Nova Notes

The Newsletter of the Halifax Centre of the Royal Astronomical Society of Canada

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Astrophoto of the Month *Blair MacDonald*

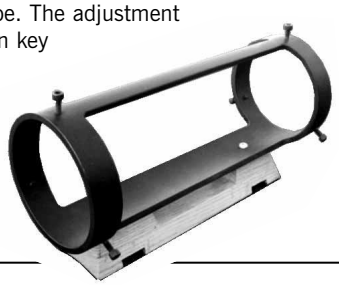
The shot below is a 3 by 3 mosaic of the heart of the Virgo galaxy cluster. Each shot is a combination of two, 1 minute, unguided exposures binned 2 by 2. The frames are taken at f/4 with a Meade 416XT CCD camera. M84 is near the center of the image with M86 to the left. The other NGC objects are cluster members ranging from 10th to 12th magnitude. IC3258 at 13th magnitude is faintly visible as a blur in the upper left corner of the image. All frames were taken automatically while I was looking through other scopes.

In This Issue...

Astro Ad

After deciding not to mount his 90mm scope to his 10" dob as a guide scope, Steve Tancock is now selling a beautiful 12" long aluminum mounting bracket for a 70mm - 90mm telescope. The adjustment screws are allen key bolts. Asking price is a mere $25.

Call Steve at 465-4092.



Letter from the Editor

Not much new to report on, other than it's been a busy issue with the inclusion of the Nova East info and the member survey – more folding!

So far, the only negative comments I've received about Nova Notes were regarding the SMU map on the back page. So after much research and long endless nights (well not really), check out the new and improved SMU map to help you find those meetings!

Thanks to Dave Chapman, Paul Evans, and Dave Lane for their continued help with Nova Notes. ✯

As heard on hfxrasc@rasc.ca...

If you're a member with email, why not become part of the Centre's email list? The list is a great resource for people looking for other members to observe with, for reminders of upcoming astronomical events, or for sharing information. Members who observe at St. Croix usually post a notice to say if they'll be out that night. Log on to our website (www.halifax.rasc.ca) to get signed up and you too could participate in lively intellectual discussions, or at least read them!

An excellent Aurora on the night of April 11 sparked this exchange of emails.

Subject: Halifax RASCals: Holy Aurora from St. Croix!

I was getting ready to take some CCD images from my back yard in Clayton Park. Now I have an apartment behind me with a VERY brightly lit parking lot and a container port less than 800 meters away and I saw a great northern lights display. Moving curtains the works could be seen with a hint of red and green. WOW!

- Blair MacDonald
(b.macdonald@ns.sympatico.ca)

Subject: Halifax RASCals: Holy Aurora from St. Croix!

I just walked out of my house at 9 P.M. in South-End Halifax and — WOW! — There was the best display I have seen from the city in 35 years here! Must have been stupendous for you lucky souls who have gone to St. Croix!

- Mike Falk
(falk@fox.nstn.ca)

Subject: Halifax RASCals: Holy Aurora from St. Croix!

Simply put...wow!
Incredible show out at the SCO tonight! 90% of the sky filled with aurora, streamers, pulses, red streaks, green streaks... very nice. It's just past 12AM now and I can look out my apt window in the city and it is still visible in the northwest.

- Darren Talbot
(dtalbot@ns.sympatico.ca)

Subject: Halifax RASCals: Holy Aurora from St. Croix!

I heard about the aurora at shortly past 11. I looked out my window in Clayton Park and I could see it clearly. I took a drive to a nearby dead end road and enjoyed the show for awhile. A great treat! In the early evening I thought about cancelling my plans and going observing at SCO tonight. This will teach me a lesson!

- Paul Evans
(evanspd@cs.dal.ca)

Subject: Halifax RASCals: Holy Aurora from St. Croix!

It was an incredible show - not quite as good as the show I saw after the RASC meeting two April's ago, but good nonetheless. Just before Daryl and I left, it picked up again, and on the way home it got bright enough that I had to stop along the 101 to watch and take some more pics (golly gee, there is a lot of truck traffic on that round near midnight!)

- Dave Lane
(dlane@ap.stmarys.ca)

Subject: Halifax RASCals: Holy Aurora from St. Croix!

After I left SCO around 11:30, I noticed it brightening up as well, and more well-defined rays were forming—I stopped along the highway to take a look too! It was either that or go in the ditch from trying to look over my shoulder as I drove! It was well defined even over the light glow as I drove through Sackville, but from my balcony in Halifax it was barely discernable. What a night!

- Michael Gatto
(michael@allura.com)

Subject: Halifax RASCals: Holy Aurora from St. Croix!

Went out at 9:10 PM (Whites Lake, halfway between Halifax and Peggy's Cove). Looking to the west as soon as I stepped outside, I could see high in the sky bright red and green streamers. The light was very bright to the North. There were moving curtains and rays – beautiful. As the hour went on, a large mass of the aurora formed to the deep south. There seemed to be a focal point – a curved band of aurora where rays from the south and north converged - in Leo around its 'head' and 'chest'.

Getting into solar observing has made this show even more special. I have been watching the sunspot activity and have kept a close watch on the sunspot group that spawned the CME. To see the results of a burst from a region of the sun I've observed at high magnification gives a real sense of how the sun and earth interact and connect.

As the show was beginning, a bright meteor streaked through Ursa Major, just below the handle of the Dipper moving to the NNE, throwing off bright pieces as it broke up and winked out. A spectacular night. I felt like a kid at Christmas.

- Craig Levine
(clevine@hfx.eastlink.ca)

Editor's Note:

A very detailed aurora report – as well as some photos – are available at Sherman Williams website at:
www.glinx.com/~sherm/Astro%20Events/Auroras/aurorae.htm

Darren Talbot also has photos of this aurora at:
www3.ns.sympatico.ca/dtalbot/html/astro2.htm

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Halifax, Nova Scotia
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Articles on any aspect of Astronomy will be considered for publication.

Nova Notes is published bi-monthly in February, April, June, August, October and December. The opinions expressed herein are not necessarily those of the Halifax Centre.

"Letters to the Editor" or letters to our resident expert "Gazer" are also most welcome.

Contact the editor at the following:

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Nova Notes is also available as a PDF file on our centre's website at **www.halifax.rasc.ca**

Material for the next issue should reach the editor by July 27

eyes Up!

