Hamilton Amateur Astronomers

Event Horizon

January 2006 Volume 13 Issue 3

The Cranky Curmudgeon Ponders Red Shift

by Bill Tekatch

Ever since Edwin Hubble found that the red shift of galaxies increased with distance, red shift has been a keystone topic in cosmology. While the professional scientific community now recognises that the galaxies are not moving away from us at great speeds, they still use terminology as if that were the case. They know that it is space itself that is expanding, ever increasing the distance between distant-galaxies. I say distant-galaxies because the galaxies in our local group are not separating from each other.

So through the years, various explanations were proposed for the cause of red shift from the Doppler Effect, to tired light, to the current General relativity stretch. General relativity theory allows the expanding space to stretch light. I have a difference of opinion that is probably more of a difference of perspective. At first glance it appears that the general relativity explanation breaks the Law of Conservation of Energy. How can a photon be stretched, being changed from the original wavelength to a longer wavelength of lower energy and not lose energy?

There are likely several perspectives that are equally correct, and here is my take. If the universe is apparently expanding, it obviously had an ever-increasing density the farther back in time that we look. That higher density or concentration of matter also meant that the gravitational field intensity was higher. So a photon formed in an earlier denser universe undergoes gravitational red shift as it travels to our current lower density universe. Gravitational red shift is well understood, proven, and by coincidence just happens to also be a part of General relativity theory. Sometimes it is just a matter of perspective.

Bill Tekatch is a founding member of the HAA, ran the Cosmology Discussion Group for some time, and has written several articles on cosmology.

HAA Telescope Clinic Summary

by Mike Jefferson

January 06/06 Teamsters Hall, 460 Parkdale N., Hamilton, ON

At the HAA Telescope Clinic there were about 23 people in attendance to give and get help in the operation of newly acquired optical equipment from Christmas, 2005. John 'Galileo' Gauvreau spent considerable time helping his student Maggie and her husband work through the operation of their new mirror lens spotter, while Mike Spicer (in his usual, very professional attire) entertained numerous listeners with tales of the mysteries of "Optics Through the Looking Glass"! GOTO's that set themselves up automatically, a 'queen of hearts' refractor, telescopes easy enough to be operated by children and cheap ways of circumventing expensive methods were just some of the 'enigma variations' and 'March hares' he unveiled to the fascination of all listeners. John's astronomy student, Brad, got some instruction in the operation of Anthony Tekatch's reflector. Anthony and Mike Jefferson spent much time discussing early concepts of space travel, the influence of computers, redundancy in spacecraft, spectra, image formation and manipulation, sundry other topics and handing out bits of advice to anyone who wanted any. Glenn Muller demonstrated the advantages of a 6" F8 Newtonian design to Robert, another student of John Gauvreau's, with some input from John and Mike J. Ann Tekatch, Gail Muller (who also did her usual, gracious, hostess 'thing' with the coffee and the hall), Tim Philp (the Patrick Moore of Brantford, ON), Bob Christmas, Greg Emery, Hal Mueller, Darryl & Sandy "Ansel Adams" Maude and other club members were all on hand to assist in many ways and areas. Glenn, Anthony, John and Gail gave assistance and advice to people observing the waxing crescent Moon, through gosammer clouds, in the parking lot at the end of the presentation. Four of us gathered at Tim Horton's on Parkdale N. afterwards, for further discussion and 'back of the envelope' stuff, until far into the very cold night! Nuts? "What do **WE** care what other people think?" All in all, a good and instructive time was had by every participant.

by Mike Jefferson

Email Reminder notice

We send email reminders before each meeting which describes the location, time and topic of the general meeting.
If you're not on the list, make sure that you receive your reminder by sending a note to:
publicity@amateurastronomy.org

An Offer

Thinking of buying your first telescope but wondering what kind to get? Before you buy, consider this offer from Mike Spicer: a "loaner" 5 inch telescope with electronic alt-az controls. The scopes are lightweight, easy to set up and very easy to use. Mike is offering newer members of our club one of these telescopes to try out for a month or so. Interested? You can reach Mike by email at deBeneEsse2001@AOL.com or by phone at (905) 388-0602.

