

# Event Horizon

February 2006

Volume 13 Issue 4

## Book review

by *Stephen Kinsella*

### The Great Beyond

By Paul Halpern

Published by J. Wiley & Sons, 326 pages \$18.99 Cdn.

The Great Beyond is subtitled “Higher Dimensions, Parallel Universes, and the Extraordinary Search for a Theory of Everything.” The book describes the history of the search for the elusive Grand Unified Theory from the 19<sup>th</sup> century through to the present day.

Right from the start, Halpern introduces the reader to the concept of extra dimensions by describing key aspects of the Kaluza-Klein theory. Halpern then takes us on a history tour of the works of 19<sup>th</sup> century mathematicians who gave us non-Euclidian geometry and scientists like Maxwell who united the laws of magnetism and electricity.

We go through Einstein’s “Miracle Year” in 1905 and the work through both world wars as well as work up to the end of the 20<sup>th</sup> century. The story is not just about the science, but also about the interaction between the scientists; their friendships as well as their rivalries.

All through the book, the reader is carried on a journey of discovery as the author takes great pains to describe the concepts behind the physics being discovered. As an elementary introduction into the world of extra dimensions and some of their implications, I feel Halpern has done an excellent job. He has made the physics very accessible.

I would recommend this book to anyone who would like to learn more about the impact relativity has had on physics for the past 100 years and the lives of some of the great scientists involved in this elusive pursuit.

by *Stephen Kinsella*Email: [skinse@hotmail.com](mailto:skinse@hotmail.com)

## HAA Astro Challenge

by *Greg Emery*

There are quite a few observing lists or challenges available for amateur astronomers to work towards completing. The most famous or prevalent is the Messier List, compiled by Charles Messier from his personal observations as well as observations of others. Other clubs or Societies have their own personal lists, such as RASC’s “NGC’s Finest” or the Saguario Astronomy Club’s list.

The HAA, being what I consider to be an excellent organization, also has several lists for the observer to work on. Two of these have been compiled by Michael Spicer and are entitled “Observing Planetary Nebulae” as well as “Observing Globular Clusters”. The third list is entitled “HAA Astro Challenge” and has been compiled by Greg Emery.

The “Observing Globular Clusters” is a list of 90 globular cluster ranging from the big name clusters such as M13 in Hercules and M22 in Sagittarius to some smaller, less well known clusters. The most southerly of the list have declinations in the -40° to -50°.

The planetary nebulae list contains 100 of the brightest planetary nebulae ranging from some of the most northerly ones down to IC 4406 in Lupus. Both this list, as well as the Globular Cluster list have suggestions for observing, and notes on details to look for.

The HAA Astro Challenge was compiled to specifically be viewable from Southern Ontario with smaller to medium sized scopes. I chose the following criteria when selecting objects: declination north of -30°; magnitude of +12 or brighter; not the usual list of objects and finally, whenever possible, provide a varied list of objects for each constellation. The objects covered by the list includes, galaxies, planetary nebulae, globular clusters, open cluster, supernovae remnants, double stars and variable stars. The list has 317 items, which are classed as one of three difficulty or skill levels. The first level is Charles Messier (Level 1), William Herschel (Level 2) and the most difficult Edwin Hubble (Level 3). The list will be available from the clubs web site in March.

by *Greg Emery*

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**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:

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**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](mailto: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](mailto: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).

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 \$25 individual or \$30 family membership fee for the year. Event Horizon is published a minimum of 10 times a year.

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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

Compiled with input from Bob Christmas, Mike Jefferson, Peter McHugh, Gail Muller, Glenn Muller, Tim Philp, Gary Sutton.

On Saturday, January 21<sup>st</sup>, 2006, a group of HAA members met at the Teamsters Hall to discuss the current, and possible future state, of planetary definition. Coinciding with the first clear weekend sky in weeks, it was a modest gathering but that allowed ample time to explore each person's ideas.

After a short slide show, covering some relevant events and facts, a quick 'round the table' survey of initial thoughts opened the discussion. The points that follow are, more or less, listed in the order that they came up.