***eyes Up!** is a forum for observing news from Centre members. This is where you can see what your fellow members have been looking at for the last two months and share your own latest discoveries.*

News may include observing reports, observational project status, witnessed daytime or nighttime astronomical phenomena, new equipment reviews, or any other notes of observational interest.

***eyes Up!** is new to Nova Notes and what it becomes is up to you the membership! All readers are strongly encouraged to contribute regardless of their observing experience. If you've observed something interesting, developed a new interest, or tried something new, let other members know. It's guaranteed that others will share in your enjoyment and benefit from your experiences.*

Rollie Strand—After my night at St. Croix

As a beginner I enjoyed myself tremendously and appreciated the help I was given by everyone. Reading your piece *(email item from Paul Heath)* brought back how awesome it was for me to see all those new-to-me wonders, now I can't wait for darkness to come so I can sit out on my porch and once more look up. I found my first Mini Messier Hunt Item M13 with my binoculars and tonight will examine it more closely with my scope. A small step for the established Skywatchers, but a giant step to someone like me. Thanks to all of you.

Paul Heath—Apollo's Race

The following records an attempt by Dave Lane and myself to track the ISS (International Space Station) using Dobsonian mounted scopes as it made a high altitude pass on the evening of April 19, 2001.

Me on the Halverson, Dave on his Dob,
We took up a challenge, way up in the stars.
From Perseus to Virgo, a chariot would race
Eyes locked on horizon, we counted down and paced.
Up jumped from the tree tops, orange fire at night
Up flung our Telrads, to eyepieces we sprang.

Gold white on the body, red wings askew
Paced rapid and climbing, through starlight it flew.

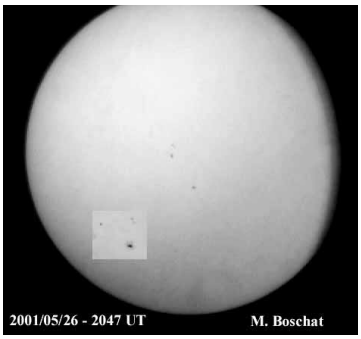
Up climbing to Zenith, a wondrous sight.
Then stumbled the Dobs, the angle not right.
Quick kick, side step, telrads up flung
Recaptured, we continued to run.

But, on down sliding skies, with fast fading light
Darkly, the glory sped into the night
So quickly began, our race had been run.

Michael Boschat—More Digital Photography Through the Eyepiece

Hello fellow observers

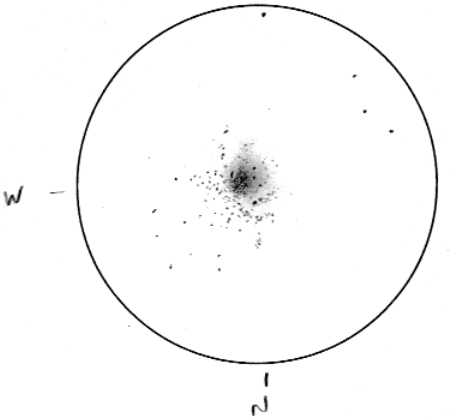
I used a Canon PowerShot 350 digital camera along with my 10 cm Maksutov telescope to take the following two images.



A crude solar shot I took through the open window with the digital camera held over my 25mm eyepiece on my 10cm Maksutov.

A small full image of the Moon with Earthshine was taken at 8:37pm 5/26/01 through a 40mm eyepiece.

Michael Gatto—M5 Sketch



Here is a sketch done at the eyepiece on May 22/01 of M5, a globular cluster in Serpens Caput, through my Celestron 6" Dob at 100X. This is an incredible object that resolves well across the whole face of the cluster with lots of nice arms and clumps of stars streaming out from the centre. At 100x the cluster seems to take up almost a third of the field. There are 2 particular stars that stand out well just S-E of the centre. This is an outstanding Globular even in my small (but mighty) 6" scope. M5 is well placed for viewing in June and July. ✯

Paul Heath—We all saw it!

Often when viewing meteorites, only one or two people see it. However, at St. Croix the other evening everyone present was tracking a satellite close to the zenith when a bright +1 to 0 meteorite appeared above Arcturus and passed through the bowl of the Big Dipper. It left a lovely train about 35 degrees long.

Sometimes, everyone does get to see the pretty ones! ✯

You may forward your submissions for eyesUp! to Paul Evans by email, mail or phone:

Email	evans@hfx.eastlink.ca
Phone	902.423.4746
Mail	26 Carrington Place, Apt 403 Halifax, Nova Scotia B3S 1J8

2001 Messier Marathon from Maryland

Paul Gray

Again this year we had new moon during the last week of March, which means Messier Marathon time! I first tried a marathon close to 10 years ago in Digby with 4 members of the Halifax centre. Since then I made three more attempts with Dave Lane only to be clouded out on all tries. With my move to Maryland three years ago now I finally had a chance to attempt the marathon from a location farther south and a little warmer both of which will make it easier.

The best weekend this year was the 23rd to 25th of March and the weather did not look good. Friday came and it was clear with the forecast for Saturday being cloudy with showers. Luckily Friday afternoon we had some warm weather and fair weather clouds brought afternoon showers and then began to disappear. By 6 P.M. it was mostly clear and getting better with only a few clouds left in the west and south. The night was not the best I had seen with the Limiting Magnitude at 5.8 but it was warm. There was frost by morning but only on the scope and none on the car thanks to the –2°C temp and light breeze now and then.

I arrived at our observing site at 6:30pm to find the only cloud left blocking my view of M74 and M77. With an hour to go before I had to observe these objects was there a chance the cloud would move for me? Tuckahoe State Park where we observe from is located on the Eastern Shore of Maryland. At 39 degrees north and 76 degrees west it is an hour and half from Washington DC but gets very dark due to the Chesapeake Bay acting like a buffer of area that cannot be polluted by light.

Nautical twilight would end at 7:21 P.M. so observing began at 7:15. I was out 5 days earlier to practice the evening objects and it paid off. I saw M77 at 7:17 and then located the field for M74 and saw it at 7:40 when it was still over 8 degrees high. The race had begun and I was off to a good start. The evening objects were seen as in the chart.

