Volume 20, Number 6

From The Editor

You just know it's been a busy month when your newsletter is packed full of reports and photos. Judging by this issue, I'd say our contributors need to take a breather! Well done, everyone.

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The sky has been a busy place, too. We have so much to observe with Comet Pan-STARRS, the International Space Station passing overhead, Jupiter, Saturn, and, of course, all those spring galaxies. All we need now are some clear skies.

Keep looking up!

Ann Tekatch Editor Editor@amateurastronomy.org

Chair's Report by Jim Wamsley

This past month was another busy one for the Hamilton Amateur Astronomers. This month's activities were kicked off March 6th with our Astronomy 101 group 2's first meeting. The class was opened by John Gauvreau, who spoke about what the class would cover in the next few weeks. I, very briefly, went over the do's and don'ts when using the club's loaner scopes. Joe McArdle then took over the class, imparting his knowledge of telescope and mount design. After a lengthy question and answer period, the class broke with the student's heads swimming with new information.

At the H.A.A. monthly meeting on the 8th , Kerry impressed us all with her incredible photos of nebulae, galaxies and other night sky wonders, as well as her impressive collection of astro toys in her observatory. Thank you very much, Kerry, for a very informative and entertaining talk. *(Continued on page 2)*

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Chair's Report (continued)

March 22nd found Matthew Mannering and I, at Hillfield Strathallan College, to act as judges for the Bay Area Science and Engineering Fair (BASEF). The H.A.A. has been involved with BASEF for a number of years. We sponsor a special award, the James A. Winger Award, for the best project with an astronomy or physics theme. Our choice for the prize this year was entitled, Artificial Gravity with Centripetal Force, by Liam Gauthier, and Eric Volkel, from St. Bernadette School. While Matthew and I where judg-

ing. John Gauvreau was delivering one of his terrific talks to the BASEF entrants, as well as several hundred other Hamilton area students. Hopefully this will inspire some students to enter an astronomy based project for future science fairs. On the following Saturday, the 24th, I had the honor of presenting the H.A.A.'s James A. Winger Award to Liam and Eric. (See photo at right)

The spring telescope clinic took place

March 22nd. This event was extremely well attended. Several members had their scopes proudly on display for the large number of people that came out to view them and ask questions. I know I was busy talking to interested people for the entire evening. Several people



brought in their scopes to get help from a knowledgeable club member. Another very successful event for the H.A.A..

At the time of this writing, our Astronomy 101 Group1's third class had not taken place, but I know that Matthew Mannering and Leslie Webb have put together an excellent program for them. This class will cover resources and how to find your way around the night sky.

Coming up in April, we have the monthly meeting. Our speaker will be Dr. Doug Welch, Professor, Department of Physics and Astronomy, McMaster University, as well as the founding Chair of the H.A.A.. Doug's talks are always extremely interesting. It's been too long since we've had Doug visit us.

April is also the month we recognise International Astronomy Day. This year, on the 20th the H.A.A. will again be setting up scopes at Bay Front Park, for both day time solar observing as well as night time observing. Check the website for the times. This is a fun day and is always well attended, so please come out, set up your scope and share a view. It's also a great time to learn something from a fellow member.

As you can see, the H.A.A. is a very active club, and I, for one, am proud to be a member.

Masthead Photo: Cmdr Chris Hadfield took this magnificent photo of Hamilton from the International Space Station in February. The ISS passes over us many times in April. See page 6 for a comprehensive listing. Timed exposures of the ISS crossing the night sky can be beautiful. I hope our many talented astrophotographers can use the data on page 6 to image the ISS this month!

Hamilton Amateur Astronomers

20th Anniversary Banquet

At Canadian Warplane Heritage Museum Hamilton International Airport 9280 Airport Rd., Mount Hope, ON

Celebrate our 20th anniversary in style!

Enjoy a tour of the museum, listen to an engaging speaker and dine under the wings of vintage aircraft. Tickets will be available at our general meetings or you can contact Ann Tekatch (editor@amateurastronomy.org), Brenda Frederick (moonspinner@sympatico.ca), or Steve Germann (treasurer@amateurastronomy.org).