(Chair's note: Since no minutes were taken, the following is a recital from memory, and some points have been expanded for clarity)

A *planet* falls within the following parameters:

- apart from slight perturbations, a *planet* orbits its host sun (or suns).
- for minimum size; it must have sufficient mass to generate enough gravity to form itself into a sphere.
- its maximum size must be below that required to burn deuterium (thermonuclear fusion) which is about 13 Jupiter masses.
- a body that, at one time, did generate thermonuclear fusion and has "burned out" is not considered a "planet" but some form of "dwarf sun".
- a body with an extreme orbit that causes it to take on *cometary* properties (halo, and possibly tail) when nearing its host sun, is a *comet*.
- rocky bodies with uneven dimensions are *asteroids*.
- *moons* have sufficient mass to generate enough gravity to form into a sphere.
- a *moon* orbits a planet, and the common center of gravity between the two bodies lies somewhere below the surface of the host planet.
- if the common center of gravity of the two bodies lies above the surface of both bodies, then each are considered planets in a *double-planet* system.

- *asteroids* that orbit a planet are not moons but *captured asteroids*.

At this point, there emerged a couple of couple of salient reasons for the existence of planetary definitions:

1. When new discoveries are announced, the layman can understand basic categories like planet, moon, or asteroid.
2. Objects falling into such categories are often "named" which increases the importance of both the discovery and the discoverer.

Recognizing the need to separate science from publicity, the working group came up with more speculative ideas:

- with the discovery of objects, in all categories, rapidly increasing it is only a matter of time before "officially naming" bodies becomes highly impractical.
- all orbiting bodies that are deemed "individually significant" could be given a catalogue number.
- exceptions may be *ring* or *belt* systems which, though comprised of a multitude of mainly "insignificant bodies", are distinct and fewer in number.
- "significant" would be defined as being "of particular interest".
- the "particular interest" would be up to the individual who is interested in it.
- it would be up to that individual to register the body with the IAU, which could become more of a licensing commission.
- to prevent scams, names may be recorded but not registered.
- by the same token, orbiting bodies should not be bought, or sold, although some regulation for working mineral claims (mining, etc.) would have to be worked out.
- the terms *planet*, *asteroid*, *comet*, would be abandoned as true scientific nomenclature; to be replaced by catalogue numbers only.
- along with the catalogue number would be a series of "properties" to describe the physical characteristics of the body.

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While this may suit the scientific community, the general public will continue to be an influence:

- common parlance will continue to call planet-like bodies *planets*, and refer to anything orbiting a planet as a *moon*.
- common parlance is any (layman) term adopted by the general public; such as referring to a one dollar coin as a *Looney*.
- anything with a name, already, will likely keep it by popular assent.
- therefore, Pluto would likely keep its status as a planet but if Mike Brown (for example) wants 2003UB313 to be a planet, he would have to promote it as such and hope that common parlance adopts it.

In summary, it was generally felt that the IAU (and the scientific community in general) needs to abandon terms such as *planet*, *moon*, etc. and adopt some form of alpha-numeric catalogue system for all orbiting bodies based upon their individual characteristics.

Overall, the evening provided for some stimulating banter and, while the underlying objective was to spend a few hours discussing astronomy with friends, it'll be interesting to see which of the above is relevant when *New Horizons* arrives at Pluto.

Clear Skies!

Glenn invites your comments on these topics or any aspect of the club. He can be reached via:

[chair@amateurastronomy.org](mailto:chair@amateurastronomy.org)



## Web Watch



**Title:** SkyScout: the iPod of astronomy?

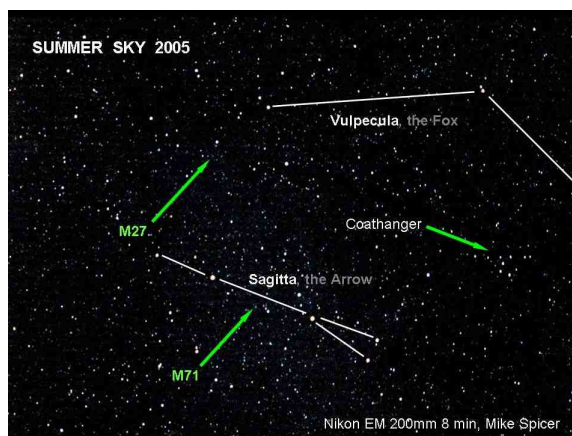
**Description:** The SkyScout is a revolutionary hand-held device that uses advanced GPS technology with point and click convenience to instantly identify thousands of stars, planets, constellations and more.