Object	Time	Altitude
M77	7:17	16 degrees 5'
M74	7:40	8 degrees 51'
M31,32,110	7:44	14 degrees 49'
M33	7:47	16 degrees 49'

The rest of the evening objects easily were observed. All were seen with my 12.5" f/5 Dobsonian except for M45,36,37,38 which were done with Binos. The Virgo cluster was easy and I only got lost on the way to M49, the last one of the cluster. I was finished the Virgo cluster and spring galaxies by 10:16. The only object not found was M83, which had not risen yet. That would have to wait 'til later.

I then used this time to go on and find more of the finest NGCs as well as some of the Herschel 400 objects. By 11:30 it was time to get M83, then take a break. During this time I did visit with Don Surles who is the Delmarva Stargazers club president and his 25" f/5 Obsession. We spent a good time looking at the Eskimo Nebula (NGC 2392) with a 9mm Nagler and OIII filter. WOW! At 352x on a 25-inch telescope the view was amazing! More detail in both the outer shell and inner shell than I have ever seen!

My observing partner who confirmed my observations, Doug Norton and I then left our gear set up with the dozen other club members and we drove 15 miles to the nearest truck stop. We had some food, got warm and rested our eyes. An hour later we were back at the site ready to keep going. The rest does amazing things!

Before going on with the marathon it was time to swing the scope low in the south and look at NGC 5128 and Omega Centauri. Wow that is huge! It was my first time observing it and even though only a few degrees high it was still amazing! After a good look it was back to the hunt. Many say that you can break 'til 2 A.M. or so but I felt that if you go out and get ahead and stay ahead and that would give you more time for those hard objects in the morning. Well it paid off.

I began at 1:29 with M5 and hunted everything low on the horizon as it rose so that by 3:07 all that was left were the 10 hard morning objects!

Again a short break with drink and food that I brought refreshed me for the morning dash to the line. At 3:30 I began hunting M69,70,54 in the bottom of the teapot. Many will know how tough these can be and with the use of a club member's 25" f/5 Obsession I was able to see these easily. These were the only other objects that I did not use my 12.5" telescope to find. M15 was then easy at 3:50.

At 4:00 I started the search for M72 and 73. Both were seen at 4:09 and 4:12. M55 was then searched for and finally was seen at 4:21 and then a quick hop to M75 at 4:26. This was out of order but due to trees it was best to be done this way. Quickly starting to run out of time now as astronomical twilight began at 4:30 so quickly I jumped over and hopped in to find M2 and with that I had 109!

So at 4:30 I started the star hop to find M30. I felt before beginning that it was hopeless. As the morning dark gave way to light, I watched the star patterns of my star hop rise out of the trees and by 4:45 I was still a couple degrees from M30. It would not be on the horizon 'til 4:58 and nautical twilight started at 5:02! At 5:10 when I could not see stars under 6th magnitude and was still 1 degree from M30 I gave up.

So, after 9 hours and 45 minutes of searching, napping and eating to stay awake I had bagged 109 of the 110 Messiers. I was asked if I would do this again. If I am at a location further south where M30 is possible, and all 110 can be seen, I may try it again. But it is unlikely I would try again from here or from any further north, now that I have done 109. It is a long night and you don't get much time to enjoy looking at objects. I prefer the relaxed pace of a slow observing session where you can take in all the views and study the objects.

Paul Gray has been a member since 1987 and is also now a member of the Delmarva Stargazers on the Delaware, Maryland, Virginia peninsula for 3 years. ✯

A New Acquaintance

Sergio Grbac

I learned a lesson Saturday night on the importance of preparation. I had some work to do in the morning and when I arrived back home Saturday afternoon, my wife suggested we go to the cottage. Since it was such a beautiful day, I agreed wholeheartedly (I know she was thinking sunny day but I was thinking dark skies). Quickly I grab my gear, load up the family and off we go. We did the meal thing then a walk along the beach. I must admit my mind was on planning the evening under the stars after everyone else hit the sack. We had rented a movie for the kids, I suggested watching it in fast forward but that didn't go over well. Finally, movie's over and it's bed time.

Outside I go. I had my binoculars, I had my tripod, my star charts, my lawn chair and was dressed warmly, night vision just coming around. Uh oh—I realized I left my red light in Hfx, sneak into the dark cottage, find a lighter and back out I go. The lighter kept my hand warm but I had to use it sparingly as it was too bright, which limited the whole evening. There were so many stars I had to star hop just to find Arcturus and Vega, after quite a search for the big dipper (sure is easier in the city). Soon after, the grass soaked through my sneakers and socks. Sneak back into the cottage (so as not to wake anyone) fumble around in the dark to put bags on my feet, more socks and back out I go. Not too much time passed and the wind picked up and I cooled down. Fumble around in the car to find a hat, I know there's one in here. Another successful scavenger hunt and back out I go. I set my bearings so as not to miss what I was hoping to be the evening's highlight. Finally my reward came creeping up over the SE horizon shining so brightly I thought it was a distant street light I hadn't noticed previously. Could that be it, yes there it was, Mars right in front of me.

Not the Mars of books or movies, it was the real thing. This was the first time we've met. I wasn't even aware it was visible to the naked eye until I joined the RASC. I left my binoculars in place and watched as it moved across my field of view. The evening was a great success after all.

When I went back inside for the night, my wife had gotten up for a minute so I had the pleasure of introducing her to my new acquaintance, still shining brightly and high over the horizon outside the kitchen window (my how easy it was for her).

This may bring a chuckle and a head shake to some of you seasoned observers, or it may bring back memories to others. The important thing is those damp socks didn't dampen my enthusiasm, and I'll be back out there again and again. ✯

Of Animals and Eyepieces

Paul Heath

With clearing skies Darren and I head to St. Croix, some cloud on the horizon but with high hopes. Arrival is a symphony of Spring Peepers, hundreds of voices filling the air.

Down to the lake to check for Jupiter and Mercury, soon spotted in the break in the trees. I rush to assemble the Dob and carry it through the shrubs to the shore. Kneeling, I sketch Jupiter with three moons. Mercury, a thick crescent, shows bright in the eyepiece. Bit on the neck by a black-fly I stand and am startled by a muskrat diving into the water at my feet. Not sure who was more startled, me or the muskrat. As I step back, a bat swoops around my head. Hopefully it caught a black fly going after me.

Moving back to the roll-off I set up for an evening of observing. Through the scope the Beehive is bright even in twilight. The sky is clear, horizon to horizon, stars twinkling brightly as the sky darkens. As the night progresses, screech owls begin intense calls and soon ruckus wing beating is heard just on the other side of the lake. The wind freshens and the stars steady to brilliant points.

