

Event Horizon

September 2005

Volume 12 Issue 10

Starfest Overview

by HAA Members



Photo by Sandy Maude

It was our first visit to Starfest and it won't be our last. We met many friendly people, saw millions of dollars of equipment (an astronomer's paradise), enjoyed clear and dark skies, ate a delicious dinner and, naturally, were excited about the Meade eyepiece I won. Darrell had an excellent opportunity to do some digital imaging, and I took some daytime pictures and tried my hand at some night shots of constellations. Despite our lack of sleep, we had a wonderful time. – Sandy Maude

For our eleventh year, Starfest seems to get better and better. Actually we go for the fellowship of making new acquaintances, renewing old friendships, general socializing and of course, viewing. With the nights perfect, the company perfect, what more could one want? A great time was had by all. – Ollie and Lou Darcie; Astronomaires Extraordinaire

This was the 14th Starfest for me, and there are always good memories. The skies were clear both nights to

offer fantastic views of some of the wonders of the universe, such as the Lagoon Nebula, the Swan Nebula, The Veil Nebula, the Ring Nebula, the Andromeda Galaxy, the Whirlpool Galaxy, and many star clusters. It was a joy as always to look through Stewart's 20 inch scope. And it was a pleasure to again share the sky with friends.

The talks were also interesting. I arrived just in time for Doug's talk, which is always filled with knowledge and humour. Another pleasure of Starfest that I never miss is a dip in the river. Dinner in town one night, and a farewell breakfast topped off the weekend. I look forward to next year! – Barb Wight



Photo by Mike Spicer

I had a great time at StarFest. The Unihedron "team" was very pleased with the success of the Sky Quality Meter. It also turned out to be a great testing ground with so many people measuring sky brightness. The best reading I received all night was 21.23 magnitudes per square arcsecond, which is much better than the 19.73 I get at home. We were also able to determine that the Northern Milky-Way contributes 0.1 mags. – Anthony Tekatch

cont'd on page 4 ...

RASC Publications page 2
Picking a Winner page 4

Bino Asterisms page 6
Upcoming events page 7

Domain Name and Web hosting for the Hamilton Amateur
Astronomy club supplied by
Axess Communications
Corporate and Residential DSL and Web Hosting
<http://www.axess.com>
support@axess.com

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.

HAA Council

Hon. Chair Jim Winger
Chair Glenn Muller
Second Chair Doug Welch
Secretary Margaret Walton
Treasurer Cindy Bingham
Observing Dir. Greg Emery
Publicity Gail Muller
Editor/Web Anthony Tekatch
Membership Dir. Stewart Attlesey
Councillor Bob Christmas
Councillor John Gauvreau
Councillor Ann Tekatch
Councillor Cathy Tekatch

PO Box 65578
Dundas, ON
L9H 6Y6
(905) 575-5433

Submissions to the web site or newsletter are welcome. Submissions may be edited for size & content.

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

Subscription Offer for Members

Members of the club are eligible for a discount on Sky & Telescope Magazine subscriptions. The regular annual rate is \$49.95 (U.S.). HAA members pay only \$39.95 (U.S.). Contact Ann Tekatch for information on how to sign up; tekatch@sympatico.ca 905-575-5433

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.

RASC publications: 2006 RASC handbooks and calendars



Order your 2006 RASC handbooks and calendars. Handbooks are \$20, calendars are \$12 each.

E-Mail Margaret Walton <mwalton@cogeco.ca> to place your advance order. We will take orders at the meetings up to the December meeting.

Chair's Report

by Glenn Muller

Even if I walk into a meeting of the HAA council with just a half page of topics to discuss, it's all but guaranteed that I'll walk out later with a full page of new ideas. Among the gems from the August 20th meeting was the suggestion of having a door prize at each monthly meeting of the HAA. Mike Spicer has offered some items and we'll be looking for other suitable donations to give away. There will be no set value and, though we will try to stay within the astronomical theme, pretty well anything goes.

It was also pointed out that some meetings run a little late. As Chair, I accept part of that responsibility since we don't always start on time. The simple solution is to get the meetings underway right at 7:30pm, so, that is what I shall endeavour to do. With that in mind, I encourage you to arrive with enough time to sign in, peruse the back table, take care of business, etc. before then.