**Site:** [www.celestron.com/skyscout](http://www.celestron.com/skyscout)

**Submitted by:** Stewart Attlesey

## Spot the Constellations

by Mike Spicer



## The Cranky Curmudgeon Proposes the Law of Conservation of Space-Time

by Bill Tekatch

First here are two relevant quotes.

It is utterly beyond our power to measure the changes of things by time. Quite the contrary, time is an abstraction at which we arrive by means of the changes of things. (Ernst Mach)

When forced to summarize the general theory of relativity in one sentence: Time and space and gravitation have no separate existence from matter. (Albert Einstein)

In researching this topic I found that Kevin J. Parcell wrote an article titled "On the Relativity of Simultaneity" that comes close to some of the concepts in this article, but with a different perspective. You may view his article at [homepage.mac.com/forever.net/Speedoftime/TCFS.html](http://homepage.mac.com/forever.net/Speedoftime/TCFS.html).

I propose that any change in space-time in a location will be balanced by changes in other locations. To explain I offer the following example. We start with four Hydrogen atoms. When they undergo fusion in several steps to become one Helium atom with the release of energy, changes to space-time also occur. The gravitational field of the Helium is more intense than that of the Hydrogen. Therefore the passage of time is slower near the Helium nucleus compared to the Hydrogen nucleus. Also time has stopped for the energetic photons generated by the fusion. Balance is retained in space-time because one Helium atom has less mass than four Hydrogen atoms. Less mass results in less gravity overall and time speeds up.

The Law of Conservation of Space-Time is just an expression of the observation that the stars by converting mass to energy cause our time to accelerate as evidenced by the red shift. The acceleration of time we experience is balanced by the slowing of time experienced by the fusion-generated nuclei and photons. Space itself is increased as mass decreases. This is all part of 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.*



## Activities summary

### 2006-02-06 Catch a Glimpse of Venus

by Mike Spicer

Several HAA members have remarked that while the nights are cloudy, the daytime skies can be clear and sunny! Don't despair... you can observe Venus!

Venus is the brilliant object (-4.6 magnitude!) in Sagittarius, low in the SE before dawn. This week, only a sliver of the planet's disk is lit but the planet appears much larger than Saturn or even Jupiter because it is so close to us.

In fact, you can see the crescent shape of Venus in a pair of binoculars or small spotting scope. As February continues, the planet's disk will grow smaller but the crescent will "wax" until in early March it will look like a small first quarter Moon.

This is your chance to test your daytime observing skills - if you start watching Venus before dawn, you can continue to see it until long after daylight. Or, if you have a telescope on a driven mount, you can have the telescope follow Saturn through the day!

*Michael Spicer, a Hamilton attorney, is a member and past councilman of the Hamilton Amateur Astronomers. He joined the Royal Astronomical Society of Canada in 1968 and has held the positions of Secretary, National Council Representative, Vice-President of the Hamilton Centre and Editor of the Orbit newsletter. He owns a few telescopes of different kinds, holds a key to the Binbrook Conservation Area and occasionally gets out observing/imaging. You may have seen some of his publications on various "observing projects": double stars, variable stars, Saturn, Jupiter, globular clusters and planetary nebulae.*



You can reach Mike via email at:

deBeneEsse2001@AOL.com  
or Lawfirm@Lara.on.ca

### 2006-01-31 An Update for Celestron go-to Scopes

by Mike Spicer

There are many types of Celestron go-to telescopes... Nexstars, Advanced Series, CPC, and CGE to name the

major series. Each telescope uses a Nexstar computerized handset to control the mount. The handsets all look the same but are not universally compatible. The alignment process differs from one model to another: the older models have "North, 2 star align", more modern models have "Level-North" and the more expensive models have an equatorial mode as well as the usual alt-az workings.

If you have ANY type of Celestron go-to telescope, I have great news for you. The company has released the "Sky align" controller that will control any of its go-to mounts. Buy one of these controllers for US\$75 and your mount will be able to do the three object sky align using any three of: bright stars, planets or the moon. Celestron users say the new alignment method is much easier: no need to find North, or level, or know the name of the alignment stars you use! And the handsets are software-upgradeable via web download.