Saturday, November 2, 2013 Doors open at 5:00 pm Cocktails at 6:00 pm Buffet Dinner at 7:00 pm Cash Bar HAA Members & Guests \$45.00 per person



The Sky This Month: April by John Gauvreau

The Sky This Month April 2013

- April 2 Comet Pan-STARRS near M31
- April 3 Last Quarter Moon
- April 10 New Moon
- April 13 Moon between Hyades and Pleiades clusters
- April 14 Crescent Moon only 3 degrees from Jupiter
- April 14 Jupiter's moons displayed on order from Jupiter
- April 17 Mars in conjunction with the Sun
- April 18 First Quarter Moon
- April 20 Astronomy Day
- April 22 Lyrid Meteor Shower peaks, early morning
- April 24 Moon rises 1 degree from Spica
- April 25 Full Moon
- April 25 Full Moon rises only 3 degrees from Saturn, 8:30pm
- April 28 Saturn at Opposition, visible all night

Last month I encouraged everyone to get out and enjoy Comet Pan-STARRS, and some of the photographic results of that are showcased right here in your (Continued on page 4)

The Sky This Month (continued)

Event Horizon. The comet wasn't the most spectacular one I've seen, but every comet is different and every one is a treat. It was great fun hearing about everyone's adventures as they tried to pick the comet out of the dusky glow. My first view was over the Hamilton Harbour, and Kathy and I had arrived plenty early to see the fading twilight. After about an hour of facing into the cold western wind, trying to keep our eyes from watering, we finally found our quarry, and I managed a few pictures of the comet while we both enjoyed a fine binocular view. The comet is now fading and although it passes right by M31, the Andromeda Galaxy, this month, it is already a binocular object at best. Overall, Pan-STARRS hasn't been as bright as we might have hoped, but I congratulate everyone who made the effort to find it and now we can all look forward to Comet ISON in November.

If there's a sight to see this month, it comes at the end of April. When the moon is full many observers run for cover, hiding indoors, away from the lunar glare that washes out the faint fuzzies of galaxies and nebulae, and certainly ruins any photographic aspirations. Some members of the HAA take this opportunity to get out and observe the full moon rise. Joe McArdle has prepared full moon rise times for the year and this month the full moon rises on Thursday April 25 at 8:27pm. The moon will be at 111° azimuth, which is in the east-south-east. The moon was actually full only about 4 hours earlier, so you really will see a <u>full</u> moon rising this month. AS an added bonus though, and what makes this month special, is that the full moon will rise right beside Saturn. Because Saturn is at opposition, meaning the point in the sky directly opposite the sun, this puts it beside the full moon, which is full because it too is directly opposite the sun. The pair will make a lovely view rising in the spring sky.



The Sky This Month (continued)

Another uniquely April event is the Lyrid Meteor Shower. Peaking in the morning hours of April

22nd, you might want to go out on the night of the 21st to try and spot some shooting stars. The Lyrids are a typically weak shower, peaking with only about 10 or 20 meteors an hour, but they have been known to erupt with up to 100 meteors an hour. This happened in 1982, but it is unpredictable, so the only way to know if this will be a good year is to go out and observe the shower. Although few in number, the meteors themselves are fairly bright, about the same as the stars in the Big Dipper, with occasional fireballs brighter than Jupiter or Venus. They originate from Comet Thatcher (C/1861 G1), and are specks of dust travelling at about 50 kilometers per second. Remember, no special equipment is needed to observe a meteor show, except warm clothes, a comfy chair and maybe a cup of coffee.

As always, feel free to send me any observing reports, photos, questions, or comments that you would like to share with your fellow members. I'm always happy to hear about your observing experiences. See you out there!