Another good idea was to make some of our Binbrook observing sessions more of a social event. To this end we are going to open the gate for the September 10th session at 7pm and have "supper under the stars". This will be a BYO event so fill your cooler with whatever you want to eat and drink (no alcohol, please – BCA rules), bring your BBQ/grill if you like and join us in the pavilion by "viewing are B" as seen on our website map of the park. Naturally, bring your optics for later and, if the weather looks iffy, check the Activities page

for any last minute changes.

Of course, we're also constantly looking ahead. The upcoming weeks will provide plenty of opportunity for viewing Mars and that just begs for a public event. It will be interesting to see if we can generate the same interest at Bayfront Park as the last Mars party did. Look to next month's Event Horizon for more details on that.

This has certainly been a good summer for star parties and, among these pages, you'll find an excellent overview of Starfest 2005. You'll also find several images taken by HAA members, among them a couple by Clyde Miller which were featured on the Universe Today website. The most interesting image, though, was that of NGC 520 forwarded to me by John Gauvreau. Taken this past July by the Gemini team's GMOS camera, you may remember NGC 520 as our entry in last Fall's Gemini Imaging Contest. The taking of this image is now perhaps coincidental; still, it's nice to know that we were on the right track and, since a full report is included with this issue, I'll let you get to it.

Clear Skies!

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



... cont'd from page 1
Starfest Overview
 by HAA Members

The theme this year was "On the Shoulders of Giants"; that is, the Big Ideas in Astronomy. This theme got us some talks unusual for Starfest, because the speakers had to try to cover enormous topics, such as "Astronomy from the ancient world to the present", in just 45 minutes. Very hard to do!

On a cheerier note, Doug Welch's talk on the amateur contest for Gemini observing time, and on the process of getting observations done on a large telescope (as opposed to "small" 20-inch scopes!) went very well indeed. Looks like the contest will happen again, so start thinking about a proposal!

I may have worried our Sky Quality Meter sellers Doug and Anthony just a bit when I mentioned I'd measured 23 magnitudes per square arcsec. The darkest skies give

brighter readings than that; I think about 22. Was the fabled SQM in error? When I checked my notes a few minutes later, I'd actually measured a sky brightness of 21.37. Turned out that the "23" I recalled was just a fun thing I'd done to see how dark the turf was! Whew. The other good news was that the SQM gave consistent readings that always seemed to make sense. In spite of the wide cone of sky the detector sees, I was able to see that the Milky Way was roughly 0.1 magnitude brighter than the rest of the sky.

Just to make it up to Doug I bought his 10x70 Fujinon binoculars, though my greatest achievement this year was probably learning how to shoot a potato cannon in Hanover. – Doug Black

One of the great things about Starfest is all the people. For a (somewhat) solitary hobby, to see 800+ people all gathered together enjoying the same thing makes you feel part of a growing movement. Also, you can check

out so many different scopes within 200 ft. of your tent; and comparing those views and the money spent to what you see in your scope and the money you spent is fun (be careful though, it can lead to aperture fever). Finally, the camaraderie is what makes the experience one to remember and keeps you coming back year after year. – Gail Muller

I think the NYAA are doing a very good job running this agenda. I don't know how the HAA would fare after 24 years of this stuff. Catering to others is always a tough job, and a tough call, even at the best of times. I know they lost \$246.00 of goodies from the Red Light cafe on Saturday night and that is a blow not only to the wallet but also to the personal feelings of people in the club! However, I liked the program!! Doug and Ron were the best!! Skies were great!! - Mike Jefferson



Photo courtesy of Charles Miller - submitted by Glenn Muller

A dark sky site really can add inches of aperture to your urban based telescope, so, while socializing at Starfest is always high on my list I dedicate at least one night to hunting down new objects or trying for more detailed views of past sightings. Somewhat new for me this year were planetary nebula. The abundance of "pointer" stars made it easy to locate, and further train my eye to recognize, those small, blue, disk-like nebulae. Another treat was M101. At Binbrook it had been a most difficult sighting, but Mount Forest's skies allowed our 6" reflector to actually resolve mottling in the galaxy's spiral arms.

