

Observer Staff

Editor & Publisher:
Michael Frascinella



THE NHAS OBSERVER

Newsletter of the New Hampshire Astronomical Society



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"All the news that fits in print"

December 2001

Eclipse 2001

The program for the Dec. 21st meeting will be given by **David Speltz**. The topic is his trip to view the June 2001 solar eclipse in Zambia, Africa.

David's story was originally printed in the July 2001 *NHAS Observer*.

President's Message

Our annual stakeholders meeting will be held December 21st at CMP. We hold elections for President, Vice President, Secretary, Treasurer, and for one of the three Board positions. It is not too late to run for one of these offices. Nominations will remain open during the first part of the business meeting. All 2002 paid members in good standing can be nominated and have the right to vote that night. If you can only make one meeting during the year, please plan to attend this one.

Looking back, we accomplished much as an organization this year. We completed the observatory and cleaned up the dark sky site, laid the groundwork for some future initiatives, and transitioned the newsletter to the web. There was also a noticeable increase in support by our members for public observing events. I want to thank all those who participated in work parties and skywatches.

As with any volunteer organization, a few people deserve special mention. The NHAS focuses most of its energy in two areas: 1) developing and maintaining our dark sky site and 2) promoting astronomy through public education and observing events. I want to especially thank **Larry Lopez**, our YFOS Site Coordinator, and **Ed Ting**, our Public Observing Coordinator, for their tireless efforts. We are lucky to have them in the organization and to continue in the same capacity next year.

Two other people deserve our thanks.

Over the last several years, I have attend more than 50 public observing sessions. At just about all of these events and more, **Ed Ting** has had the support of **Mike Townsend** and **Herb Bubert**. I did not want their contributions to go unrecognized. Our mission is really about sharing our knowledge of the night sky with the public (our neighbors). They have embodied that spirit in their support.

Since we are an astronomy club, I would like close this month's message the same way I have tried to do each month during my tenure as President, with what's going on in the night sky. Hopefully all of you had a chance to catch the Leonids on the 18th. It was quite a remarkable show.

On December 2-3, Saturn reaches opposition. Due to the current ring tilt, it will be at its brightest in 30 years. By midmonth, it will high enough for good viewing. Please get out your telescope and observe this wonderful object. If you missed the Nov. 30th lunar occultation of Saturn (due to the weather), we have another chance on the morning of the 28th. Let's hope for clear skies.

The Geminid shower is schedule to peak at about 10 p.m. on the night of the 13th, a day before the New Moon, so viewing will be good. Given ideal conditions (dark skies), some are predicting 60 or more per hour. Not quite the Leonids, but they still should provide a good show.

Finally, you still have a chance in early December to catch comet LINEAR C/2000 WM1 before it drops too far south to be viewable at our latitude.

★ John Pappas

Public Observing Highlights

The Coffee House on Friday Nov. 16 coincided with the Leonids later that evening. I set my alarm for 2 a.m., slept through it, and woke up just in time to get outside in my driveway as the storm was peaking. This was the best meteor shower that I can recall seeing.

Coming up: A skywatch on Dec 7th at CMP, and another special one at CMP on Dec. 12th.

The planetarium is getting very active these days. Education Director **Tanja Diederich** stated, "We will not be doing our regular Hot Cosmic Topic Series Dec. 7th; we will be doing a Winter Solstice Family Night Out from 5-10 p.m.; three planetarium shows, demonstrations, discounts in the store and on memberships." So if NHAS members could show up a little early on Dec. 7th, it would be appreciated!

★ Ed Ting

Special CMP Report

The Special CMP Skywatch of Nov. 7 was led by the following NHAS members: **Roger Greenwood, Ed Ting, Herb Bubert, Mike Townsend, John Pappas, and Rich DeMidio**.

The weather was very clear and cold. The wind did not die down until after 7:30 p.m., so **Roger** and I had to watch our Obsessions closely as the light shrouds would act like sails.

Roger and I started the evening by comparing interferometer certificates from the Torus mirrors (for bragging

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Feature Story

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Special CMP Report (from page 1)

rights). The results were a wash.

This was a special night for CMP since it was part entertainment and part fundraising. As such, several VIPs came out from time to time to observe.



We pointed our scopes to different objects so that people could go around quickly and see different objects. We targeted Mars, Saturn, M57, M11, M15, M31, Double Cluster, Epsilon (ϵ) Lyra, Albireo, T Lyra, Eta (η) Cassiopeia, and Gamma Andromeda. I kept an extra coat handy and lent it a few times while folks were observing. We all also helped to recruit a new member.

CMP could not turn off the street lights because of night classes in session, so many objects were totally washed out. I estimate that we had about 50 visitors over the course of the evening.

I experienced some personal pride when my seven year old **Ross** successfully used the Obsession's Telrad to target Saturn, Mars, and Jupiter. I would tell him that some people wanted to see an object and he promptly placed the scope in the proper position. People were impressed and I was one proud papa. He was quite the social butterfly, walking around announcing what was being shown in the scopes.

★ Rich DeMidio

ATM True Grit

The ATM next meeting will be on January 13, 2002 at noon at my home in New Boston.