John observing@amateurastronomy.org



Observing the International Space Station by Joseph McArdle

The chart below lists dates and times when the International Space Station will be passing over the Hamilton/Binbrook area. During these passes, the ISS can easily be seen with the naked eye as a moving point of light. Times given are local, EDT. Our thanks to Joe McArdle for preparing this list. - Ann Tekatch, Editor

Date	Date Brightness		Start			Highest point			End			Time of Day
	[Mag]	Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.		
1-Apr	-0.4	4:16:01	17°	NE	4:16:01	17°	NE	4:17:22	10°	ENE	Visible	Morning
1-Apr	-3	5:48:48	11°	NW	5:51:51	66°	NNE	5:55:05	10°	ESE	Visible	Morning
2-Apr	-2.2	5:00:37	36°	N	5:01:17	41°	NNE	5:04:24	10°	E	Visible	Morning
3-Apr	-0.4	4:12:39	16°	ENE	4:12:39	16°	ENE	4:13:34	10°	E	Visible	Morning
3-Apr	-3.2	5:45:27	21°	WNW	5:47:23	50°	SW	5:50:32	10°	SE	Visible	Morning
4-Apr	-2.6	4:57:45	46°	ESE	4:57:45	46°	ESE	5:00:09	10°	SE	Visible	Morning
5-Apr	-1.8	5:43:14	19°	SSW	5:43:14	19°	SSW	5:45:10	10°	S	Visible	Morning
6-Apr	-1.8	21:30:39	10°	SSW	21:32:16	24°	SSW	21:32:16	24°	SSW	Visible	Evening
7-Apr	-2	20:40:41	10°	S	20:43:17	22°	SE	20:45:13	14°	E	Visible	Evening
7-Apr	-1.2	22:16:29	10°	WSW	22:18:04	25°	W	22:18:04	25°	W	Visible	Evening
8-Apr	-3.4	21:25:47	10°	WSW	21:29:04	84°	NNW	21:30:37	29°	NE	Visible	Evening
8-Apr	0.1	23:03:21	10°	WNW	23:03:27	11°	WNW	23:03:27	11°	WNW	Visible	Evening
9-Apr	-3.2	20:35:17	10°	SW	20:38:30	55°	SE	20:41:43	10°	ENE	Visible	Evening
9-Apr	-1.5	22:12:20	10°	W	22:15:15	28°	NNW	22:15:39	28°	N	Visible	Evening
10-Apr	-2	21:21:23	10°	W	21:24:31	40°	NNW	21:27:34	10°	NE	Visible	Evening
10-Apr	-0.1	22:59:20	10°	NW	23:00:22	15°	NW	23:00:22	15°	NW	Visible	Evening
11-Apr	-2.8	20:30:34	10°	WSW	20:33:49	63°	NNW	20:37:05	10°	NE	Visible	Evening
11-Apr	-0.9	22:08:19	10°	WNW	22:10:53	21°	N	22:12:04	17°	NNE	Visible	Evening
12-Apr	-1.2	21:17:16	10°	WNW	21:20:03	25°	NNW	21:22:50	10°	NE	Visible	Evening
12-Apr	-0.3	22:55:03	10°	NW	22:56:24	16°	NNW	22:56:24	16°	NNW	Visible	Evening
13-Apr	-1.6	20:26:14	10°	W	20:29:15	33°	NNW	20:32:16	10°	NE	Visible	Evening
13-Apr	-0.8	22:04:10	10°	NW	22:06:32	18°	N	22:07:50	15°	NNE	Visible	Evening
14-Apr	-0.8	21:13:10	10°	WNW	21:15:38	19°	N	21:18:06	10°	NE	Visible	Evening
14-Apr	-0.6	22:50:25	10°	NW	22:51:57	18°	NNW	22:51:57	18°	NNW	Visible	Evening
15-Apr	-1	21:59:42	10°	NW	22:02:09	19°	N	22:03:15	16°	NNE	Visible	Evening
16-Apr	-0.9	21:08:52	10°	NW	21:11:14	18°	N	21:13:35	10°	NE	Visible	Evening
16-Apr	-1	22:45:32	10°	NW	22:47:16	23°	NNW	22:47:16	23°	NNW	Visible	Evening
17-Apr	-1.5	21:54:54	10°	NW	21:57:40	24°	NNE	21:58:30	22°	NE	Visible	Evening
18-Apr	-1.2	21:04:12	10°	NW	21:06:46	20°	N	21:09:18	10°	ENE	Visible	Evening
18-Apr	-1.4	22:40:35	10°	NW	22:42:29	30°	NW	22:42:29	30°	NW	Visible	Evening
19-Apr	-2.4	21:49:56	10°	NW	21:53:02	38°	NNE	21:53:42	34°	NE	Visible	Evening
20-Apr	-1.7	20:59:16	10°	NW	21:02:10	28°	NNE	21:04:57	11°	E	Visible	Evening
20-Apr	-1.7	22:35:42	10°	WNW	22:37:42	32°	WNW	22:37:42	32°	WNW	Visible	Evening
21-Apr	-3.4	21:44:56	10°	NW	21:48:13	79°	NNE	21:48:57	50°	ESE	Visible	Evening
22-Apr	-2.7	20:54:13	10°	NW	20:57:25	48°	NNE	21:00:14	13°	ESE	Visible	Evening
22-Apr	-1.2	22:31:09	10°	W	22:32:59	21°	WSW	22:32:59	21°	WSW	Visible	Evening
23-Apr	-2.5	21:40:04	10°	WNW	21:43:11	42°	SW	21:44:18	30°	S	Visible	Evening
24-Apr	-3.3	20:49:11	10°	WNW	20:52:29	77°	SW	20:55:40	10°	SE	Visible	Evening
25-Apr	-1	21:35:41	10°	W	21:37:57	17°	SW	21:39:51	12°	S	Visible	Evening
26-Apr	-1.8	20:44:22	10°	WNW	20:47:19	31°	SW	20:50:14	10°	SSE	Visible	Evening