Observing and camping make a great combination but, no matter which day you arrive, the party always ends too soon. Fortunately, there's another one planned for next August (24th – 27th) and I hope to see you there! – Glenn Muller



Photo by Ann Tekatch

Friday and Saturday nights at Starfest 2005 were the two most spectacularly clear nights I can remember at Starfest. The weather was superb all weekend. Every year there are more and more children attending. I think this is due to the NYAA's introduction of the children's program "Kidfest" over the past few years. Alexandra was very pleased with this year's Kidfest and the big crowd of kids that attended.

The door prizes were outstanding and it was really nice to see an 11 year old girl (and her dad!) win the 8" Meade LX200 GPS. We're looking forward to Starfest's 25th. anniversary next year! – Ann Tekatch

A link to a gallery of pictures from this year's Starfest can be found on the front page of the HAA website. (www.amateurastronomy.org)

Picking a Winner – The Imaging of NGC 520

by Glenn Muller

Last year, a number of people directly involved with The Gemini Observatory and The Canada-France-Hawaii Telescope (CFHT) offered imaging time to the winners of a contest open to amateur astronomy clubs across Canada. Two entries were allowed from each club; one to be a target for the Gemini Multi-Object Spectrograph (GMOS), and the other as a target for CFHT's MegaPrime camera.

The HAA Council solicited suggestions from the club membership and, after a difficult selection process, chose colliding galaxies NGC 520 as the club's GMOS entry and barred spiral galaxy NGC 2403 which contained a new supernova as our choice for MegaPrime.

As most of you now know, the top spots went to clubs from Alberta and Quebec and their entries duly imaged and publicized. However, there is a saying that "good

things come to those who wait” and, at the end of August, I was alerted by an e-mail from John Gauvreau that a GMOS image of NGC 520 had just been released. It was particularly gratifying that John had noticed this first since NGC 520 had actually been his suggestion. Anyway, here is the image and much of the accompanying text from the Gemini website:

NGC 520



Friday, August 26, 2005 - The Gemini Observatory released a pair of images today that capture the dynamics of two very different interactions in space. One is a cold, dark dust cloud that resembles an ethereal-looking Chinese dragon [not shown – gm]. The other shows a distant duo of galaxies locked in a knot-like embrace that could portend the long-term future of our own Milky Way galaxy [NGC 520 – gm]. The two images were selected based on observations made during the first half of 2005 at each of the twin Gemini telescopes.

NGC 520 features two completely entwined galaxies that stretch across 150,000 light-years. According to Ian Robson, Director of the UK's Astronomy Technology Center, “If we could see these objects as an extreme time-lapse movie made over millions of years, the galaxy pair would dance in a graceful orbital embrace that is likely similar to the fate between our Milky Way and the great Andromeda Galaxy.”

Gemini North on Mauna Kea captured the image of NGC 520, showing two interacting galaxies against a backdrop of dimmer much more distant galaxies. Gemini Astronomer Kathy Roth oversaw the observations and shared her reactions. “Watching images like these come off the telescope is always a thrill. It is very satisfying to have

everything working perfectly and to be able to take advantage of the great conditions on Mauna Kea,” she said. “This particular image not only makes a pretty picture but I expect will be useful to astronomers who model interacting galaxies and how these interactions trigger star formation.”

The specifics of the image were given as follows:

The Object:

NGC 520 has a unique shape that is the result of two galaxies colliding with each other. One galaxy's dust lane can be seen easily in the foreground and a distinct tail is visible at bottom center. These features are a result of the gravitational interactions that have robbed both of the galaxies of their original shapes. Some astronomers speculate that each member of the pair was originally similar to the Milky Way and Andromeda Galaxy. This collision could be providing us a glimpse at what might happen to our own galaxy in about five billion years as the Andromeda Galaxy collides with our Milky Way.

Estimated to lie some 100 million light-years away in the direction of the constellation Pisces, these galaxies have likely changed significantly in the time it has taken for their light to reach us. This view may be fairly early in the galactic dance that these galaxies have been performing. Hints of star formation (faint red glowing areas above and beneath the middle of the image) may have become more pronounced during the course of the collision.