Articles submissions

The HAA welcomes your astronomy related writings for the Event Horizon newsletter. Please send your articles, big or small, to:
editor@amateurastronomy.org
The submission deadline is two days before each general meeting.

HAMILTON AMATEUR ASTRONOMERS

Event Horizon is a publication of the Hamilton Amateur Astronomers (HAA).
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Submissions to the web site or newsletter are welcome, and may be edited for size & content.

Chair's Report

by Glenn Muller

Despite a media predilection for terrorist tsunamis of avian flu, astronomers have rung in the last few "New Years" with some exciting planetary missions. 2004 saw Spirit and Opportunity bounce into the spotlight on Mars, and 2005 revealed the true nature of Saturn's rings and several of its moons, including the tantalizing surface of Titan. For 2006, we can expect the January launch of *New Horizons* which is a long-awaited mission to Pluto.

For a small orbiting body, barely visible in backyard scopes, Pluto has garnered a lot of attention lately. With the discovery of slightly larger, more distant, worlds Pluto suddenly finds itself the focus of a benchmark debate over what constitutes a planet.

Briefly covered, during last October's presentation titled "Planets and Pretenders", the HAA will devote an evening for discussion on organizing solar system objects into categories that encompass all the variables.

While a couple of hours may be hardly sufficient to scratch such a large surface I still anticipate some entertaining thoughts on the possibilities. So, to get the wheels turning, here is some applicable information:

Pluto:

- With a diameter of 2274 km there are 5 known moons that are larger.
- Currently credited with 2 moons of its own.
- Its orbit ranges from 29 AU to 49.5 AU and, although that occasionally brings it closer to the Sun than Neptune, Pluto has the most eccentric orbit of the planets.
- Considered to be part of the Kuiper Belt yet it is no longer the largest KBO discovered.
- During its close approaches to the Sun, Pluto forms a thin nitrogen/carbon monoxide atmosphere which eventually refreezes.
- Tidally locked with its moon, Charon, the two bodies always have the same side facing each other.
- Charon may draw molecules from Pluto's atmosphere.
- It is possible, though unknown, that Pluto has a magnetosphere

Other objects:

- Some moons, like Titan, have atmospheres.
- Some moons, like Ganymede, have magnetospheres
- Some asteroids have moons
- Some moons are asteroid-like – they could either be captives of the host planet or debris from a broken moon.
- Some moons have cometary properties – a good example is Enceladus, shown in a Cassini image releasing icy jets.

Additional factors:

- Several exo-planets have been discovered, many with several times the mass of Jupiter. When such objects have at least 13 times Jupiter's mass, they have the ability to burn a hydrogen-like element called *deuterium*. This could push them through the upper limit of the "planet" category into the "brown dwarf" category.
- Finding a lower size/mass limit may be the most difficult parameter to define.
- An object may change states so it may be simplest to categorize solely on the objects current state.
- After determining basic categories (i.e.) Planets; Moons; Asteroids; Comets etc; a series of subcategories may further group the individual variables (i.e.) composition; diameter; atmosphere; signs of life; orbital characteristics; etc. (see the companion article)

Since the International Astronomical Union (IAU), the recognized clearing house for naming celestial bodies, has no real definition for a planet I see no reason why our discussions should not be as relevant as anyone else's. In fact, despite several *Google* searches, the most comprehensive systems for classifying planets were found on *Star Trek* theme sites.

Within this issue of *Event Horizon* you'll also find suggestions for classifying planetary characteristics, as well as details on the upcoming evening of discussion, so bring it along with your ideas when you come.

Somebody's got to organize the Universe – it may as well be you!

Glenn invites your comments on these topics or any aspect of the club. He can be reached via `chair@amateurastronomy.org`

Creating a Planetary Classification System

by Glenn Muller

Technology has extended our reach into the Cosmos to the point where general terms no longer suffice. Blurry definitions of celestial bodies need refining, and specific catalogues of individual characteristics must be compiled in order to understand how the parts are "put together" and how each part contributes to the overall picture.

For those who take up the challenge it quickly becomes apparent what a monumental task this is. So much so, that very few are willing to put forth any semblance of a system. This possibly explains why the creators and followers of the *Star Trek* television series appear to be among the forerunners in this endeavour.

