Sep. 18 Europa 01:21 ---> 04:11
Sep. 18 Io 21:06 ---> 23:24
Sep. 21 Callisto *---> 20:13
Sep. 21 Ganymede *---> 22:25
Double transit visible from dusk to 20:13
Sep. 25 Io 23:02 ---> 01:19 Sep. 26
Sep. 28 Ganymede 22:48 ---> 02:26 Sep. 29

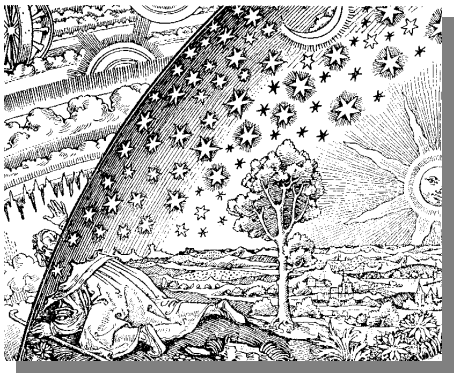
For other events, such as eclipses, occultations, transits of satellites and the remainder of the shadow transits, search the table in the

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.



Ann's Excellent Observing Table ...

(Continued from page 1)

The table's top could be made from easily available thin plywood but the table's legs proved to be a real challenge.I checked the local hardware stores and couldn't find anything suitable. I was resigned to the fact that I would have to design some kind of tripod to set the tabletop on. That's when the light bulb above my head came on! A TRIPOD!!!!

This flash of inspiration hit me about a half hour before a night of observing at Binbrook. I dashed into the basement and found a suitable piece of 1/4" plywood. After rummaging around the workbench, I found some 1/4 - 20 T-nuts (it's amazing the stuff that astrophotographers have in their basements, eh?). I quickly drilled a hole in the centre of my plywood "tabletop", hammered in the T-nut and - ***presto!*** - instant observing table!

I tested the strength of my new table by attaching the plywood top to the tripod and then setting Uranometria off to one side of the table - no problem, the tripod's screw held the tabletop securely enough to prevent the whole thing from toppling over. However, if I wanted to tilt the tabletop to hold Uranometria at a convenient viewing angle, the book kept sliding off. I dashed back into the basement!

A strip of 1/2" x 1/2" wood attached along the bottom edge solved the problem!

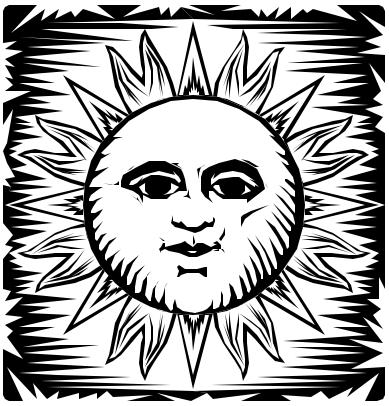
The entire "table" took me less than 15 minutes to put together. Its height is completely adjustable and the three legs keep the tabletop steady on uneven ground. It's absolutely perfect! And cheap, too! (If you already have a heavy duty tripod.)

After field-testing my table, I've added a few more niceties. While observing, I found the table very handy for holding eyepieces. Although the lip along the bottom sort of kept the eyepieces from rolling off, it wasn't very good. I have since drilled two 1.25" holes in the tabletop. Extra eyepieces sit very securely in these holes. I've also sealed the plywood and covered it with some self-adhesive vinyl to keep the wood from getting wet and warping. The plywood could have been painted, but the vinyl covering has a very cute astronomy theme to it - I couldn't resist.

My Excellent Illuminated Clipboard fits very nicely on the table, too!

There you have it - Ann's Excellent Observing Table! Try it, you'll like it...

Ann Tekatch



Rob'serving Report ...

(Continued from page 2)

"RASC Handbook". In August check between 01:00-09:00 UT. At the beginning of September between 00:00-08:00 UT and near the end between 00:00-10:00 UT. Jupiter is rising about 1 hour earlier every two weeks. To get your local EDT subtract 4 hours from the UT shown for each event.