Above: John Gauvreau took this beautiful image of Comet Pan-STARRS on March 14 from Hamilton's waterfront.

Below: Ann Tekatch's image of the Comet as seen looking west over Lake Niapenco at the Binbrook Conservation Area. Image was also taken on March 14.



Comet Pan-STARRS Gallery





Above: Bob Christmas's image of Comet Pan-STARRS taken March 14 at the Binbrook Conservation Area.

Left: This image was taken from Bob's balcony in Burlington on March 23, 2013.

Below: Don Pullen's Comet Pan-STARRS image was taken from Alberton Road near the 403 on March 14.



Comet Pan-STARRS Gallery



Above: David Tym captured this image of the comet near his home. His photo was featured on CHCH TV during Mario Carr's astronomy segment.

Below: Don Pullen managed to capture the Moon as well as Pan-STARRS in this image. Comet Pan-STARRS can be seen in the centre of the photo, just above the wispy clouds. Image was taken March 14 near Alberton Road and the 403.



March General Meeting Summary by Bob Christmas

I honestly don't remember a meeting of the HAA ever being cancelled before. But such was the call in February, and wisely so, when a ferocious snowstorm pounded Southern Ontario and the Hamilton area.

But the weather was fine for our March meeting, and after a hiatus of several weeks, we had yet another tremendous turnout of about 100 people in the Hamilton Spectator Auditorium.

HAA Chair Jim Wamsley kicked off the meeting with some announcements, including our spring Telescope Clinic, which was held two weeks later on the 22nd, as well as upcoming Astrophotography workshops and Astronomy-101 classes.

Jim then passed the floor to our main speaker of the evening, longtime HAA member Kerry-Ann Lecky Hepburn, who presented her talk on her personal history and adventures with photography of the night sky, or astrophotography, during which she showed many of her stunning images of the night sky she has taken over the years, some of which have won prestigious awards, and some of which were featured as NASA Astronomy Pictures of the Day (APODs).

Her first dabbling with night-sky photography was part of a grade-11 science project, in which she was studying variable stars. Her project included taking a time exposure of the variable star Algol. Her astrophotography hobby grew from there, with photos of the moon, some of the planets, some aurorae, and Comets Hyakutake and Hale-Bopp. While she was a student at York University, she used the university's observatory telescope to take images of Comet Hyakutake and the Orion Nebula (M42).