Unfettered by a need for strict scientific accuracy, Trekkies have boldly gone and created a planetary classification system of their own. Below are some examples of that system and, while it has some obvious flaws, in the absence of readily-accessible alternatives it provides a reasonable starting point:

Class C – Geo-Inactive

Age:	2-10 billion years
Diameter:	1,000 – 10,000km
Location:	Ecosphere / Cold zone
Surface:	Barren, Cratered, Low surface temperature
Atmosphere:	Frozen
Life Forms:	None
Example:	**Pluto, Earth's Moon**

Class J - Adaptable

Age:	4-10 billion years
Diameter:	5,000 – 10,000km
Location:	Ecosphere
Surface:	Barren; little or no surface water
Atmosphere:	Thin, mostly carbon dioxide
Life Forms:	None
Example:	**Mars**

Class K – Gas Giant

Age:	2-10 billion years
Diameter:	50,000 – 140,000km
Location:	Cold Zone
Surface:	Tenuous, gaseous hydrogen and hydrogen compounds Radiates some heat
Atmosphere:	Zones vary in temperature, pressure, and composition
Life Forms:	None
Example:	**Jupiter, Saturn, Uranus, (at 49,532km Neptune could be also included)**

Class M – Terrestrial

Age:	4-10 billion years
Diameter:	10,000 – 15,000km
Location:	Ecosphere
Surface:	Surface water abundant; if water or ice covers more than 80% of the surface then planet is considered Class O (Pelagic) or Class P (Glaciatic)
Atmosphere:	Nitrogen, oxygen, trace elements
Life Forms:	Extensive vegetation, animal life, humanoids
Example:	**Earth**

While the common categories adopted in this system satisfy the requirements of science-fiction television, the omission of important factors like *mass* or *orbital eccentricity* move it away from serious consideration. Also, packaging a set of individual characteristics under single letter "Class" designations will soon result in an unwieldy number of classes, most of which will end up with only one or two members.

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To my mind, though, the greatest flaw is that information in each of the fields is not readily sortable, rendering the most basic of database functions inoperable, and I am of the opinion that a system of categorization needs to be in database form.

When each characteristic has its own field, and variables of that field are assigned values, then, similar items may be grouped together simply by sorting on a given field. While it is acceptable to use numerical values, in the following system I opted for letters since there are 26 distinct letters (A-Z) as opposed to 10 distinct numbers (0-9).

To keep this explanation short and simple I will only introduce some basic components and give a few examples of those. Fields that I would put into a basic planetary database include: *Diameter; Atmosphere; Magnetosphere; Surface Composition; Rotational Period; Orbital Period; Orbital Eccentricity; Host Star Class.*

If you noticed that I, too, omitted major items like *Mass*, it is simply due to my hope that those more qualified will help to fill in the blanks – I'm also of the opinion that this is by no means a one person job!

Anyway, below are some rudimentary values for the above fields:

Diameter: **A** = 1,000 – 5,000km; **B** = over 5,000 – 10,000km;
C = over 10,000 – 25,000km; **D** = over 25,000 – 50,000km;
E = over 50,000 – 100,000km; **F** = over 100,000km

Atmosphere: **A** = thin, mostly heavy elements; **B** = thin, heavy & light elements;
C = moderate surface pressure; **D** = dense, Venusian-like surface pressure;
X = none; **Y** = unknown

Magnetosphere: **A** = weak, unstable **B** = robust; mostly stable; **X** = none; **Y** = unknown

Surface Composition: **A** = barren, dry, cratered;
B = barren, frozen elements, moderate cratering;
C = barren, distinct sections of dry & frozen surface;
D = frozen, ice-like surface; **E** = volcanic, flowing lava;
F = some liquid areas – not water; **G** = water detected;
H = completely covered in liquid – not water;
I = completely covered by water;
J = has liquid and dry areas conducive to biological life;
K = biological life detected
Y = unknown, (dense atmosphere of gas giant)

Rotational Period: **A** = less than 6 hours; **B** = over 6 hours less than 24 hours;
C = 24 – 72 hours; **D** = 4 (Earth) days – 1 (Earth) week;
E = 8 days – 1 (Earth) month; etc.; etc.;
Z = tidally locked (see orbital period)

Orbital Period: **A** = 1 – 10 months; **B** = over 10 months – 30 months;
C = over 30 months to 10 years; **D** = over 10 years – 200 years;
E = over 200 years

Orbital Eccentricity: **A** = 0.000 – 0.010; **B** = 0.011 – 0.020; **C** = 0.021 – 0.050;
D = 0.051– 0.100; **E** = 0.101 – 0.200; **F** = 0.201 – 0.300;
G = 0.301 – 0.400; etc.; etc.