Briefly the North excites. A faint red glow appears, then pale spikes begin to climb in the north. A pale curtain begins to form but soon fades. Brief but enthralling nonetheless.

Gary joins us as we begin the nights observing in earnest. Then the frustration begins. Despite an ECU chart I am lost in Virgo, too many faint fuzzies and no recognized guide stars. After awhile I decide to look at old favourites.

M13 is a nice tight cluster with the 32mm eyepiece. Gary offers a loan of his large eyepieces. M13 becomes a brilliant cluster of well defined stars with the Pentax 10.5mm- 65 deg. AFOV (apparent field of view) eyepiece. Then the 7mm Pentax- 65 deg. AFOV eyepiece. Now within the cluster, well defined curves of bright stars stand out amongst the cluster stars. The detail is amazing, a propeller shape of stars within a ball of bright points of light. The large eye relief allows for an easy search for cluster details. A truly wonderful view of an old friend.

As Mars begins to shine through the trees, I check the sky transparency. The 6.4 star below Polaris is easily visible. A delightfully clear sky.

As we put things away to head home, I look up at the sky. With the Milky Way rising high above and stars bright to the horizon, a perfect night comes to an end. Frustration, success and wonder, all punctuated by Nature with voice and sudden appearance, have led to a memorable night. All the reasons we watch the stars all rolled into one.

So if it has been awhile, come join the stars, at the dark of the moon, by a still lake, in the not so quiet woods. I promise you will be glad you did. ✯

April 2001 Meeting Report

by David Turner, Meeting Reporter Emeritus (i.e. retired)

April 20, 2001: another exciting Friday night in the city of Halifax, this time with clear skies (for a change) and a hoard of people in attendance at the Loyola Building of Saint Mary's University. It was a standing room only crowd of over 50 people that packed the meeting room to the gunwales. For a moment I wondered if I was in the right place. Either I had mistakenly stumbled upon a pep rally for the Summit of the Americas demonstrators, or an awful lot of people had suddenly given up television in protest to Rodger being voted off Survivor. Usually the RASC can count on only two subject areas to attract interest in the monthly meetings: sex or violence. Well, there was no violence at this meeting (although admittedly I was not present for the entire executive meeting), and certainly no sex, even under the scurrilous gaze of this muckraking reporter. What was the drawing card for the meeting? Curious minds want to know.

And now the boring details. The meeting began at 8:01 P.M. as David Tindall warned those in attendance that there would be a short break at 8:30 for viewing a passage of the International Space Station. He then pointed out the infinite advantages of membership in the RASC, literally $ thanks to the inclusion of a "priceless" subscription to NovaNotes. Annual membership was listed at $40 for the present, with the possibility of that number being $44 after the vote at the forthcoming General Assembly. "Get your membership while it's hot… or at least cheap."

The first speaker of the evening was Michael Falk, our librarian, who talked briefly about the new library books available for immediate loan: *The Night Sky* (National Audubon Society version), *The Night Sky* (Discovery Centre version), *Collins Guide to the Night Sky* (do I detect a common theme here?), and a Constellation Guide Book from Czechoslovakia, if I took down the information correctly. Dave Lane then made his first appearance of the evening to present a short spiel on the International Space Station and where and when to see it in the sky. Apparently the St. Croix mafioso have managed to observe the ISS through their telescopes, which is something of a trick unless you have a Telrad finder and a telescope that can be manhandled about with ease. The ISS was described as a "golden tube with red solar panels" as viewed through a telescope. Next followed a visit to http://www.heavens-above.com/ to check out all of the information that is available on the Web about the ISS and its passage times. The highlight for the evening was a predicted passage of ISS over Nova Scotia beginning at ~8:31:30 P.M. local time, but only in the northeastern part of the sky for a few minutes. Are those times daylight saving or standard?

Next it was time for Paul Evans and an abbreviated "What's up?" segment, tonight kept mercifully short to allow for the ISS viewing session. Paul called attention to an executive decision to upgrade the telescopes available for membership use, namely plans to liquidate the older, less useful inventory of Centre telescopes and to use ~$1200 to purchase newer 'scopes that would be easy for novices to use. A "show of hands" indicated that it was a popular item with those in attendance, either that or a lot of people suddenly had a need to visit the facilities.

Next came David Croston with a box full of items for general sale… well almost. Tonight's specials were limited to T-shirts, unfortunately, because David had forgotten the other items. So, will that be a $15 T-shirt for the loved one in the standard large, larger, or larger still size? There would be RASC badges as well, at a mere $5, but those were in the other box, the one that didn't make it to the meeting. Better memory next time, eh David?

Dave Tindall regained control of the meeting again briefly at that point to mention the beautiful auroral displays of recent weeks, and to note that various members of the audience had brought along some of their photographs of recent displays. A selection of deep red images of the northern lights was available for viewing from Barry Burgess, and one or two others as well.

And now… it's ISS time. At that point the meeting turned a bit weird as Dave Lane invited everyone to step outside briefly for a quick search of the skies to see the predicted passage of the ISS and the Space Shuttle, with a "free Centre T-shirt for the first person to spot it." The weather was certainly co-operative, with clear skies in all directions. But it was still early in twilight and the skies were a tad on the bright side for satellite viewing. A few of us, who didn't have jackets on, stayed in the back row of viewers at the top of the steps (close to the entrance to Loyola) while the rest of the mob below searched the western skies with little luck. At ~8:31:15 I happened to spot a faint moving spot of light in the northeastern sky, exactly when and where predictions had indicated that the ISS would be seen. While the others in our small group were also able to spot the satellite, I noticed that the rest of the crowd was still looking off to the west. About two minutes later, when the ISS had disappeared off to the east, a cry went up from the group below, most of whom were looking a bit north of the zenith. Another faint light had appeared overhead, probably the Space Shuttle.

Back inside the Loyola Building later, David Croston was puzzled. Who was the recipient of the free T-shirt?

Next on the agenda was the Handbook Study, a regular feature designed to highlight a section of the Observer's Handbook for the membership. The item had somehow become lost at meetings held in recent years, perhaps because other segments of a standard meeting had expanded well beyond their natural time limits, leaving no time for other items such as the Handbook Study. At tonight's meeting the person selected to

lead the study was Terry Pulliam, who had been selected at the previous meeting. Terry pointed out that, since April was National Poetry Month (it was in all the papers, right?), he had selected to read Robert Frost's *The Star Splitter* for the Handbook Study, which he then proceeded to do. It is an interesting poem about a fellow from Maine named Brad who burned down his house for the insurance money, the intent of which was to purchase a telescope — the star splitter — with the proceeds. But surely I have been asleep at the switch. Where exactly in the Handbook does one find a poetry section? Perhaps Steve Tancook, designated for the next presentation, will explain at the next meeting.