Find out more at the Celestron web site or visit your local astro retailer.

### 2006-01-29 Cloud and a Little Mars

*by Mike Spicer*

Observers' Report for 28 January 2006

A warm sunny Saturday in late January with not a flake of snow on the ground. Who would have thought of it any other winter but this?

Oh no! The Clear Sky Clock predicted thick cloud and rain starting at dusk, continuing for the entire weekend! But I wanted to try out a new autoguiding feature! Perhaps the descending cloud would be late! I set up a C9.25 LXD-55 early on and fished around in blue sky for bright stars...

The new autoguiding feature worked beautifully. I found Mars and Capella at dusk through increasing haze. The ToUcam Pro on the 9.25" put up a steady image of a bright but tiny Mars on the computer. In the same high-power field of view was a bright star (that Mars would come close to occulting as I type this note), 4th magnitude Delta Arietis. Mars is flying across the sky at  $1/2^\circ$  per day even as its distance from us has increased to 90 million miles. In three weeks it will buzz the Pleiades - an excellent wide-field photo opportunity. In mid-June Mars will pass through the middle of M44 the Beehive to link up with Saturn, another great photo opportunity!

The planet's disk this January evening was just 9" of arc in diameter and at magnitude 0.14, the planet was noticeably fainter than Capella, also high overhead. Solis Lacus was visible on the disk, among a few other

features. As I watched the image on the screen, I kept repeating the mantra "big telescopes can see through cloud"...but then the weekend's thick curtain of cloud descended over the haze and I acknowledged defeat.

### 2006-01-27 Cloud and a Little Mars

*by Glenn Muller*

With no Moon, and good seeing and transparency, last night was a rare one, of late, for backyard astronomers. Gail and I set up our 6" reflector and immediately went to M42. As soon as we saw the Trapezium, sitting like 4 diamond chips, at low power (57x) we knew we were in for a good session. The nebula, itself, looked like a hawk with outstretched wings, the southern portion extending right out of the 1 degree FOV. As I looked up to get my bearings, a short, bright, meteor flamed down from Kappa Orionis and burst into fragments close to Mu Leporis. Saturn was a real joy with Titan, Rhea, Tethys, and Dione. We also checked out galaxies M81/M82, M1 the Crab Nebula, M44, M45, and Polaris and it's companion. I finished the night by tracking down M79, a small glob below Lepus. Anytime I can see this from Grimsby, I know I've had a decent session. Hope you had a good one too!

### 2006-01-27 Observers' Report, 27 January

*by Mike Spicer*

SATURN AT OPPOSITION, 27 January 2006

I imaged Saturn with an RASC member last night using a 9.25" SCT under outstanding conditions. Seeing was limited to 3" (arc-seconds) in the evening and the Trapezium in Orion scintillated but "E" was clearly visible anyway. The seeing steadied as the night progressed. Saturn's moons were visible even at low powers and the Cassini Division was visible all around the rings despite their half-closed tilt. The air was still and  $-10^\circ\text{C}$  didn't seem too cold for extended observing of galaxies in Leo and Ursa Major until after 3 a.m. from my backyard patio in Hamilton.

Cold, crisp and clear: 26 Jan 06

Observing Report, 26 January 2006

The first night of long-lasting, beautiful clarity this month, and the cold front may bring a cloudless tomorrow night, too. Seeing (steady air) improved toward midnight and may be even better tomorrow night.

$-10^\circ\text{C}$  is not really that cold for January, so I set up an LXD-75 mount with a C9.25" SCT. Polar alignment was quick and painless. While the optics cooled down I did some widefield observing of Saturn (floating just

below the Beehive), and the M-galaxies in Leo. There appeared to be a lot more moons than usual, dancing around Saturn. Braced against the breeze, I was able to observe for some time until my eyes started to water. Time for imaging.

I couldn't find the DSI for imaging galaxies, so I set up the Toucam on a laptop beside the scope. For a webcam, the Toucam has quite a reach - taking long exposures I was able to capture more moons than I had been able to see with the 26mm eyepiece. Short exposures captured the planet and rings, but the seeing was not good enough to get a really good image. Maybe tomorrow night! I hope Celestron returns my Nexstar 11" soon, I miss that telescope and its fork mount.