Kerry obtained a Canon Digital Rebel 300D and a Celestron 6-inch Schmidt-Cassegrain scope in 2007, as well as new techniques of digital imaging and processing. Since then, her imaging equipment, imaging optics, and her processing techniques grew increasingly sophisticated. Today, her repertoire of equipment includes an AT8RC Ritchie-Chretien telescope, a Sony QHY-8 CCD camera, an SBIG ST-8300 CCD camera, and a Canon 5D digital SLR. She regularly collaborates with fellow astrophotographers, such as Paul Mortfield and Stephano Cancelli. Astrophotographers from near and far have sought her phenomenal image post-processing expertise. Kerry has become one of the best astroimagers in Canada, even in North America, even the world. We at the HAA are so blessed to have Kerry as one of our own members!

If you have not done so already, check out Kerry's astrophotography on her website, <u>http://www.weatherandsky.com/main.php</u>. She has some amazing work.

After Kerry's presentation, we took an intermission break for the usual mingling and conversations. Afterwards, Alex Tekatch and Matthew Mannering drew the door prizes and the 50/50.

After the break, HAA member Kevin Salwach gave another fine presentation of This Day in Astronomy, outlining historical astronomy and space events that have taken place on this day, March 8.

Our director of education, Mario Carr, gave us some insight into his history with the HAA, and how he has reached out to the local media, including Hamilton Mountain News and CHCH TV, to talk about night-sky events and to promote our club. I always enjoy his articles whenever they appear in the Burlington Post.

Finally, the HAA's observing director John Gauvreau talked about Comet Pan-STARRS, and the fact that it was rotating into the Northern Hemisphere and becoming visible to us this month in the evening sky after sunset. John invited everybody in the audience to observe, and image, this comet. (Indeed, many of us have seen and imaged Pan-STARRS, as this EH edition's Pan-STARRS gallery attests!)

After the meeting, about 20 of us rendezvoused at Crabby Joe's in West Hamilton for food, drinks, and further astro-banter.



HAA Featured at the Burlington Library by Mario Carr

Here is a picture of the table top booth that I set-up at the Burlington Central Library, 2331 New St about a week ago. The display will be there until the end of March and we also have it for two weeks in July. I posted information about the club along with our club brochure and old astronomy magazine that people can take home. I noticed that a lot of brochures were gone. Hopefully, this will translate into new members. The library told me that the table top displays are offered to charities and non-profit groups.

Club observing director, John Gauvreau, will also be presenting a talk at the Burlington Central library called "To Boldly Go: Astronomy 101." 7 - 8:30 p.m., April 30, 2013. Take a tour of the universe from Earth out through the planets and beyond the stars to the furthest reaches of the universe. To register for the free event click http://www.bpl.on.ca/ or call 905.639.3611 ext 1321.





Across

- 1. On April 17 this planet is in conjunction behind the sun.
- 3. On April 14 the moon is near this planet.
- 7. On April 28 Saturn is a mere 1.3 billion kilometres away at.
- 9. On April 25 the moon is below this planet.
- 10. April 2-5 comet PanStarrs will be beside this galaxy.

Down

- 2. On April 20 this day will be celebrated at Hamilton's Bay Front Park.
- 4. On April 13 the waxing crescent moon will be between the Hyades and this star cluster in the evening sky.
- 5. On April 24 the moon is extremely close to this star.
- 6. The full moon on April 25 is also called this moon.
- 8. On the predawn hours of April 22 this meteor shower peaks.

Answers on page 17

Spectroscopy: The Mother of All Astronomical Investigation by Mike Jefferson

About ten years ago I decided to become involved in the activity of astronomical spectroscopy. 'Star' and 'solar' 'rainbows' have always intrigued me. Why did astronomers consider them so wonderful and so important? What were the mysterious dark and light lines that coursed through their very appearances. How was it possible to read the answers to questions about the night sky in them?

Spectra have done more to advance our knowledge and understanding of the skies above us than any other form of astronomical research. Spectral inquiries have been with us since the time of Isaac Newton and before. However, they were on a little-travelled side road. Spectra were originally formed using prisms placed in the optical paths of telescopes. Today we use diffraction gratings. Before the advent of photography spectral images had to be hand-drawn and hand-coloured. The process was very slow, cumbersome and crude. Some understanding of the nature of light was brought about from this work. However, real advances only came when spectroscopy was mated with photography. Very accurate images could be made, measured and archived for later calibration and comparison. This work happened in the late 1800's and early 1900's, the same period when relativity and guantum physics began to make gigantic strides. It was realized from laboratory work that all elements on the periodic table came with their own set of spectral fingerprints and many of these were also being seen in solar and stellar spectra. This meant that the molecules and atoms that existed here on Earth were also out in the universe. Some were even out in the universe but were not on Earth at all. One example is helium, synthesized from the fusion processes in all stellar bodies. It was, thus, a newly discovered element and termed

'helium' from the Greek word 'helios' or 'sun', because the sun is the star where it was first seen.