Monthly In-Sights

August

- 11/12- Perseid meteor shower peaks.
- 17- Double shadow transit on Jupiter. (see above)
- 21@10pm- Moon passes just 0.008 deg. south of Saturn.
- 24- Double shadow transit on Jupiter. (see above)
- 25-Moon passes 0.3 deg. north of Aldebaran.

September

- 1@8pm- Partial Solar Eclipse.
- 16:morning- Mercury at greatest western elongation, 18 deg.
- 18- The Moon is 0.2 deg North of Saturn
- 21- Double shadow transit on Jupiter.
- 22- Aldebaran 0.3 deg. south of Moon.
- 22@1956EDT- Vernal Equinox.

- Mercury moves into pre-dawn sky-best views in 3rd. week of Sept.
- Venus is low in the evening twilight and sets about 1 hour after sunset..
- Mars is in the SW in the evening and sets 2 hr. after dusk. Very small angular diam.
- Jupiter rises near sunset and is visible predawn twilight.
- Saturn rises early/mid evening.
- Neptune & Uranus are near the Sagittarius/Capricorn border.

Rob Roy
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"UFO Scope"

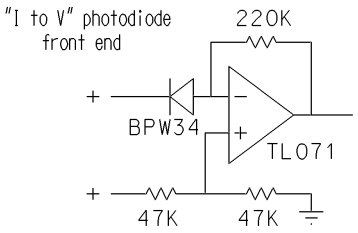
UFO SCOPE
(c)1996 William Beaty

- Binoculars
- Small solar cell
- Audio amp
- Headphones

Something I always wondered about regarding UFO sightings. Say it's night, and you see a light in the distant sky. Is it really an airplane? Or suppose it is behaving oddly, performing maneuvers impossible for an aircraft, etc. Is the light coming from that object similar to that of a lightbulb? Specifically, is the light amplitude of that object pure and smooth DC? After all, nearly all manmade light sources are modulated as a result of their AC power supplies, so their brightness is vibrating with audio frequency. Connect a solar cell to an audio amplifier, hold it under an incandescent bulb, and you'll hear MMMMMMMMMM at 120Hz. So, what sort of vibration might be imposed on those distant lights in the sky, hmm?

As a kid with an electronics hobby I once taped a selenium solar cell to the eyepiece of a small 50X telescope, routed it to an audio amp, then pointed it at distant light sources at night while listening to the signal. Incandescent streetlights give a deep hum, their AC light output is a pure 120Hz sine wave. Mercury and sodium vapor bulbs are nonlinear, they give a complex 120Hz waveform that sounds like WHAANNNNNNNN. Neon signs sound different, with a squealy high frequency buzz component to their 120Hz fundamental. Automobile headlights are DC, so I never tried viewing them. Recently I saw an article by (I think) Don Lancaster which mentioned that headlights are modulated by car vibrations, so I checked it out and yes, car headlights give off a continuous soft gonging sound even on smooth highways. Their filaments vibrate, and different cars give
different pitches of "bell" sounds. Aircraft strobes are easy to detect as a loud clicking. Other aircraft lights *may* have a standard 800Hz modulation (from their 400Hz supplies), but the thermal inertia of their filaments tends to filter out any high frequencies. Maybe with a low noise detector the 800Hz of aircraft lights could be sensed.

I put together a better viewer recently. Binoculars provide a "sighting scope" even when one eyepiece is occupied by a photocell. A Seimens BPW34 PIN photodiode and opamp front end gives a bit more gain than my selenium cell. Headphones give much better low frequency response than a speaker. And the whole thing can be battery powered and duct-taped to a set of large-aperture nighttime binoculars. Any light source appearing in the field of view of one side will be heard as optically demodulated audio picked up by the other.



If you build this "UFO Scope", definitely make it a point to use it quite a bit before going hunting for "craft." You want to become familiar with the sounds of all conventional light sources, including lamps, headlights, aircraft, fires, and if you manage to crank the gain high enough, the twinkle patterns of various stars. That way you'll be able to point the device at the local version of "Marfa Lights" and either say "yeah, sure, it's just headlights," or possibly "holy ----, aliens modulate their ship lights for voice comm!"