Tomorrow night promises to be a great observing opportunity, bundle up and have a ball !

### 2006-01-22 Cloud and a Little Mars

*by Glenn Muller*

Saturday, January 21, 2006

Although it was a promisingly clear night, members of the HAA "working group on planetary definition, and other related stuff" (HAAWGP, AORS) gathered at Teamster's Hall for a thoroughly entertaining discussion. Many informed and interesting opinions were expressed, and some general consensu were reached. For a synopsis of our conclusions be sure to check out the chair's report in this edition of the Event Horizon.

### 2006-01-14 Some Kewl Observing, 14 January

*by Mike Spicer*

What more could we ask for on a Saturday night? A clear, cool evening with the most beautiful constellations visible in the East. No red lights required to get around, since the full Moon lights up the scope and every accessory. A bit windy at times, but it's January and coat, hat and gloves are a good idea.

I set up a 90mm Meade refractor on an LXD-75 mount and used only 2" eyepieces. My observing partner liked the idea of observing from a seated position. Orion rising to the meridian gave fantastic low-power views of the Sword with a 52mm erfle, including the Trapezium within M42. The 14mm showed all 4 stars in the Trapezium clearly.

Saturn in the 14mm UWA and a 9mm Nagler gave beautiful views of Titan, Dione and Rhea on one side of the planet, Tethys on the other. As the rings close, the satellites tend to form up in a line parallel to the ansae

of the rings, much easier to find! The Cassini division was clearly visible at the apses of the rings.

There was a distinct face in tonight's full Moon, or am I influenced by TV ads showing Prime Minister Paul Martin's face on a balloon? With a 2" ND9 filter the rays of several major craters were striking in low power views, though most features were so brightly lit as to be washed out... one wonders at the Sun's effulgent power to make an asphalt-colour lunar surface reflect so brightly.

With all the recent member moaning about weeks and weeks of cloud, I do hope you got out observing on at least one of the clear nights this week!

### 2006-01-14 A "BLOW-UP" AT THE FIRST MONTHLY MEETING OF 2006 *by Mike Spicer*

About three dozen Hamilton Amateur Astronomers and 20 guests picked up copies of the January 2006 Event Horizon and filled the seating at the Teamster's Hall on Parkdale Avenue for our first monthly meeting of 2006.

Friday the 13th was lucky for us. Our MC Glenn Muller introduced three interesting speakers and several out-of town visitors, including Peter and Debra Ceravolo from Ottawa and Paul Mortfield from Mississauga!

Before the meeting started, our digital projector blew up an excellent "Sky this Month" presentation by our Observing Director, Greg Emery. The audience was supplied with coffee courtesy of Gail Muller and Cindy Bingham gave out tickets for our monthly draws - beautifully colourful "wind socks" provided by Ann Tekatch and some excellent astronomy books. The socks are blown up when it's windy.

Debra Ceravolo, President of the RASC Ottawa Centre, gave the main talk of the evening under the watchful eye of her husband. The Ceravolo family has discovered six supernovae over the past 3 years as part of an international effort to spot these exploding stars in far-off galaxies. Debra demonstrated how the various types of supernovae "blow up real good". She explained with infectious enthusiasm, some of the stellar dynamics involved, the instruments used to collect thousands of digital iamges of faint galaxies, the "blink" method her group uses to find supernovae, the impressive MaximDL software that "stretches" images, teasing out detail that otherwise goes unseen, the many spurious things that show up on the digital images and the method for reporting and certifying "finds".

Mike Jefferson reported on his recent trip to Costa Rica, extolling the darkness of the sky “down there” and the visibility of objects we can’t see from Hamilton. The audience was very impressed with Mike’s framed spectral photo blow-up, a culmination of years of collecting the spectra of stars and solar system images. He received well-deserved applause.

Mike Spicer rallied interest in observing on Saturn and its moons, with up-to-date viewing information, blown-up Cassini photos and images taken from his backyard with inexpensive equipment. The darkened hall, filled almost to capacity, was hushed during his talk, but two dozen eyepieces he was giving away disappeared by the meeting’s end. Copies of Mike’s Powerpoint presentation are available on request.