At that point in the meeting I suddenly realized that the second year of the Tindall regime was one of change. It was suddenly break time for refreshments! Yes! Admittedly I had heard it suggested previously that a break be held in the middle of the meeting instead of at the end, since it would allow more time for socializing. In fact, it was de rigueur when I was a member of the Sudbury Astronomy Club many years ago. Perhaps I was one of those who had originally suggested a similar practice for meetings of the Halifax Centre, but now a fait accomplit. Wow!

By the time the break had ended, the guest speakers for the evening had managed to complete preparations for their talk (aha, now I see the real reason for the early refreshments). The speakers were Kevin Casteels and Jeff Kowalski, second year students in the Astrophysics program at Saint Mary's, speaking on "Time Lapse Photography and Animations in Astronomy." The two students had given a similar talk a few months earlier at the annual meeting of the Atlantic Universities Physics and Astronomy Conference (AUPAC) held in Wolfville, but dictator-of-the-twisted-arm Tindall felt that it would be of interest to the wider audience of the RASC and had invited them to speak at the April meeting. Besides, the 10–15 minute format of AUPAC talks had meant that Kevin and Jeff were only able to touch briefly on some of the more interesting aspects of astronomy animations before their conference talk was cut off. For the Halifax RASC presentation they were unfettered by such restrictions, provided of course that one can keep the presentations by Dave Lane to a minimum.

Kevin and Jeff — or is that Jeff and Kevin? — proceeded to talk about a variety of time lapse imaging experiments they had carried out involving both 35-mm photography and CCD imaging, the latter at the Burke-Gaffney Observatory using either the 0.4-m telescope or a telescope-mounted camera. First on the list was their asteroid observing project for AST 312, which involved CCD imaging of a variety of asteroid fields. For that they used Astrometrica to match the orbits, and Flash to animate some of their better images into a dvi movie file. Next came time lapse photography of Jupiter with various exposure times. For short exposure times the rotation of the planet's disk is detectable, while for long exposure times the satellite motions become evident, even if the planet's disk is overexposed. Kevin described the techniques used to align the various images in Flash, a necessary feature to avoid the images hopping around when the movie is run. Their first attempt was rather uninteresting, representing only about an hour's worth of satellite motion. Their second attempt represented about a three and half-hour imaging session, and drew some oohs and aahs from the crowd as the Galilean satellites wove their orbital paths about the giant planet. Their third attempt showed the disk of Jupiter itself, as obtained from CCD imaging every five minutes with the 0.4-m telescope through a pizza box aperture placed in front of the telescope.

The next animation was a shot of sunset from the roof of the Loyola Building, where the view displayed the overexposed setting Sun, a crescent Moon coming into view, and the briefest of brief glimpses of Mercury appearing above the horizon just as the time sequence terminated. The images were simple 35-mm shots that had been aligned using whatever could be detected of the horizon in each frame. Additional animations included the northern lights as seen in a sequence of individual shots (no movie), and a time-lapse sequence of a fire at Kejimkujik Park. The boys seemed to be running out of steam at that point. Their next animation sequence was a view of Orion and Jupiter setting as viewed from a site near St. Margaret's Bay. Given that the foreground features in the early frames disappeared as twilight ended, the alignment technique used here for the images was a bit different. For more details, Kevin has included some of the animations on the Astronomy and Physics home page at http://www.ap.stmarys.ca/gallery. As Dave Tindall commented following the talk, "It's nice to see a good use for Flash other than those things on people's Web sites that only delay opening them."

Follow-up speakers included Paul Heath continuing the poetry theme by describing a recent observing session at St. Croix ("Me and the Halverson, Dave and his Dob…" — huh, sounds rather obscene?), and Paul Evans making note of the next Members Night at St. Croix (April 27th or 28th). Last to speak was Dave Lane — who else? — to describe a mirror-making workshop weekend that he had spent recently at Mallard Lodge, Delaware, on invitation from Paul Gray. The workshop was hosted by the Delmarva astronomy group, an organization involving astronomy clubs from Delaware, Maryland, and Virginia in the Chesapeake Bay area (do they know they are sitting on an ancient impact site?). What followed was a gallery of images of the weekend, including scenes of the mirror grinding sessions and mirror testing techniques, as well as a short tale about flying back to Canada with Peter Ceravolo on the "next storm of the century" weekend.

The meeting ended soon thereafter, as Dave Tindall introduced Gary Welch, who is to speak at the May 11th meeting of the Centre. ✯

May 2001 Meeting Report

Pat Kelly

The third Friday of May being on the Victoria Day weekend, the meeting was held on the second Friday. That had little effect on attendance as we were only one body shy of 40.

There was a short discussion of the membership survey that can be found included with this issue. There is a door prize (a green centre T-shirt) as an incentive to send one in. Those at the meeting saw one modeled by David Chapman — he even offered to sell it "off his back", but only got a bid of 25¢.

David (Tindall, that is) proceeded by introducing the main speaker, Dr. Gary Welch of the Astronomy and Physics Department of Saint Mary's University. He used most of the biography that Gary had sent to him, which included a few interesting tidbits that went beyond the usual list of where speakers obtained their degrees. For instance, Gary grew up in Los Angeles where, he claims, third-magnitude stars were considered deep-sky objects. It was also here that he discovered that joining two pairs of binoculars in series did not produce a better view of the Moon. He was also the first guest user on the then-new 1.5-metre telescope at Cerro Tololo. He returned from that observing run sporting his first beard, which he "was required" to shave off shortly thereafter. His current beard, for those who are counting, is his second one.

(It should be noted that Dr. Welch is noted for his dry sense of humour. When I mentioned to Doug Pitcairn on the Monday following the meeting that he had missed a good talk, his reply was "Oh, who gave it? I was talking to Gary last week and he said that the main speaker was not going to be very good so I decided not to go.") That sense of humour also came through in his presentation.