Many background galaxies also appear in this image. They represent galaxy evolution at an even earlier epoch in the history of the universe.

The Image:

This image of NGC 520 was obtained on the night of July 13-14, 2005 at the Gemini North Telescope on Mauna Kea in Hawaii. The image was a combination of four images obtained with the following filters and total exposure times per filter:

Filter	Exposure
g'	480 seconds
r'	480 seconds
i'	480 seconds
H-alpha	1200 seconds

The stability of the atmosphere was very good for the duration of the data acquisition and allowed high image quality at the following levels:

Filter	Image Quality (FWHM)
<i>g'</i>	0.60"
<i>r'</i>	0.58"
<i>i'</i>	0.54"
H-alpha	0.57"

The images were combined in chromatic order by assigning the following colours to each filter:

Filter	Colour
<i>g'</i>	blue
<i>r'</i>	green
<i>i'</i>	yellow
H-alpha	red

Image Orientation: North = up, East = left

Field-of-view: 5.6' x 4.5'

END OF SITE TEXT

I made a quick addition of the exposure times and got a total of 44 minutes, which is well within the hour allowed by the contest. Here is a reprint of our entry abstract so that you may compare the points made by the HAA to the comments of the professionals:

Target:

NGC 520 (ARP 157) Galaxy type Pec.

R.A. 01h 24m 34.7s Dec. +34d 47' 49" Epoch 2000

θ 4.6' x 1.9'

Equipment requested:

Gemini GMOS-N

Abstract:

Does NGC 520 foreshadow the fate of our own Milky Way? In three billion years when our galaxy collides with M31, the resultant chaos could be that of the merging pair in Pisces also known as ARP 157.

From our perspective, the greatest forces of nature are exhibited with all the visual tension of the French Apache (*A-posh-eh*) dance. It's a tumultuous union in which entire star regions are tossed away while others form amidst the shredded remnants of the dark dust lanes that lace this pair together.

Sized at 4.6' x 1.9', it is our hope that a Gemini Multi-Object Spectrograph (GMOS) could resolve the conspicuous trailing tidal tail to the very edge of the frame and, through the use of various filters, take full advantage of the aesthetic potential of this target.

From a Scientific Perspective, it could also:

- Improve the estimate of the relative distance to NGC 520, which has been pegged as any-

where from 11 million to 120 million light years away.

- Reveal new star formations.
- Reveal the ignition of new nebulae.
- Reveal new supernovae and/or Update data of known item types listed in (b), (c), and (d). Provide further data for galactic motion models

Finally, for Public Education, with the above factors notwithstanding, instructors know well that in order to teach someone – first you must get their attention. At the HAA, we are in agreement that a GMOS image of NGC 520 will do exactly that.

END OF ABSTRACT

Out of interest, I sought comment from Dr. Doug Welch who has the unique perspective of being both HAA Councillor and a Gemini Contest Director. Although he had excused himself from the Club's selection committee, with his usual sense of humour he said, "*it is clear that great minds think alike*", then added, "*the HAA choice was clearly a suitable and appropriate target.*"

Of course, just because a contest limits the number of winners, that does not preclude runners up from being desirable targets. It's entirely possible that the other entrants may also see their own suggestions realized in this fashion.

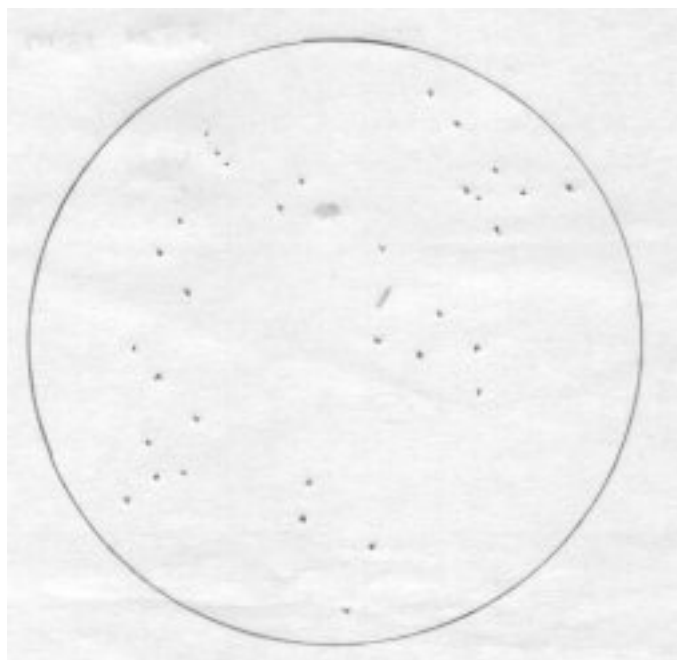
The imaging of NGC 520 may well have been just a happy coincidence for our part, but I'd like to give the last word to nineteenth century mathematician Jules H. Poincare, for he said: "*A very small cause which escapes our notice determines a considerable effect that we cannot fail to see, and then we say that the effect is due to chance.*"