After the meeting there was a lot of chatter: members admiring Tim Harpur’s newly-acquired LXD-75 go-to mount (all ready for autoguiding); Doug Welch hawking a number of very good eyepieces and Anthony Tekatch receiving congratulations for maintaining an awesome website for the club. About twenty of us retired to East Side Mario’s on Queenston Road after the meeting for a few hours of drinks, food, stories and laughter.

## 2006-01-12 Great Observing 12 January 2006

*by Mike Spicer*

After weeks of constant cloud, Thursday evening 12 January the sky was clear and telescopes were set up quickly on the patio. How the stars have shifted in the last 6 weeks!

A new 8” Schmidt Newtonian was set up with a 4” apo guidescope. My observing partner and I took long looks at Saturn. The air was warm and humid with a slight wind. Seeing (measuring the atmosphere’s steadiness) was only 4 arc-seconds, a 3 mm Radian (260x) showed a shakey planet. We settled on a 9mm Nagler (90x) and a 52mm wide-field 2” eyepiece (40x) for the 8” S-N and an 8-24mm zoom (100x max) on the apo refractor.

The little constellation Cancer looked beautiful, with Saturn set just a degree below and to the left of M44 (the Beehive open cluster). The finderscope or binoculars showed the two in the same field of view, the open cluster a sparkling loose collection of 15 6th and 7th magnitude stars. At 40x the S-N wide-field telescope showed a golden Saturn in the same field of view as M44, 15 bright stars set among 100+ fainter ones!

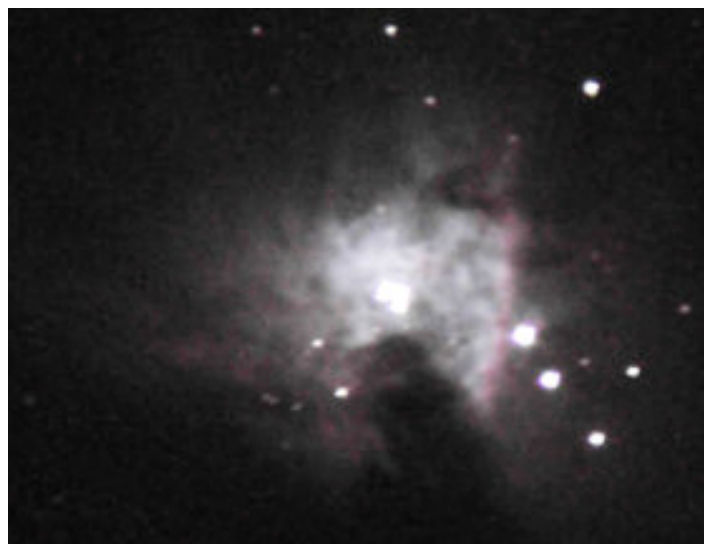
Saturn approaching opposition (January 27th) was breathtaking. Titan, Hyperion and Iapetus were E of

the planet; Rhea, Tethys and Dione were in a tight N-S line W of Saturn just outside the half-closed rings. We recalled that three years ago, Jupiter had buzzed the Beehive in the same way Saturn will in the next few weeks.

With a full moon hanging above us and the sky awash with light, tiny Enceladus and Mimas were not visible but Starry Night Pro showed them both clustered near Dione. My partner remarked that the refractor showed a crisp image of the planet and moons at 100x, though the moons were not as bright as in the 8” reflector and Dione was not visible to her.

Not a night for imaging, perhaps - there were wisps of cloud on the wind and a nearly full moon so bright I could not bring myself to turn the telescopes on it. But after so many nights of cloud, with more cloud and rain predicted, I was happy to spend an evening on the patio with a new scope and my friend.

## EyeCandy



Orion Nebula By Tim Harpur



## For Sale

Need upgrades or accessories for your scope? These 5 items are available from Mike Spicer (deBeneEsse2001 at AOL.com) or 905-388-0602:

### Celestron Nexstar 80mm achromat

This makes a great 80mm finder or guidescope  
The dewcap has a built-in Baader solar filter !