Host Star Rating: This would be based on the common spectral classes **O**; **B**; **A**; **F**; **G**; **K**; **M**

So, applying the above to Earth (SOL 3) for example, you would get: **SOL 3 – c;C;B;K;c;B;B;G**

The translation is that SOL 3 is the 3^{rd} planet from the star catalogued as SOL, and where there is a numerical range lower case letters indicate the lower half of the range:

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SOL 3 -c;C;B;K;c;B;B;G

- **c** - it has a diameter between 10,000 and 25,000km
- **C** - SOL 3 has moderate surface pressure
- **B** - it has a robust magnetosphere
- **K** - the surface has both liquid and solid areas conducive to biological life
- **d** - the rotational period (day) is between 24 and 72 hours *(lower case = lower range – 24 hours)*
- **B** - the orbital period is between 10 and 30 months *(upper case = upper range – 24 months)*
- **B** - the orbital eccentricity is between 0.011 and 0.020 *(Earth is 0.017 - Pluto is 0.248)*
- **G** - the spectral class of the host star is G *(yellow star)*

With additional fields the end result could be a long string of letters. However, once those pertinent fields are standardized they would have a set order of listing - like the table of the elements that is taught in High School - then it would be a simple matter to access, say, a planet's rotational period just by requesting its "field 5 rating" (the value for rotational period would always be in field 5 of the database). This would also allow for quick retrieval of planets with similar values.

For now, though, the most important thing is to determine exactly what constitutes a planet, as opposed to a moon, asteroid, or comet. That will be the first order of business for the discussion night at Teamster's Hall, 7:30pm on Saturday January 21st., and I'm looking forward to hearing all of your great ideas. Keeping in mind that I basically "threw" this together during a cloudy holiday, if you'd like to discuss any of the above feel free to e-mail me at `chair@amateurastronomy.org`

January Skies

by Greg Emery

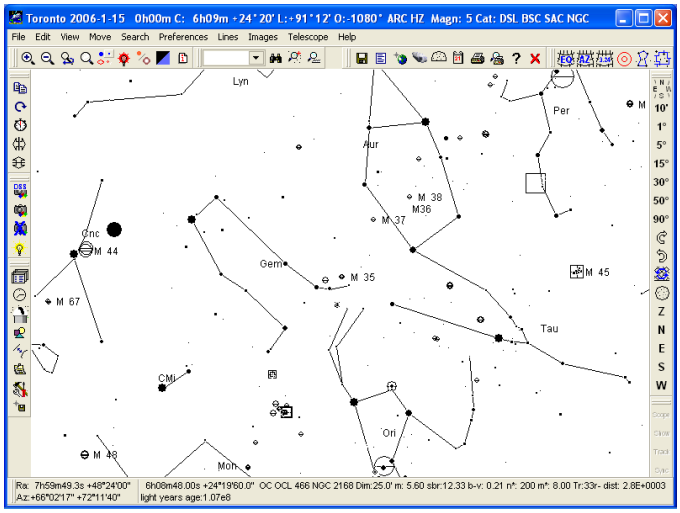
Eventually the skies will clear and we will see the stars. For those of you who are deep sky enthusiasts, the moon will most likely be full – or at least close to it. At this time of year, the winter Milky Way cuts across the sky.

The cold, clear winter nights offer long viewing with the potential for exceptionally clear skies. There are deep sky objects for those of all skill levels.