Now if you'll excuse me, I think I'll go check the MegaPrime site!

Binoculars and Dark Skies = Galaxies and Asterisms

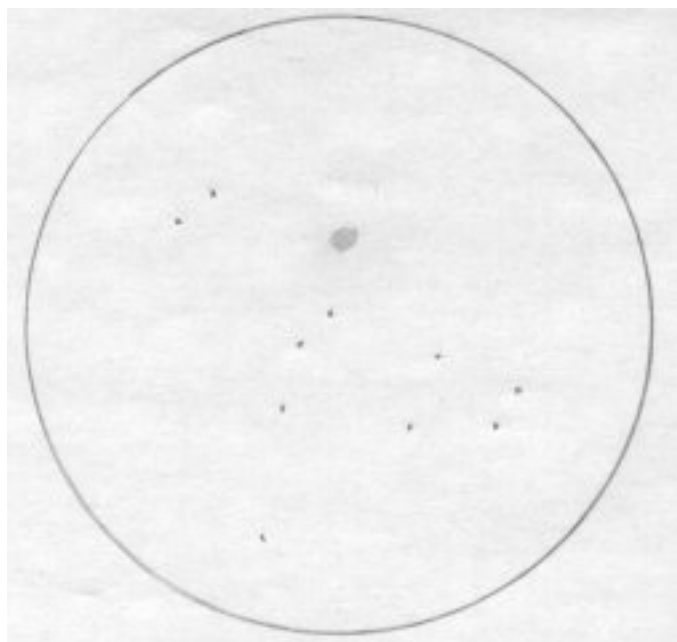
by Glenn Muller

This past July I took my 10x50 binoculars up to a cottage just south of Gravenhurst. Clear dark skies and a surprising lack of mosquitoes gave me the opportunity to do a little sketching. Those who lament the lack of a telescope need only the right conditions and a little patience to find many DSO's. This first sketch shows galaxies M81 & M82 within an interesting 5.3° star field.



Although I didn't get around to sketching M32, the Andromeda Galaxy is another object that often looks best in the low power, wide field vista that binoculars provide.

Another neat find I literally stumbled across was an asterism formed by the combination of globular cluster M19 and a lateral string of bright star pairs.



While sketching I noticed that a bisecting line of stars became body and tail to the wings and head of what I'm calling "the dragonfly". Upon confirming the sighting with my Sky Atlas 2000.00 I realized that had I aligned the binos slightly lower I would have seen a

curved extension to the tail much like on the actual insects I'd seen during the day.

Although these sketches are flipped vertically, due to my use of a mirror mount, you should be able to find this unique configuration on any decent sky chart – or, better yet, get out your binoculars and see the dragonfly for yourself before M19 disappears for another year.

Upcoming Events

Event: Supper under the stars - observing session

Date: Saturday, Sept. 10th 7pm

Location: Binbrook Conservation Area, lets congregate in "viewing area B" as seen on this map (www.amateurastronomy.org/bcamap.html); and use the adjacent pavilion and picnic tables.

Details: Bring whatever you want to eat/drink (no alcohol, please), a portable BBQ/Grill if you are so inclined - and of course your optical equipment!

We're heading into the best viewing season of the year - I hope you can join us!

Event: HAA General Meeting

Date: Friday October 14, 2005 7:30pm

Topic: Imaging techniques with presentations by Mike Spicer, Clyde Miller and Darrell Maude.