Aperture 80mm / 3.2"  
F/5 - focal length 400mm  
Smooth 1.25" focuser  
\$125, mounting rings \$40

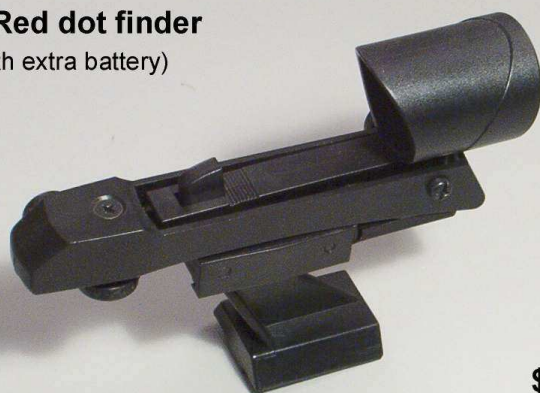
### Excellent 30mm finder (photo shows it fits an Orion)



OTA just \$25

Don't use a poor quality finder.  
This beautiful OTA + crosshair  
will fit into your Orion bracket.

### 1x Red dot finder (with extra battery)



\$30



Need a better barlow? Taiwan-made, \$35



A complete observing case !  
Five 1.25" Taiwan plossls + barlow  
and a set of excellent 1.25" filters

Only \$200

## Upcoming Events

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



## Snowstorm on Pluto

By by Dr. Tony Phillips

There's a nip in the air. Outside it's beginning to snow, the first fall of winter. A few delicate flakes tumble from the sky, innocently enough, but this is no mere flurry.

Soon the air is choked with snow, falling so fast and hard it seems to pull the sky down with it. Indeed, that's what happens. Weeks later when the storm finally ends the entire atmosphere is gone. Every molecule of air on your planet has frozen and fallen to the ground.

*That* was a snowstorm—on Pluto.

Once every year on Pluto (1 Pluto-year = 248 Earth-years), around the beginning of winter, it gets so cold that the atmosphere freezes. Air on Pluto is made mainly of nitrogen with a smattering of methane and other compounds. When the temperature dips to about 32 K (-240 C), these molecules crystallize and the atmosphere comes down.

"The collapse can happen quite suddenly," says Alan Stern of the Southwest Research Institute. "Snow begins to fall, the surface reflects more sunlight, forcing quicker cooling, accelerating the snowfall. It can all be over in a few weeks or months."

Researchers believe this will happen sometime during the next 10 to 20 years. Pluto is receding from the warmth of the Sun, carried outward by its 25% elliptical orbit. Winter is coming.

So is New Horizons. Stern is lead scientist for the robotic probe, which left Earth in January bound for Pluto. In 2015 New Horizons will become the first spacecraft to visit that distant planet. The question is, will it arrive before the snowstorm?

"We hope so," says Stern. The spacecraft is bristling with instruments designed to study Pluto's atmosphere and surface. "But we can't study the atmosphere if it's not there." Furthermore, a layer of snow on the ground ("probably a few centimeters deep," estimates Stern) could hide the underlying surface from New Horizon's remote sensors.

Stern isn't too concerned: "Pluto's atmosphere was discovered in 1988 when astronomers watched the

planet pass in front of a distant star—a stellar occultation." The star, instead of vanishing abruptly at Pluto's solid edge, faded slowly. Pluto was "fuzzy;" it had air. "Similar occultations observed since then (most recently in 2002) reveal no sign of [impending] collapse," says Stern. On the contrary, the atmosphere appears to be expanding, puffed up by lingering heat from Pluto's waning summer.

Nevertheless, it's a good thing New Horizons is fast, hurtling toward Pluto at 30,000 mph. Winter. New Horizons. Only one can be first. The race is on. . . .

Find out more about the New Horizons mission at [pluto.jhuapl.edu](http://pluto.jhuapl.edu). Kids can learn amazing facts about Pluto at [spaceplace.nasa.gov/en/kids/pluto](http://spaceplace.nasa.gov/en/kids/pluto)



This artist's rendering shows how Pluto and two of its possible three moons might look from the surface of the third moon. Credit: NASA/ESA and G. Bacon (STSci)

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

## Council meetings

All club members are welcome to attend the council meetings. Contact [info@amateurastronomy.org](mailto:info@amateurastronomy.org) for details.