Binocular Objects:

Binocular objects include Saturn, Mars, and the Moon from our solar system. Deep sky objects for binoculars could include M45, M42, M35 through M38 as well as M52 and the Double Cluster. The chart below shows open clusters M35, M36, M37, M38, M44, M45 and M48. Following the string of open cluster from Auriga down towards Orion and Monoceros, we are tracing the winter Milky Way. The plane of the galaxy is home to open clusters and nebulae. Personally, of the open clusters mentioned I prefer M44, M45 as well as the Double Cluster (NGC 869 and NGC 884) in Perseus.

Some Binocular Targets for January

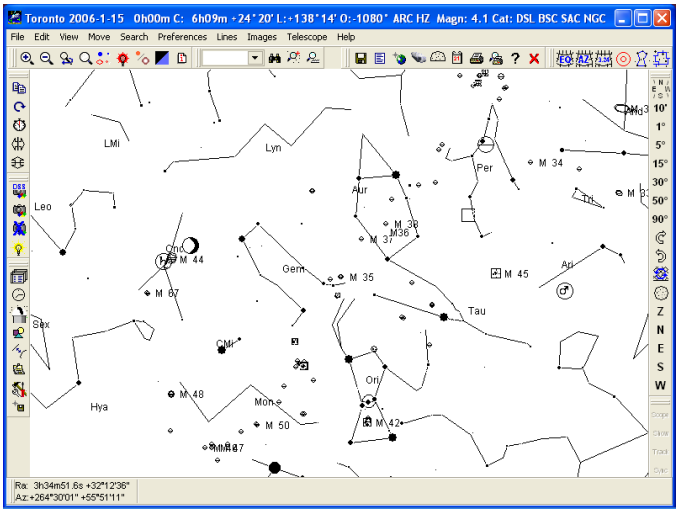


Advanced Binoculars and Telescope Targets.

So what are you to do if you have seen these targets previously and need to be challenged a little more? What if the light bucket from under the Christmas tree is ready for a work out? Consider doing some warm up exercise and light stretching in preparation for the Messier Marathon that is only two months away! Your warm up marathon (really just an astronomical 10K

run) begins with the open cluster M34 in Perseus. From the starting point, proceed southeast to M45 in Taurus, while in Taurus pick up M1 (not shown on the chart). Jumping up to Auriga, follow the string of open clusters down to M41 and M93 in Canis Major (off the bottom of the chart). Remembering Orion to the West will allow you to see M42, M43 and M78.

Messier 10K Warm-Up



Continuing the hunt to the East find M48 in Monoceros and then move northeast to Cancer for M44 and M67.

This covers about 18 of the 110 targets in the marathon. Still feeling like you are up for more? Leo and Coma Berenices are rising in the East. With these two constellations and Ursa Major to the North, the measly 18 targets balloons to the mid-forties, an excellent workout at anytime of the year!

by Greg Emery

Activities summary

2006-01-06 Telescope Clinic a Point-and-Click Success

by Mike Spicer

HAA members turned out to meet the public and provide information on using new telescopes on Friday night at the Teamster's Hall. From 7:30 until almost 10 pm, over two dozen people came by with telescopes, questions and equipment needs. The parking lot was full of cars and the Hall was full of chatter and banter.

Members brought scopes too, to demonstrate the various types, the advantages of each and the kind of equipment used in the club. Gail made sure there was coffee for everyone, Greg and John were effusive with guidance for new people, Anthony, Glenn and Tim were prepared to extol the praises of the Dob and go-to Mak, respectively... Mike had his pockets full of eyepieces to try out on scopes, there were lots of Event Horizon newsletters available and Sandy took photos of the crowd for the web site.

After 9:30 the Moon and Mars appeared in time for scopes to be set up in the parking lot for evening viewing... the first in weeks for many members! You can see we have a great club when a cloudy night brings out so many friends eager to help others enjoy their hobby.

2006-01-06 Sunspot Report, Friday 6 Jan 2005

by Mike Spicer

First, I am pleased to report seeing the sun and some blue sky this morning, one of the few times it has not been overcast in the past six weeks.

Second, I can report that there are NO sizeable sunspots visible this morning as I made video through a 70mm telescope, and so I have returned to making video of the sparrows and finches alighting on a feeding bell in the back yard.

Don't forget that HAA is meeting tonight at 7:30 pm at the Teamster's Hall on Parkdale Avenue for a TELESCOPE CLINIC. This is your chance to see other telescope equipment and give or get information on holiday acquisitions. All are welcome. I hope to see you there.