Other than the fortuitous opportunities to view rainbows, my first experiences with spectra came from reading an article in "Event Horizon" by our founder, Doug Welch. He had purchased and conducted tests on the then-new "Rainbow Optics" 1.25" diffraction grating/spectroscope. Doug wrote so highly of it that I asked him if he considered it a worthwhile purchase. He answered in the affirmative, I bought one from California and have never looked back (no pun intended)! For a low-resolution instrument it is certainly very finely ruled -~200 lines/mm. By comparison, I have a large and heavy instrument (~15 cm in diameter) that was probably from a professional application. It is ruled to the accuracy of over 700 lines/mm. And there are instruments out there in space and in other places around the globe that are ruled to finer degrees than that. The big problem with fine ruling is that it becomes like frosted glass and it takes a very large telescope (beyond amateur acquisition) to put enough faint starlight through it for any useful research purposes. However, for solar light such fine ruling is just not a problem. Another issue with very fine ruling is spectral spread. 200 lines/mm (lpm) will allow the target star and the spectral spread to fit on the film plane of 35 mm or medium format camera. That may be a bit of a stretch (no pun intended!) for CCD's and electronic detectors. Most are smaller than a 35 mm frame. If you can't get the star and its rainbow on the same frame, calibration may be a bit more challenging. The solution for this is to get a grating with fewer lines.

This brings me to where I am now, in this adventure. Several years ago, at NEAF (the North Eastern Astronomical Forum), Dennis Di Cicco was doing his usual 10-minute interviews (*Continued on page 14*)



HAA Helps Hamilton

To support our community, we will be collecting non-perishable food items and cash for local food banks at our general meetings. Please bring a non-perishable food item to the meeting or a donation of cash and help us help others in these tough economic times.

If you would like to help or have any questions about this initiative, please contact Jim Wamsley at 905-627-4323.

Spectroscopy: The Mother of All Astronomical Investigation (continued)

of various exhibitors and the one that caught my attention was Tom Field of Rspec (Real Time Spectroscopy), Seattle, Washington. Tom is a software engineer with a big interest in astronomy. He has written pieces of spectral software for other applications (industrial/educational) but the one that interested me was his astronomical version. He also sells camera and telescope adapters for spectral equipment and is an agent for Paton Hawksley Educational (British manufacturers of many kinds of diffraction gratings). Their astronomical version is a standard 1.25" cell for astronomical applications. However, it is ruled to 100 lpm which means it passes more light than more finely ruled instruments. Also, it has a narrower spread between the star and its rainbow and in the rainbow itself ie. designed for digital applications - the whole image appears on the detector.

Recently I have downloaded Tom's software into my computer and have played with it for familiarity. The camera software has been loaded in, as well, for image acquisition. Learning the camera operation is another hurdle with which I am still wrestling. I have a long (and fun) way to go to learn how to use this equipment and its software. If anyone is interested, I can teach you a few of the basics to help you, too, to get started in this fascinating study. The imagery you will acquire is the highest 'resolution' astronomical imagery you will ever have, no matter the size or sophistication of telescope/camera. Having said that, it is not really correct to speak of diffraction images in terms of resolution. However, there are things they will reveal about the universe that not even the world's best astrophotograph will show you. You will be looking at the heart of energy lines of the atoms and ions in the fingerprints of stars, planets(reflected light) and other astronomical phenomena. Aspects of quantum mechanics will be right in front of you to see.