If a similar device is attached to the eyepiece of a large telescope, will any interesting sounds be received? For example, the flame of a candle *sounds* like the low rush of a burning candle. If the nucleus of a comet has wailing gas jets, occasional explosions, vibrating plasma, etc., perhaps some of the comet's reflected light will become modulated, and the original sound could be extracted by the photodetector.

So far I've not encountered any mysterious lights. I have found that my single opamp stage doesn't give enough gain to "hear" the dimmest light sources without burying them in noise, so it's time to modify the thing. Bigger gain resistor, a few tens of picofarads across it to prevent oscillation, etc.

The next HAJA meeting will be on Monday, September 15th, 1997 at 7pm in the Burke Science Building, room B148. We will not be meeting in August due to summer vacations.

The Hamilton Amateur Junior Astronomers (HAJA) is a group for children aged 12 and under. The meetings generally consist of a brief discussion about a current astronomy topic, followed by a fun activity. In the last year we have talked about many interesting topics. The HAJA home page lists some of the topics with links to related sites. You can visit our home page at:

http://www.science.mcmaster.ca/HAA/HAJA/Haja.html

In September we would like to plan some additional activities for the children. We could go on a group field trip to the Toronto Science Centre one Saturday, or perhaps to a park for a picnic and some solar observing.

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The Orbiting Gourmet (Part 2): Soup's On!

One of the neat things about astronomy is that once you learn about how something works, you can spot the same processes in lots of of seemingly unrelated things. Take the Sun, for example. Bet you never thought of it as analogous to a bowl of soup! But the two are more alike than you might at first realize.

"Despite the differences, miso soup, illustrates a process that happens throughout the universe."

The missing link is a process called convection. Both the Sun and the soup want to be the same temperature as their surroundings, so they get rid of excess heat by stirring themselves up. In the Sun, bubbles of hot gas rise to the surface, where they can radiate their energy to space. Then the cooled cells sink back down, only to be heated up again in the Sun¹s interior.

These bubbles of gas rising to Sol's outer surface give it a granular appearance. Each bubble is an enormous 700 km across - slightly more than the distance from Hamilton to Montréal - yet exists for only about 10 minutes. It's a fascinating show, but limited only to those with meter-class telescopes.

However, you can observe convection in your very own kitchen by fixing yourself a tasty bowl of miso soup. Miso is the Japanese word for fermented soy bean paste, a savory additive that's low-calorie and rich in protein. Just whip up a batch using the following recipe and serve hot. You'll be able to see the delicate grains of miso billowing up from the bottom in graceful clouds.

Realise of course, that temperature isn't the only difference between your soup and the Sun. The medium for convection is a liquid in the first case and a gas in the second. There's also a change in mixing length - the typical distance that a heated cell rises. For your soup, the mixing length is no larger than the depth of your bowl, while in the Sun, it's millions of times larger.

Despite the differences, miso soup, illustrates a process that happens throughout the universe. The outer fourth of the Sun is churning in this way, as is the Earth's atmosphere. Pre-main sequence stars don't just have a convective region, they're fully convective. The is phenomenon even crops up in pulsating variable stars, where it serves to dampen the radial oscillations.

So ladle out a bowl of miso soup. It'll not only fill your stomach. When you contemplate how the swirling broth relates to the rest of the rest of the universe, it'll also fill your mind.

Convecting Miso Soup (serves 4)

3 1/2 cups instant dashi (fish soup stock)*
2 -3 tbsp miso paste*
1 package firm tofu (optional)
3 green onions
soy sauce

Method:

Prepare the dashi according to package directions. Cut the green onions into tiny rings.

Stir the miso paste into a small amount of the soup stock to soften it up. Pour this back into the soup pot and stir, adding the green onions and soy sauce to taste. Bring to a brief boil. Don't let the mixture boil for longer than a few seconds, or the miso will lose its flavor.

If you like, cut up a package of firm tofu and add the cubes at the same time as the onions.

* Look in the ethnic foods section of your local grocery store for these items. If you can't find them, visit any Asian grocery store. One such place is Yum-Yum's on the corner of Locke and King in Hamilton.