Dr. Welch started off his talk by treating us to a quick tour of the main types of galaxies: spirals, S0 galaxies, and ellipticals. According to Dr. Welch, ellipticals are boring to look at, even in large telescopes. He then described the famous "tuning fork" diagram which Hubble had used to categorize galaxies and how some early attempts to explain galactic evolution had used this diagram to demonstrate that "early" galaxies (the ellipticals) evolved into "later" forms (the spirals).

As we now know, that theory to explain galactic evolution does not work. All galaxies have an age of approximately 10 billion years, and all contain stars that are about the same age. The biggest difference between early and late galaxies appears to be that the early types used up their gas a long time ago, and as a result, are no longer making new stars, while the later types are still forming stars, even at the present.

So, how do we check to see if elliptical galaxies really have no gas left? Simple, we look for it. Keep in mind that when we say "gas" what we really mean is hydrogen, as it makes up most of the gas in the universe. There are essentially three "temperatures" at which hydrogen gas exists in a galaxy: cool, warm, and hot.

Warm gas (about 10,000 K) gives off visible light, and makes up the well-known HII regions, of which the Orion Nebula is one of the best examples.

Hot gas (106–107 K) gives off X-rays, which precludes looking for it from the ground as X-rays are blocked by the Earth's atmosphere. To find this hydrogen requires an X-ray satellite like ROSAT. It is thought that the hydrogen discovered in this manner is bound to stars, and thus not available for new star formation.

Cold gas (10–1000 K) emits radio waves and comes in two "phases". When it is in a very tenuous form it exists mostly as atomic hydrogen. There areas are HI regions and can be easily detected by the 21-cm radiation that they emit. HI regions are not only easy to detect with radio telescopes, there is also a direct correlation between the strength of the signal and the amount of gas.

The other form of cold hydrogen is much harder to detect. It is found in much denser regions of gas called molecular clouds. Due to the increased density, the hydrogen is not atomic, but exists in the molecular form, H2. The hydrogen molecule is symmetric, being composed of two identical hydrogen atoms. As a result, it is very hard to get it to emit radio waves of any frequency making it difficult to detect. In Dr. Welch's own words, "Bummer!". To find molecular hydrogen, we have to look for other molecules, called tracer molecules, which do emit radio waves. Assuming that the ratio of hydrogen to the tracer molecule is similar in molecular clouds as it is in later-generation stars, we can calculate the amount of hydrogen gas present. Carbon monoxide (CO) is often used as a tracer for hydrogen as it is made up of two different atoms, which allows it to emit lots of radio waves. It is usually assumed that there are about 10,000 hydrogen molecules for every CO molecule that is detected. This method is not foolproof as there are known examples of galaxies which have active star formation, implying that they have lots of molecular hydrogen, but show almost no CO emission.

He showed some CO data of NGC 4310 that had been obtained at a wavelength of 2.6 mm. As most galaxies are moving away from the Milky Way, there is a Doppler shift in the wavelength for which corrections must be made.

By measuring the amount of CO, which in turn, allowing for the assumptions previously mentioned, gives us the amount of hydrogen. Unfortunately, there is an additional complication. The intensity, for a fixed amount of CO, depends on the square of its distance from us. This, in turn, means that the amount of hydrogen is also dependent on knowing an accurate distance to the galaxy being studied. For historical reasons, astronomers who study this subject measure a term other than the actual amount of hydrogen. They use

the ratio of M, the mass (in solar units) to the luminosity (L) of the stars in a galaxy (also in solar units). Since the luminosity also depends on the square of the galaxy's distance, the ratio cancels out this effect. According to Dr. Welch, once you use this ratio for a few years, you do not think of it as being such an odd way to measure the amount of hydrogen. For the Milky Way, M/L = 0.4. For late galaxies, it ranges from 0.1 to 1.0, while for early-type galaxies it is much less than 0.01. He pointed out that this value is really an upper limit, because you cannot actually detect it.

Using these techniques on the Milky Way we get an interesting census of where the hydrogen is found. The HII regions, like the Orion Nebula, while visually spectacular account for a negligible amount of hydrogen. Most of the hydrogen is in the form of atomic hydrogen with it being two to three times as abundant of molecular hydrogen.

So, we have now determined that elliptical galaxies should have no hydrogen gas left, and we know how to detect gas in spiral galaxies that should have gas in them. Now we arrive at a bit of a problem due to stellar evolution which provides two methods of returning gas to the interstellar medium, a "fast" method and a "slow" method.

The fast method involves the Type II supernova explosions produced by the deaths of massive stars. These, while infrequent, return about 90% of the exploding star's mass to the interstellar medium. Type Ia supernovas, produced by the collapse of a white dwarf in a binary star system, also produce sudden bursts of gas to resupply a galaxy's gas reserves. Single stars, and less massive stars, also contribute significantly during their later stages of life, including the planetary nebula phase, but at a much slower rate. While these types of stars only return about 50% of their material, there are a lot of them and they would provide a more continuous supply of hydrogen to form new stars.

When you account for these sources of "recycled" hydrogen, the value of M/L for a typical early-type galaxy should be about 0.1, near the lower range for spiral galaxies. So, where is the gas in elliptical galaxies?

Dr. Welch has been looking at this problem by studying four elliptical galaxies in the Local Group. They are M32 and M110 (the two bright companions of the Andromeda Galaxy), NGC 185, and NGC 147. The "near pair" of M32 and M110 have interacted with Andromeda, the "far pair" have not. All four galaxies appear to be identical. Gary describes them as "four peas in a pod". They all have a luminosity of about 1% that of the Milky Way, they are all about 10% of the size of the Milky Way, they all are dominated by the light of old stars, and they all have several percent of their stars which appear to have been formed about one billion years ago (in the recent past for a galaxy).

Given their similar appearance, it is reasonable to assume that all four should have the same amount of gas. There are no visible signs of HII regions and X-ray satellites have found no hot gas. Gary and several colleagues have been searching these galaxies for cool hydrogen, using a wide variety of radio telescopes.

Keeping in mind that we are expecting M/L to be about 0.1, how much is there when you actually look? Consider the far pair first. For NGC 147, M/L <0.001, while NGC 185 yields a value for M/L of 0.01. Both show a lot less than expected. In the case of NGC 185, it can be argued that the recent burst of star formation was followed by a series of Type II supernovas which pushed all of the gas out of the galaxy, and that the little that we see today is a result of a billion years of "outgassing" from less massive stars. What about NGC 147? Could all of its gas have been removed by a "continuous" series of Type Ia supernovas? If so, why hasn't that happened to NGC 185 as well?