2005-12-29 Variable Star Observing Report 29 Dec 2005

by Mike Spicer

The annual AAVSO year-end Newsletter was delivered today. It listed the 2004-05 tallies for observations by country, and also by individual observer.

Canada listed 31 active observers who sent in 126,518 estimates, a substantial percentage of the worldwide totals (740 observers sending in 935,526 observations). I suspect the increase in Canadian observers (up from 18 just two years ago) was due in part to the challenge issued by Rick Huziak of Saskatchewan.

HAA member Steve Kinsella was one of the Canadian observers listed, congratulations, Steve! I remember observing with him during the summer and fall, comparing our estimates of the variable stars he had selected to follow. Keep up the good work, Steve!

Interested in Variable Star observing? I prepared a little introductory booklet for a workshop given to another local club this year, if you'd like a copy. Of course you can get all the information you need from the AAVSO:

`www.AAVSO.org`

2005-12-26 5th mag star to be occulted by space rock, Jan 7th *by Mike Spicer*

A SPECTACULAR SATURDAY AFTERNOON ASTRONOMICAL EVENT

Just after 5 pm local time on Saturday January 7th, asteroid # 2152 Hannibal, a distant space rock 47km wide, will pass in front of the 5th magnitude star 12 Aquarii. The star will be 27° above the SW horizon. I am optimistic it WILL be clear that weekend.

12 Aquarii is a naked-eye star and a double star - mags. 5.9 and 7.3, yellow and blue stars separated by 2.8" of arc, easily split even in a small refractor.

It is just 8° W of the beautiful globular cluster M2 and 3° N of open cluster M73... there's lots to see in binoculars while you are waiting for the occultation.

Only one of the two stars that make up 12 Aquarii will be occulted because the asteroid subtends much less than one second of arc. Which of the two stars will momentarily disappear and then reappear 1.1 second later??

If you have a 14" or larger telescope set up to observe this event, then during the star's disappearance you may glimpse the asteroid covering the star... a 16th magnitude object.

If you are imaging the event - lucky dog - try to get a shot of the cluster of galaxies just 3° E, in the same field of view as 5 Aquarii, another 5th magnitude star in Aquarius. NGC 6975-6-7-8 are all in a line just 1/4° S of 5 Aquarii; 6978 is the brightest, but 6976 and 6977 are both beautiful spirals. You'll need a CCD camera and at least an 8" scope to capture an image of these galaxies. A photo of these galaxies is posted on the main page to stimulate (look carefully for several more, very faint, galaxies in the photo).

And the not-so-good news... You will need a western horizon clear of trees, located somewhat north of Hamilton (Orillia, actually). Details at:

`www.asteroidoccultation.com/2006_01/0107_2152_7111_MapNA.gif`

Asteroid occultations of naked eye stars are EXTREMELY RARE. Is anyone interested in mounting an expedition to observe this event? Please let me know at: deBeneEsse2001@AOL.com

2005-12-21 Will you be up Christmas Day at 10 a.m.? Of course! *by Mike Spicer*

Christmas morning, after the kids have opened their presents, after you have all the shredded wrapping paper in a garbage bag, and after your cup of coffee... you can set up a scope at 10 a.m. and train it on the crescent Moon (not the Sun!).

The "dark" side of the Moon will be uncovering Spica, that first magnitude star in the constellation Virgo, at quarter after ten (15h 14m UT to be exact). You can see Spica even in the daytime sky in a telescope! It's your chance to see a lunar occultation on Christmas Day! Don't force the whole family outside or you could miss that sudden reappearance of Spica! Merry Christmas!

2005-12-20 At Last! Great Observing Weather, eh? Tues., 20 Dec 05 *by Mike Spicer*

After three weeks of cloud, some clear nights at last! Have you been out observing this week? I admit that Sunday and Monday were windy - I thought asteroid Andromache was being blown on a brisk breeze for that occultation early Monday morning... but tonight the sky was marvellously clear until the fog rolled in after midnight and Saturn was high in the east in the late evening.