If instant dashi is unavailable, you can make the stock yourself using 30 g each of dried anchovies and kelp to 3 cups of water. Boil until the mixture is reduced to 2/3 of the original volume.

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Astrologic Puzzle Answer

Bill was observing M13 and Rosa had the 3-inch refractor.

From L to R, Bill, Ann, Doug, Rosa and Stewart, using 10, 6, 8, 3, and 4-inch scopes respectively which were white, gray, pink, black and green in colour. They observed M13, the double-double, M57, Albireo and a-Herculi using Norton's, Mag-6, Cambridge, Uranometria and Sky Atlas 2000.

Thanks to the thousands who submitted answers and helped solve this puzzle. Complete set of Naglers went to Zelda Zorkovich. Congratulations, ZZ! Now that you know the whole story, there's not much point in my writing about this star party for Event Horizon.

NOTE: I intended in #4. that: IMMEDIATELY to the left of the green scope was the black one. If you assumed that it could be anywhere to the left, there are other solutions. Apologies for the oversight.

Rob Roy
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SEDS-Canada

I would like to inform you of the second annual SEDS-Canada multimedia contest on the world wide web. SEDS-Canada is a national educational organization dedicated to encouraging students to pursue studies in science and engineering by generating interest in space exploration.

There are three essay topics which are categorized according to the academic levels of the SEDS membership. A total of $1,200 in prize money will be awarded to the best entries. Contest guidelines are posted at http://www.seds.ca/Contest/. As well, a short description of the topics is enclosed. I would appreciate your assistance in distributing the contest flyers to your members.

If you have any questions regarding the contest, do not hesitate to contact me. My phone number at work is 978-4560 and my e-mail address is: christine.marton@utoronto.ca. I look forward to receiving many excellent entries from your members.

Yours sincerely,

Christine Marton
Treasurer
June 23, 1997

SEDS-Canada Multimedia Essay Contest

Web site: **http://www.seds.ca/Contest**
email: **seds@seds.ca**

SEDS-Canada is proud to present its second annual Multimedia Essay Contest. Space exploration is not only about astronauts, rockets, and robot probes It is also about inspiration, imagination, and insight. The purpose of this contest is to give students across Canada an opportunity to inject new inspiration, imagination, and insight into the Canadian space program. To allow students to express themselves to the fullest, the format of the competition is a multimedia essay, an HTML document rich with text, graphics, animation, video, and sound. Scholarships and prizes with a value up to $500 will be awarded to the best essays.

Inspiration SEDS-Canada invites the students across Canada to produce and submit an original, self-contained multimedia essay about space exploration for ready use on the World Wide Web. The actual space exploration topic depends on the writer's age group (kindergarten to grade 8, junior/senior high school, college/university).

Eligibility Those eligible are all Canadian students from kindergarten to grade 13, CEGEP, and University or College undergraduates. All entrants must currently be studying in a Canadian secondary or post-secondary educational institution. Entrants must address the essay topic designated for their grade level.

Awards The student with best multimedia essay for each level will awarded an cash award and his/her entry will be placed online at the SEDS-Canada WWW site for a year. All finalists will receive a certificate of merit. All entrants will receive a free annual student membership in SEDS-Canada and subscription to Ylem, the SEDS-Canada newsletter.

Imagination All multimedia essays must be original works, but may include references obtained from online sources or published material (in any media). All references, online or not, should be cited (identify the original author, title, publication/site, URL, and date).

General Guidelines

All multimedia essays must be created using HTML and may include:

- graphics (in .GIF or .JPG format, including animated .GIFs)
- video (in Quicktime, RealVideo, or MPEG-1 format)
- sound (in .AU or .WAV format, or using RealAudio)
- Java applets and/or JavaScript interactive virtual environments (in VRML)

The multimedia essays may be created in English and/or French.

All multimedia essays should include a cover HTML page with the student's full name, grade/year, school or institution, and address (including email address if any). The cover page should also include a very short introduction of the student, describing how and why s/he got interested in space exploration. Group entries are only allowed for the K-Grade 8 level category. All other entries must be individual.