Maybe we can learn more by looking at the near pair. For M32, M/L < 0.00002! It has no gas. M110 has an M/L ratio of 0.002. Did M110 lose all its gas on its last pass through the disk of M31? If so, then an M/L value of 0.002 is what would be expected from outgassing since that encounter. This argument does not work for M32, which should have as much gas as M110. Alternatively, if M110 is so poor in gas due to cleansing by Type Ia supernovas, then why didn't the same thing happen to M110?

So how did two of the galaxies end up with so much more gas than the other two? Did they recently pick it up from intergalactic space? Do they have a lower rate of supernova explosions than the other two, and if so, why? Is their gas arranged so that it is harder for it to be coupled to the gas from supernova explosions? (There is definitely enough energy to do the job!)

It is obvious that more galaxies of this type need to be studied, which according to Gary, is what you always say when you want to get more telescope time. The next step will be to look at the 28 "normal" S0 galaxies that lie within 20 Mpc of the Milky Way and are in the northern sky. Of course this means that he will have to spend more time in Hawaii but such is the price of science!

There were a few interesting questions raised after the talk. One person wanted to know whether the shape of an elliptical galaxy would have an effect on its ability to have gas cleared from it. Dr. Welch said that it would, but the effect is not well understood. He also gave a rather animated explanation of the different types of orbits that stars could follow, but to me it just looked like a lot of handwaving!

Another question raised was whether one could detect the suspected clouds of intergalactic hydrogen that might be picked up by these galaxies. Gary replied that a large telescope would be needed and it would have to cover a lot of the sky, and there was no guarantee of success. The committees that grant observing time on telescopes have a name for that type of proposal—a fishing expedition! Such requests are seldom granted.

Following the main talk, we had our mid-meeting munchies. We reassembled and David Croston, who had brought the right box with him this month, conducted a Ferengi trading session in T-shirts, RASC pins and star chart place mats. Sales of place mats were brisk (we sold two) and there was some concern that we would not have any left for prizes for next month's "Who Wants to Be a Gazer" game show.

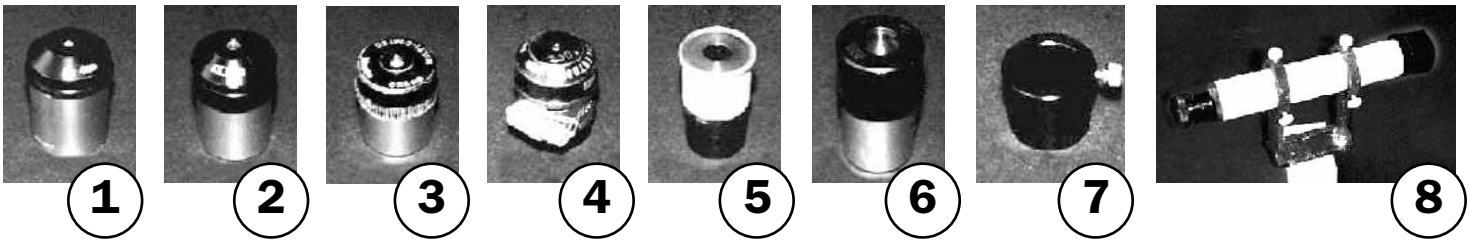
Paul Evans was up next with "What's Up". The main topic was the coming return of two planets to the evening sky: Mercury for a brief appearance, and Mars for the rest of the summer. Paul mentioned that "that was it" for planets, but Dave Chapman pointed out that you could see Venus in the morning sky. Paul's reply was "I'm not a morning person." Still, you would think that after Dave Lane's stint as observing chair that every successor would be very careful to check on the whereabouts of Venus!

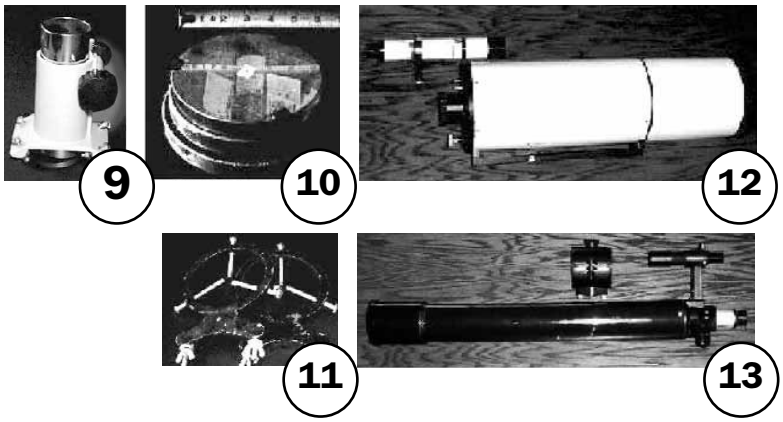
Nova East 2001 will be held this year from August 17–18 at Smileys Provincial Park. The main speaker will be Peter "Party Animal" Cerovolo, maker of very nice astronomical instruments. Details can be found elsewhere with this issue. It should be another great time, so register early and register often! If you want to help or do a workshop, contact Paul Evans.

Blair MacDonald was up next with a sneak preview of the talk he will be giving in the fall. He shared some of his recent CCD images. There was an interesting comparison between images taken it the city, and ones taken from a dark site. Most of the city shots were produced by adding a series of images, whereas the images taken from a dark location could be made with a single exposure. To illustrate this, he showed us comparable images where the "country" images was made with a single one-minute exposure, while the city image required adding together eight 5-minute exposures!

The meeting wrapped up with the handbook talk. This month we had Steve Tancock talking about telescope parameters. He reviewed how to determine the magnification of an eyepiece with a given telescope, how to find out the actual field of view of an eyepiece, and determine several other useful parameters. ✯

RASC Inventory Blow-Out Limited Time Offer. While Supplies Last!!





The Centre has decided to liquidate some of its assets in order to finance a set of good quality "loaner" scopes and eyepieces. Some of these eyepieces (#1,3, & 4) will yield VERY high magnification on most scopes. The 6" mirror is in good shape but may need to be recoated. There are 2 scopes available. The first is an 80 mm refractor that is in good condition according to Steve Tancock who's looked through it. The second is a 6" Maksutov which also appears to be in good condition, but no members have tested it recently. All items are sold on an as-is-where-is basis, but members should try to arrange to test these items before purchase to ensure satisfaction. If you have any questions or wish to purchase an item, please contact Steve Tancock at 465-4092.