I shovelled off the patio, set up a newly-acquired mount and telescope, had a quick look at the moon after polar aligning and enjoyed a few sights while waiting for the scope to cool down. Yes, it will be cold for the next couple of months, but the air will be crisp and clear. Winter skies are the best!

Tonight Saturn's was symmetrically framed with "moons". As the rings close up, the moons move in narrower ellipses and can "line up" as seen from earth, like Jupiter's moons. Tonight Saturn displayed "moons" evenly spaced in an E-W line-up: Titan opposite a 7th magnitude star, Rhea and Dione opposite each other. And of course the rings, with the Cassini division still visible at each apse.

Have a great Christmas season. May the New Year bring you continued health and happiness. I hope to see you out at the Teamster's Hall on Parkdale for our upcoming meetings on January 6th (a clinic for new telescope owners!), January 13th (our regular monthly meeting) and January 21st (a discussion group led by Glenn).

Upcoming Events

The next HAA General Meeting will be held at Teamsters Local 879, 460 Parkdale Ave. N., Hamilton, (rear entrance) on Friday February 10, 2005 7:30pm. More details here: `www.amateurastronomy.org/`

January 21st, 7:30-9pm: Planets and Pretenders - Part Deux ; a slide presentation, on how newly discovered variables have blurred definitions for solar system objects, will be followed by an open discussion on creating a new system of categorization. Everyone is welcome to attend. Location: Teamster's Hall.

Web Watch

Title: NASA looking for internet volunteers to study Stardust

Site: `http://science.monstersandcritics.com/news/article_1074942.php/NASA_looking_for_internet_volunteers_to_study_Stardust`

Site: `http://stardust.jpl.nasa.gov/home/index.html`

Title: NASA: Whirlwind Disaster (for Kids)

Description: Where do these monster storms we call hurricanes come from? Why do they always form near the equator and only during certain times of the year? How do they come to be so organized and so destructive? You can find answers to these questions and play an exciting hurricane word game called "Whirlwind Disaster" at the SciJinks Weather Laboratory Web site. SciJinks targets young people of middle school age. It is a joint effort of the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA). The new "How does a hurricane form?" page and accompanying interactive game can be found in the How & Why menu on the SciJinks Weather Laboratory home page,

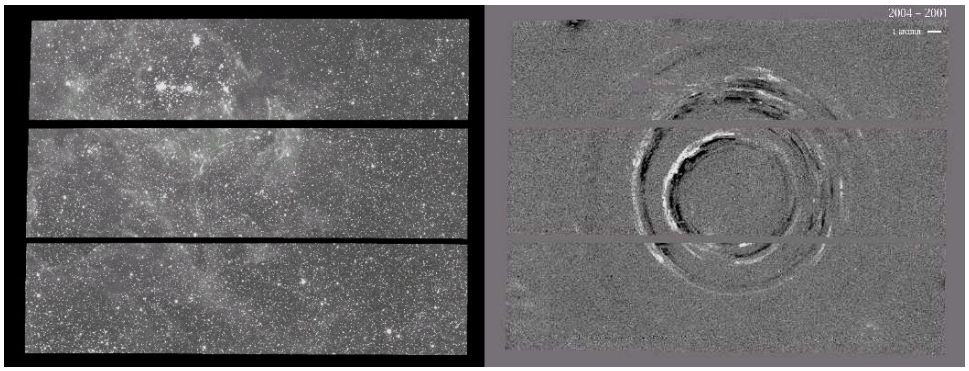
Site: `http://scijinks.gov`

Title: Scientists discover 'light echoes' of ancient supernovae

Description: Astronomers (including HAA's Dr. Doug Welch) have found "light echoes" from three ancient supernovae by detecting their faint, centuries-old light reflected in the clouds of interstellar dust. The finding, to be published this week in Nature, means astronomers will, for the first time, be able to study these important but rare events that appeared hundreds to thousands of years ago.

Site: `dailynews.mcmaster.ca/story.cfm?id=3737`

Site: `www.universetoday.com/am/publish/cfa_old_supernova.html?21122005`



SN 87A at left, light echoes of SN 87A taken between 2004 to 2001 shown on right.