All entries must be viewable on a standalone multimedia computer using Netscape Navigator 3.0 or Microsoft Internet Explorer 3.0.

Contest entries are due on October 1 7, 1997 and can be mailed to: SEDS-Canada, c/o Christine Marton, 125 Hanson St., Toronto, ON, M4C 1A3

All entrants will be notified by November 28, 1997, if they have been selected as finalists The winners will be contacted and their prizes will be mailed.

Essay Topics:

Diary of a Canadian Astronaut (Kindergarten-Grade 8 Level)
First Prize: $100

Canadian astronauts like Bjarni Tryggvason are conducting research that
will help design the International Space Station. Space stations represent one step in humankind's ongoing quest to explore the solar system and beyond.

Follow a day in the life of a Canadian astronaut during an actual space shuttle mission (such as Bjarni Tryggvason's upcoming flight on STS-85), and in doing so, answer the following questions: What does an astronaut do aboard the shuttle? What

SEDS-Canada ...

sort of work does s/he do? How does s/he sleep? How does he/s eat? How does s/he have fun? Did going into space change her/his personal outlook of the world? What does Canada look like from space?

Builders of the Arrow (Junior/Senior High School Level)
First Prize: $200

The most famous plane in Canadian history is the Avro Arrow (CF-105) which was rolled out on October 4, 1957. 1957 also marked the dawn of the space age as the then Soviet Union launched Sputnik 1, the first orbital satellite. Two years later, the 50th anniversary of Canadian aviation saw the Canadian government cancel the Arrow program and destroy all Arrow aircraft.

Many highly skilled engineers and technicians left Canada to work on the fledgling American space program. Examine the background of key personnel from the Avro Arrow project, and discuss in detail their contributions to the Arrow project, as well as their contributions to the American and Canadian space program.

New Life for Mars (College/ University Level)
First Prize: $500

Viking 1 and 2 were the first spacecraft to land on Mars. Launched in 1975, their mission was to determine whether life had existed on that planet. However, they found no strong evidence for the existence of life on Mars, even in a primitive form. Twenty years later, 1997 will see the rendezvous of Mars Pathfinder and Mars Global Survey at Mars, as well as the launch of the Cassini mission to Saturn.

Using data from past robotic missions, including Viking, design both the biological experiments, and the probe that would deliver them to the planetary surface, that could test for the presence of life. Discuss why Viking tests results may have been inconclusive.

Observing Double Stars

Dear Friends in Astronomy:

I have just read the article “Observing Double Stars” which appeared in the March 1995 (Vol.2, Issue 5) issue of EVENT HORIZON, and thought that you might be interested in the DOUBLE STAR OBSERVER.

I have just begun to republish the DOUBLE STAR OBSERVER after stopping two years ago due to arthritis problems. A new doctor has greatly improved this condition, so the DOUBLE STAR OBSERVER is back. It is a quarterly newsletter devoted entirely to double star observing, and will soon return to its former worldwide distribution. A subscription to the DOUBLE STAR OBSERVER is only $6.00 U.S. funds outside of the United States. This price covers publication costs and mailing. Hopefully, the low price will encourage amateurs to subscribe.

If you are interested in subscribing, please send a Canadian postal money order for $6.00 U.S. funds, made payable to Ronald C. Tanguay. The address is:

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Clear skies & good seeing.

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Ask the "Expert" (Part two)

I cannot understand how astronomers can know how our galaxy looks, or where we are located in it.

Brian Chire

Yes, this is last month's question again. The first time I tried to answer this I ran out of room. To refresh your memory, I previously explained how Shapley found that globular clusters formed a spherical shell centered somewhere in the direction of Sagittarius at a distance of 25,000 to 30,000 light years. And now for the rest of the story.

In the 1920's Jan Oort and Bertil Lindblad measured motions of stars in the vicinity of the Sun. They found that the motions would be best understood if the Sun and surrounding stars were orbiting some distant point. It appeared that the Sun is orbiting a more-or-less circular path around a point many thousands of light years away. This agreed with Shapley's observations of globular clusters.