1. 4mm Ortho	**$15**
2. 9mm Kellner	**$15**
3. 6mm Ortho	**$15**
4. 4mm Ortho	**$15**
5. .965" Reticle	**$15**
6. $1\frac{3}{16}$th" ~10mm	**$15**
7. .965" to $1\frac{1}{4}$" Adapter	**$15**
8. 6 x 30mm Finder	**$15**
9. $1\frac{1}{4}$" Metal Focuser	**$15**
10. 6" F.8 Mirror in Cell	**$60**
11. $4\frac{1}{4}$" (Inside Diameter) Mounting Rings	**$15**
12. 6" Maksutov Cassegrain	**$200***
13. 80mm Celestron Refractor	**$200***

These are all merely asking prices, feel free to make offers!

The St. Croix Observatory

The St.Croix observatory. Pictured from left to right, the RASCan, the warm room and the roll-off roof observatory.

The roll-off with the roof partially open.

Part of your membership in the Halifax RASC includes access to our observatory, located in the community of St. Croix, NS. The site has grown over the last few years to include a roll-off roof observatory with electrical outlets, a warm-room and washroom facilities. Enjoy dark pristine skies far away from city lights, and the company of like minded observers searching out those faint fuzzies in the night.

Members' Night

Every Friday night closest to the new Moon is Members' Night at St. Croix. The purpose of members' night is to attract members from the centre to share an evening of observing with other members. It's also a great night for beginners to try out different scopes and see the sky under dark conditions. For more information or transportation arrangements, please contact the Observing Chairman Paul Evans at 423-4746.

Dates for Members' Nights for the following two months are

Fri. June 22nd *(rain date Sat. 23th)*

Fri. July 20th *(rain date Sat. 21th)*

Special – Members' Night Comments

I have to say that this past week has REALLY impressed me. The number of people that have been utilizing the Observatory have been impressive.(I cannot recall such a fine attendance during an observing run) I'd like to express my support for, and thanks to, our Observing Chairman, Paul Evans, for instituting a Members' Night program. It certainly has worked well over the past months.

Furthermore, to those individuals who have experienced their first exposure to St. Croix, I look forward to your return. I hope all of you felt welcomed. Our enjoyment of the night sky is the paste that binds astronomers together. Most of all, I hope to see all of you at Nova East 2001 in August. If you thought a Members Night was fun, wait till you get to a Star Party! More astronomers. More telescopes. More observing. And best of all, the sharing of ideas and fellowship which fuel our individual desires to learn about our Universe.

Daryl Dewolfe — May 28, 2001

Become a St. Croix Key Holder

For a modest key fee, members in good standing for more than a year who have been briefed on observatory can gain access to the St.Croix facility. For more information on becoming a key holder, contact the Observing Chairman Paul Evans at 423-4746.

Directions from Halifax

(from Bayers Road Shopping Centre)

1. Take Hwy 102 (the Bi-Hi) to Exit 4 (Sackville).
2. Take Hwy 101 to Exit 4 (St. Croix).
3. At the end of the off ramp, turn left.
4. Drive about 1.5 km until you cross the St. Croix River Bridge. You'll see a power dam on your left.
5. Drive about 0.2 km past the bridge and take the first left (Salmon Hole Dam Road).
6. Drive about 1 km until the pavement ends.
7. Drive another 1 km on the dirt road to the site.
8. You will recognize the site by the 3 small white buildings on the left.

Meeting Announcements

Halifax Centre of the Royal Astronomical Society of Canada

Meetings begin at

8:00 P.M.

Members of the general public are welcome.

All members—but especially new ones—are invited to come to the meetings 20 - 30 minutes early to participate in our new informal "Meet and Greet". It's a chance to ask questions about astronomy, the RASC, memberships, or to just say hello.

Room 176 Loyola Building
Saint Mary's University *(See Map Below)*

*June's Halifax **RASC Executive meeting will begin at 6:45 P.M.** and run until 7:15 P.M., followed by the Minas Basin Pulp and Power presentation in room 179. All members are welcome to attend.*

June 15 (Meeting will be held in room L179)

Special Announcement

The Halifax Centre owes its St. Croix Observatory site to the hospitality of Minas Basin Pulp & Power Company Limited.

This year Minas Basin is applying to the Province for renewal of its water rights on the St. Croix River.

Minas Basin wishes to meet with the Halifax Centre in order to inform us of the nature of their company, the status of their application, and to answer any questions we may have concerning the lands at St. Croix.

In particular, since we are a public group with an interest in (and an investment at) St. Croix, they are seeking our support regarding their application to the Government of Nova Scotia.

All members, particularly those who use the St. Croix Observatory, are invited to attend a half-hour presentation by Minas Basin Pulp & Power immediately prior to the Centre meeting in June, at 19:15 in Room L 179.

(At the opposite end of the corridor from our usual meeting rooms).

"Who wants to be a Gazer"

By: Pat Kelly

Abstract:
The main presentation for the evening will be "Who Wants to be a Gazer", hosted by our own Pat Kelly. You could be one of the lucky contestants selected from the studio audience! See how many questions you can answer as you go for the big prize, but don't use up your lifelines too quickly!

There are no meetings scheduled for the summer months of July or August.

Halifax Centre Executive 2001

Honorary President	Dr. Roy Bishop	
President	Dr. David Tindall	455-7456
1st vice-president	Pat Kelly	798-3329
2nd vice-president	David Croston	477-5817
Secretary	Steve Tancock	465-4092
Treasurer	David Lane	826-7956
Nova Notes Editor	Michael Gatto	453-5486
National Representative	David Lane	826-7956
Librarian	Dr. Michael Falk	422-5173
Observing Chairman	Paul Evans	423-4746
Councilor	Clint Shannon	889-2426
Councilor	Dave Chapman	463-9103
Councilor	John Jarvo	897-0529

Meeting Location

Meetings are held every third Friday of the month, except for the months of July and August. Meetings take place in room 176, Loyola Building (#3 on map) at Saint Mary's University.

1. McNally
2. Sobey Building
3. Loyola Academic Complex
4. Loyola Residence
5. Patrick Power Library
6. Science Building
7. Burke Building
8. Bookstore
9. Alumni Arena
10. The Tower
11. Rice Residence
P = Parking