NASA's Space Place

A New View of the Andromeda Galaxy

By Dr. Tony Phillips and Patrick L. Barry

This is a good time of year to see the Andromeda galaxy. When the sun sets and the sky fades to black, Andromeda materializes high in the eastern sky. You can find it with your unaided eye. At first glance, it looks like a very dim, fuzzy comet, wider than the full moon. Upon closer inspection through a backyard telescope—wow! It's a beautiful spiral galaxy.

At a distance of "only" 2 million light-years, Andromeda is the nearest big galaxy to the Milky Way, and astronomers know it better than any other. The swirling shape of Andromeda is utterly familiar.

Not anymore. A space telescope named GALEX has captured a new and different view of Andromeda. According to GALEX, Andromeda is not a spiral but a ring.

GALEX is the "Galaxy Evolution Explorer," an ultraviolet telescope launched by NASA in 2003. Its mission is to learn how galaxies are born and how they change with age. GALEX's ability to see ultraviolet (UV) light is crucial; UV radiation comes from newborn stars, so UV images of galaxies reveal star birth—the central process of galaxy evolution.

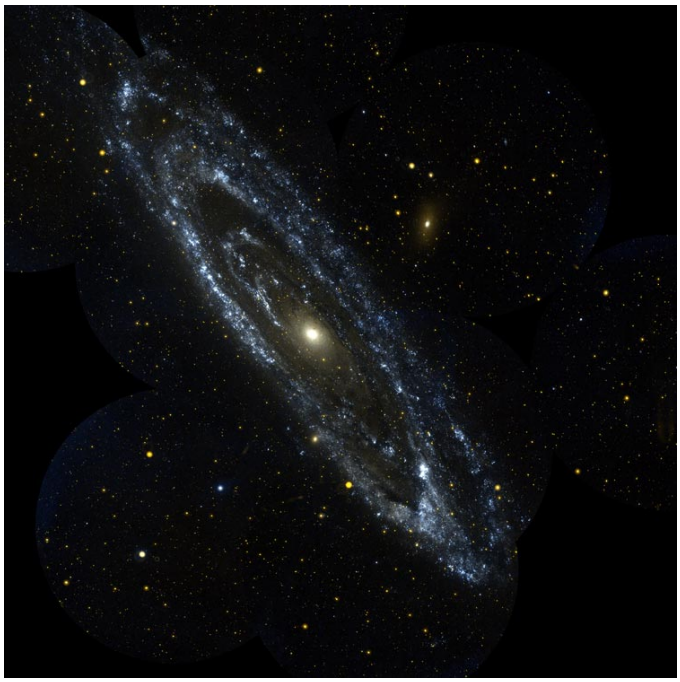
GALEX's sensitivity to UV is why Andromeda looks different. To the human eye (or to an ordinary visible-light telescope), Andromeda remains its usual self: a vast whirlpool of stars, all ages and all sizes. To GALEX, Andromeda is defined by its youngest, hottest stars. They are concentrated in the galaxy's core and scattered around a vast ring some 150,000 light years in diameter. It's utterly *un*familiar.

"Looking at familiar galaxies with a new wavelength, UV, allows us to get a better understanding of the processes affecting their evolution," says Samuel Boissier, a member of the GALEX team at the Observatories of the Carnegie Institution of Washington.

Beyond Andromeda lies a whole universe of galaxies—spirals, ellipticals and irregulars, giants and dwarfs, each with its own surprising patterns of star formation. To discover those patterns, GALEX has imaged hundreds of nearby galaxies. Only a few, such as Andromeda, have been analyzed in complete detail. "We still have a lot of work to do," says Boissier, enthusiastically.

GALEX has photographed an even greater number of distant galaxies—"some as far away as 10 billion light-years," Boissier adds—to measure how the rate of new star formation has changed over the universe's long history. Contained in those terabytes of data is our universe's "life story." Unraveling it will keep scientists busy for years to come.

For more about GALEX, visit `www.galex.caltech.edu` Kids can see how to make a galactic art project at `spaceplace.nasa.gov/en/kids/galex/art.shtml`



The GALEX telescope took this UV image of the Andromeda galaxy (M31), revealing a surprising shape not apparent in visible light.

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Council meetings

All club members are welcome to attend the council meetings. Contact `info@amateurastronomy.org` for details.