Location: The Spectator Building

Details: www.amateurastronomy.org/

Observing Notes by Mike Spicer and Glenn Muller

Observing Report - September 3/05 by Glenn Muller

Sixteen astronomers gathered on the "observing hill", Saturday night, to take advantage of Binbrook's dark skies. Most were members, some were guests, but all were invited to share the views through a variety of refractors, reflectors, SCT's with binoviewers, and binoculars. There was no lack of interesting targets and the combined knowledge of the group managed to introduce something new to almost everyone. Even a veggie tray with blue cheese dip was passed around, perhaps as a precursor to next week's picnic/observing session (more details later).

A light breeze kept the dew at bay, and the lack of a Moon made up for moisture in the atmosphere that kept the transparency from attaining an "excellent" rating. The Milky Way was clearly visible and the Double Cluster and Andromeda Galaxy were naked eye objects. Almost parallel in altitude, Jupiter and Venus made a nice pairing and, around midnight, Mars began to preview what is sure to be a nice showing in the next few months.

Small blue planetaries, nebulae, and globular clusters were captured and compared but, for a number of people, the highlight of the evening was open cluster NGC 457. Sometimes known as the the ET cluster, some people saw the well-known movie character with outstretched arms while others saw a fighter jet taking aim at another open cluster - NGC 436. Check out this object in Cassiopeia for yourself and let me know if you see the two brightest stars as alien eyes or as the afterburners on an F-14.

Clear Skies

Wednesday August 24 by Mike Spicer

Over half a dozen telescopes and binoculars trained on a beautiful night sky at Binbrook, Wednesday night 24 August. Before Mars and the Moon enlightened us, we had magnitude 5.5 skies, the Milky Way overhead, all of Scorpius and Sagittarius to peruse, and even a green aurora! Photos thanks to Mark Gemmell.

Thursday August 11 by Glenn Muller

Did anyone notice the 4 day old Moon came within 10' of Spica last night? The ample amount of earthshine on the "dark" side gave the orb a real 3-D effect when seen with the star in the same FOV of a low-power eyepiece, or binoculars.

The Perseid meteor shower has it's first (main) peak after midnight, tonight.

If you can't see the meteors, you can still listen to them online via this link: science.nasa.gov/audio/meteor/meteorburst.m3u

The meteors sound somewhat like radar pings on a submarine. The hours around dawn will likely yield the best results.

STARFEST 2005 - A little sun, a lotta stars Sunday August 07 by Mike Spicer

The NYAA annual Starfest near Mount Forest, Ontario ended with two glorious evenings of clear dark skies filled with stars. Two dozen HAA members were among the 800+ amateur astronomers who attended. Photos and articles to follow.

OBSERVING PROJECTS FOR 2005 Wednesday May 04 by Mike Spicer

Fabulous summer and fall weather brings out the observer in all of us. A list of objects to observe is something we can all use! Planetary Nebulae are fascinating to observe under excellent conditions; globulars are bright and large enough to see even under so-so conditions. Both types are relatively bright and suitable for imaging. For 2005 you can draw on my Observing Planetary Nebulae or Observing Globular Clusters. I distributed them at the May 2005 meeting but you can download a copy by clicking on the HAA "Tools" button.

Each 12 page booklet lists about 100 objects by RA and Declination, designation, size in " or ' of arc, description or concentration class, brightness, and the constellation where the object can be found. There are even some photos or

drawings of representative examples. Members are encouraged to use the recording sheet included with the Globular Cluster list and to draw what they see. I'd like to hear about your observing experiences and we can post those here on the "Activities" page..

EyeCandy



Aug 18, 2005: M5 taken on the 22nd June, 2005 from Brantford ON Canada by Clyde Miller. Recently appeared on www.universetoday.com



Photo by Darrell Maude submitted by Mike Spicer



Aug 25, 2005: Orion M42 from Brantford ON Canada by Clyde Miller. Recently appeared on www.universetoday.com.