Recent measurements show that the Sun is orbiting the centre of the Galaxy at a distance of about 8.5 KiloParsecs* (KPc) at an orbital speed of about 220 Km/sec. With this information and the assumption that the density of stars in the Sun's vicinity is typical for the whole galaxy it is possible to estimate the mass of the galaxy. This is done using Kepler's law as modified by Newton to include the masses of two bodies in orbit.

$$(m_1 + m_2)\, P^2 = a^3$$

where:

m1 - mass of the Sun
m2 - mass of the galaxy
P - orbital period in years
a - semimajor axis in AU**

* 1KPc = 3.08×10^{16} Km
** 1AU = Distance from the Earth to the Sun
To calculate the period:
P = Orbital circumference/Orbital speed

$$= \frac{(8.5\ \text{KPc} \times 3.08\text{x}10^{16}\ \text{Km/KPc} \times \pi \times 2)}{220\ \text{KM/Sec}}$$

$$= 7.477\text{x}10^{15}\ \text{seconds}$$

= 237 Million Years

Since the mass of the Sun is insignificant relative to the Milky Way, Kepler's formula can be simplified to:

$$m = a^3/P^2$$

$$= \frac{(8.5\ \text{KPc} \times 2.0628\text{x}10^{8}\ \text{AU/KPc})^3}{(237\ \text{MYr})^2}$$

$$= 9.6\text{x}10^{10}$$ or 96 billion Suns

(Continued on page 10)

NEAR: Flying by Mathilde

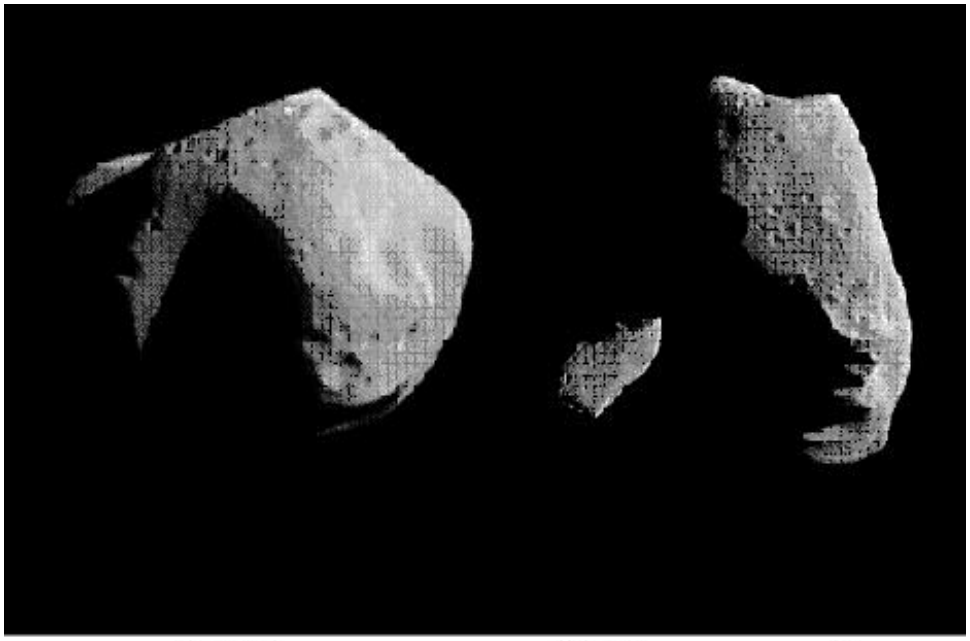
On June 27 at 8:50 am EST the asteroid Mathilde finally had a visitor. The NEAR spacecraft passed within 1200 km of the asteroid and flew by at 10 km/sec. Mathilde is a dark C-type asteroid some 60km in diameter which rotates once every 17.5 days. The encounter took place some 2 au from the Sun and some 1.7 au from Earth. Due to power limitations the only working instrument was the multicolour camera. Here are some of the first findings from the encounter:

Size: ~ 50 X 53 X 57 km
Volume: 600,000 km³(±30%)
Mass: ~1017g(±6%)
Density: ~ 1.3 g/cm³
Albedo: 3%
5 craters > 20 km across.
Largest crater 30 km across,6 km deep.
No satellites found yet.