When I started this quest 10 years ago, spectroscopy was still between emulsion and digital. I was using film cameras. I would have to use (or waste) a whole roll of film to get a few images that I wanted. I never knew what I was getting until I visited the development lab. Calibration consisted of a small cardboard template that was skewed to a particular camera lens/telescope focal length. Film was not as sensitive to starlight as electronic detectors. I could not match flux graphs with spectra. Any kind of flux graph was a guess-fit scenario, at

best. The digital age has revolutionized all of that. Images that look like lower-resolution professional work are very doable. You do not need the long exposure times, the sophisticated tracking and the darkest of skies that are necessary in standard astrophotography. The understanding of your object will also be much greater - you will analyse what you have just imaged. Simply put, there will be no guessing games at what you have just acquired. 'Fingerprints' tell no lies!

What can you determine from your spectra? Besides viewing the specific energy levels of electrons (as predicted by Quantum Theory), molecular bands in cooler stars will reveal chemical compounds that have been able to form in these older, redder stars. Dark spectral lines can be seen that indicate specific levels of electromagnetic absorption and electron escape. Bright spectral lines show specific levels of electromagnetic escape and attendant electron capture. Stellar classification, stellar evolution, red and blue shifting, fluorescence in the atmospheres of Wolf-Rayet stars, forbidden lines in hot nebular clouds, stellar rotational speeds, probing of planetary atmospheric composition, temperatures and energy levels of different parts of stellar electromagnetic spectra, evidence for the chemicals that support life and searching for stellar differences by comparing the spectra of stars that are in the same classification, can be seen from the vantage of your camera-spectroscope or camera-spectroscope-telescope backyard set-up (There is simply no need for an interstellar spaceship!). Behind all of this is the realization that you are dealing with many aspects of modern quantum analysis. Using the 'micro' of spectroscopy we see the macro of the larger universe and what is happening in it. You will find much that is simply not obvious in photographs or eyepiece images.

There are 3 types of spectra: the continuous spectrum can be seen as a rainbow and a spectrum without lines and is a thing of great beauty; the absorption and emission spectra have lines, dark and bright respectively, are formed from either a slit in a spectrograph or a point-source image and are scientifically very valuable.

My greatest achievements in my film-based work were as follows: 1) Peter McHugh (colleague and former HAA member) and I sent a project of varied spectra, and investigations into each one, to "The Society for Astronomical (Continued on page 15)

Spectroscopy: The Mother of All Astronomical Investigation (continued)

Sciences" SAS Annual Forum in California, after discussions with Dale Mais (an SAS member) at Starfest ~ 2002. SAS is a group of scientists and amateur astronomers who specialize in spectroscopy, especially of Mira variables. Peter's and my work was very well-received. I did the spectra and Peter did all of the image processing. The analyses were collaborative. 2) Hanging in my computer room are 2 huge spectra, each about 1mX30cm and matted and framed. One is a Mars spectrum with comparison to professional spectra, calibrated so that all lines match. The second is Vega and the hydrogen Balmer lines are very fat, indicating a young and hot star with a very high rotational speed. I like to joke that these are the most expensive astronomical images that were ever made! I am indebted to Peter for all the work he helped me with!

In closing, I have to paraphrase Doug Welch on the beauty of spectroscopy. It will show you the most beautiful colour you have ever seen. If you have never seen a good spectral image you need to see one at least once in your life....and preferably more!

Photos From March 22 Scope Clinic



The photos on this page and the one following are courtesy of Don Pullen and Ann Tekatch. All photos were taken at our recent Telescope Clinic.

As Jim Wamsley mentions in his Chair's Report (beginning on page 1 of this newsletter), the clinic was very well attended by both club members and the public.

Members of the public were encouraged to bring their telescopes for help in setting them up and advice on how best to operate them.







UPCOMING EVENTS

April 12, 2013 - 7:30 pm General Meeting at the Hamilton Spectator Auditorium. Dr. Douglas L. Welch from McMaster University will be our main speaker.

April 20, 2013 - Astronomy Day observing at Bayfront Park. See website <u>amateurastronomy.org</u> for details.

April 27, 2013 - Astrophotography Group meeting in the basement of the Centurion Apartments, 75 Main Street, Dundas. Contact Jim Wamsley for details or directions (chair@amateurastronomy.org).

May 10, 2013 - 7:30 pm General Meeting at the Hamilton Spectator Auditorium.

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