From the Binbrook observing session of 20050825, Photo by Mark Gemmell



Starfest 2005 at night by Ann Tekatch



Improbable Bulls-Eye

Dr. Tony Phillips

Picture this: Eighty-eight million miles from Earth, a robot spacecraft plunges into a billowing cloud almost as wide as the planet Jupiter. It looks around. Somewhere in there, among jets of gas and dust, is an icy nugget invisible to telescopes on Earth—a 23,000 mph moving target.

The ship glides deeper into the cloud and jettisons its cargo, the “impactor.” Bulls-eye! A blinding flash, a perfect strike.

As incredible as it sounds, this really happened on the 4th of July, 2005. Gliding through the vast atmosphere of Comet Tempel 1, NASA’s Deep Impact spacecraft pinpointed the comet’s 3x7-mile wide nucleus and hit it with an 820-lb copper impactor. The resulting explosion gave scientists their first look beneath the crust of a comet.

Credit the JPL navigation team. By sending commands from Earth, they guided Deep Impact within sight of the comet’s core. But even greater precision would be needed to strike the comet’s spinning, oddly-shaped nucleus.

On July 3rd, a day before the strike, Deep Impact released the impactor. No dumb hunk of metal, the impactor was a spaceship in its own right, with its own camera, thrusters and computer brain. Most important of all, it had “AutoNav.”

AutoNav, short for *Autonomous Navigation*, is a computer program full of artificial intelligence. It uses a camera to see and thrusters to steer—no humans required. Keeping its “eye” on the target, AutoNav guided the impactor directly into the nucleus.

The system was developed and tested on another “Deep” spacecraft: Deep Space 1, which flew to asteroid Braille in 1999 and Comet Borrelly in 2001. The mission of Deep Space 1 was to try out a dozen new technologies, among them an ion propulsion drive, advanced solar panels and AutoNav. AutoNav worked so well it was eventually installed on Deep Impact.

“Without AutoNav, the impactor would have completely missed the nucleus,” says JPL’s Ed Riedel, who led the development of AutoNav on Deep Space 1 and helped colleague Dan Kubitschek implement it on Deep Impact.

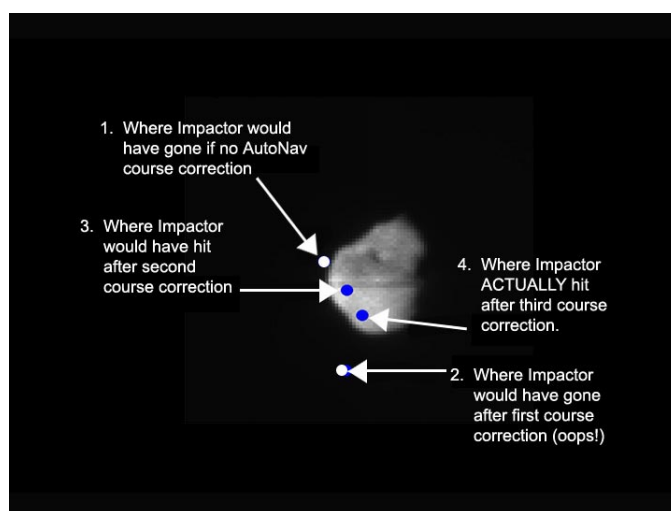
En route to the nucleus, AutoNav “executed three maneuvers to keep the impactor on course: 90, 35, and

12.5 minutes before impact,” says Riedel. The nearest human navigators were 14 light-minutes away (round trip) on Earth, too far and too slow to make those critical last-minute changes.

Having proved itself with comets, AutoNav is ready for new challenges: moons, planets, asteroids ... wherever NASA needs an improbable bulls-eye.

Dr. Marc Rayman, project manager for Deep Space 1, describes the validation performance of AutoNav in his mission log at <http://nmp.nasa.gov/ds1/arch/mrlog13.html> (also check [mrlog24.html](http://nmp.nasa.gov/ds1/arch/mrlog24.html) and the two following). Also, for junior astronomers, the Deep Impact mission is described at <http://spaceplace.nasa.gov/en/kids/deepimpact/deepimpact.shtml>

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



Comet Tempel 1, as seen by the Deep Impact impactor’s camera. Three last-minute AutoNav-controlled impact correction maneuvers enabled the Impactor to hit the bulls-eye.

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 for details.