For more information go the NEAR web page at **http://sd-www.jhuapl.edu/NEAR**.

Below is a comparison of Ida,Gaspra and Mathilde.

Ray Badgerow
667883@ican.net



August / September Night Skies

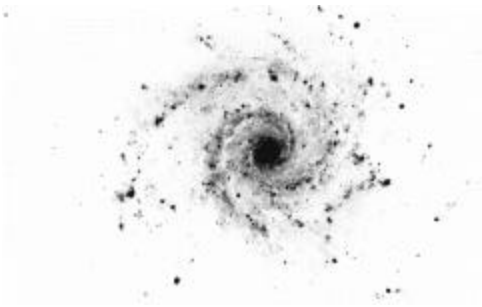
Ask the "Expert" ...

(Continued from page 8)

Since the Sun is a larger than average star, the number of stars must be a few hundred billion. Note that this ignores the mass beyond the orbit of the Sun including dark matter.

So far we know that our galaxy is a disk and has a mass at least 96 billion times that of our own Sun. Further details about our galaxy are to be found using radio telescopes to measure the energy given off by hydrogen at a wavelength of 21.1 cm. One advantage of using this wavelength is that it can pass relatively easily through obscuring gas and dust in our galaxy as compared to visible wavelengths. When a radio telescope is pointed in a particular direction in the plane of our galaxy the 21.1 cm emission is picked up from all locations along the line of sight. Due to variations in the rotational speed with distance from the centre of the galaxy it is possible to measure the distribution of hydrogen. This is because of the variation of the emission frequency from 21.1 cm from Doppler shifting. In this way it is possible to map out the spiral structure of the Milky Way.

From the mass and distribution of stars we can conclude that the Milky Way is similar to many other spiral galaxies visible in the night sky. A whole book could be written about this subject but I hope that this gives you at least a partial answer.



Spiral Galaxy M74 in Pices

Doug's Stuff Fer Sale

(2) 8" blanks
$65 each

(3) 6" blanks (400 grit ground 2 sides)
$45 each

6" Pyrex blank + ceramic tool
$75

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$50

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$40

Don't see what you'd like? Ask me!

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(905) 524-0848 (home)
welch@physics.mcmaster.ca

CALENDAR OF EVENTS

♦ Aug 29, 30, September 5, 6, 26, 27	**BINBROOK OBSERVING SESSIONS** - Proposed observing nights. For confirmation or directions call Rob Roy (692-3245) or Ann Tekatch (575-5433)
♦ Tuesday, September 2, 11:59 PM	**EVENT HORIZON DEADLINE** - Please submit your articles and pictures to Stewart Attlesey, **attlesey@interlog.com** or modem (905)827-9105 or snail mail to 1317 Mapleridge Cres., Oakville, L6M 2G8
♦ Thursday, September 4, 8:00 PM	**ROYAL ASTRONOMICAL SOCIETY OF CANADA Hamilton Centre** - General Meeting - Spectator Building auditorium.
♦ September 5,6 &7	**HURONIA STAR PARTY** - Put on by the South Simcoe Amateur Astronomers. Contact Christopher Trace (905)729-4982 for details.
♦ Friday, September 12, 7:30 PM	**HAA GENERAL MEETING** - at the Spectator Building auditorium. Speaker to be announced. Parking lot observing, weather permitting.
♦ Monday, September 15th, 7:00PM	**HAJA MEETING** - McMaster Burke Science Building, room B148. See Page 4.
♦ Friday, September 19, 7:30 PM	**COUNCIL MEETING** - Location to be announced. Call Doug at 525-9140 Extension 23186 if you are interested in attending.
♦ Saturday, September 20, 8:00 PM	**COSMOLOGY DISCUSSION GROUP** - Room B148 (next to the Planetarium) Burke Science Building, McMaster University. Topic will be "Introduction to Cosmo logy". For more information contact Bill Tekatch at 575-5433 or **tekatcba@mcmail.cis.mcmaster.ca**