We need snow removal volunteers to prepare YFOS for the Congelate I Vostri Panini event (Freeze your Buns) on Jan. 11 or 12. Contact me at lopez@mv.mv.com



★ Larry Lopez

How Big Is That Diagonal in the Window?(Part 3)

In Parts 1 and 2 we verified a supposition that definition loss caused by obstructions in the optical path, up to 30-35% the effective diameter of the primary, will *not* prevent a good telescope from achieving the limits of prevailing atmospheric environment. Our simple investigation revealed it was *not* oversized secondaries that caused difficulties, so the question remains, "What is the cause of the meager performance often delivered by amateur equipment?"

All astronomical telescopes with good optics and a diameter greater than a few inches, without active correction, are limited by Earth's atmosphere to a visual resolution no better than a few arc-seconds. So why is it that most professional telescopes like Mt. Wilson, Lowell Observatory, Keck, Kitt Peak and many others yield such superior planetary images when compared to smaller amateur telescopes, when all have the same resolving limit, as well as comparable f values, and therefore similar theoretical brightness?

A *complete* amateur 12-inch diameter Dobsonian, with accessories and mounting, ready to use, costs only about \$1000.00. A truly professional quality astronomical *tube assembly only*, with a 12-inch or so aperture costs in excess of \$10,000.00! At least ten times as much! Need I say more?

With few exceptions, optics for amateur use were designed on near a zero budget, made by an amateur, or by unskilled day workers, employed by small companies that were the world's lowest bidders for their product. Many times these low budget manufacturers use materials, techniques, processes, and equipment from the dawn of optical history, and workers are pushed to their limits to generate quantity over quality. It is only a strange twist of fate that any of these telescopes are as fine as they are. At best, most are no more than facsimiles, lookalikes of their higher quality professional counterparts.

Most modern instruments use at least a few optical components, such as lenses, mirrors, eyepieces, correctors, and field flatteners, with at least a few elements

faster than f/6 or f/7. But few employ designs, procedures, or equipment for testing, that consider the higher order aberrations that become exponentially important as focal length decreases, or are testing formulas employed to compensate when applying non-linear equations at low f numbers. Due to the use of common simple formulas in the production of low f number optics, and the inability of most testers to detect higher order aberrations, many amateur instruments are simply not designed, polished, or figured correctly.

Next we must concede that the long-term state of matter in the universe is toward maximum entropy, constantly changing, moving, or randomly oscillating from one value to another. And so it is with an optical surface being figured, unless time-consuming, expensive processes and techniques are applied. Heating, cooling, mechanical stresses, and a host of other naturally occurring forces cause areas of an optical surface to change, in sometimes unpredictable ways, resulting in the formation of many repetitious pairs of ridges, bumps, hills, and valleys of all sizes and amplitudes.

Then this most significant error of low cost optical production, manufacture, and test is covered up. Short period repeating errors are masked to make the optics appear better on paper by representing errors in RMS, or arithmetic mean, instead of actual peak-to-valley limits. The average or RMS of many small, out-of-focus points lying on either side of the RMS value may meet the artificially contrived overall RMS, or average number, but these small variations are really there, each with slightly different focal lengths. And *it is the surfaces of these peaks or valleys that actually redirect light, not some mathematical representation of them.* Therein lies a most significant difficulty, the presently accepted method of specifying and testing an optical surface cannot detect these miniscule points.

Consider a typical mass-produced optic where the surface has innumerable small, random, peak or valley areas that focus either too long, or excessively short. Since these areas are diminutive,

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How Big (from page 2)

and numerous, they will be seen as a trivial widening of the fringes, or unresolvable noise between the fringes in the standard Zygo Interferometric Test. Similarly they will not be detected with the common null or shadow testing techniques such as Foucault. It may be possible for an experienced operator using a sophisticated Ronchi tester to just detect, but still not be able to measure, these small errors.

Because of the physics of the way the peaks and valleys are formed they will have little or no surface that actually meets the computed RMS number, be of small and nearly equal amplitude, but opposite in polarity relative to the mean value, and therefore mathematically cancel each other.

The result is a surface with thousands of extremely small unresolved areas of both longer and shorter foci that average to the RMS value. The effect is magnified by the steeper incident angles involved with low f optics, and accounts for much of the unresolved blur and background noise normally attributed to short focus primaries, and their resulting larger secondaries.

An optic with a surface accuracy better than 1/20th of a wave RMS will contain numerous small peaks and valleys, each with only a few thousandths of a square inch area that will mathematically cancel each other. But each small peak or valley is really there, and will focus differently, contributing to poor contrast and low resolving power.

A surface figured accurate only to 1/4 to 1/8 wavelength of yellow/green light, peak to valley, will always perform as expected, and most times be quite superior to an optic figured accurate to 1/20th wave RMS. Few optics actually need to be figured to an accuracy more than 1/8th wave peak to valley – anything more is wasted effort, and less will reduce performance.

Optical devices tested using the RMS measuring techniques seldom perform as well as one might expect by interpreting measurements made by RMS techniques. To obtain true professional performance we must build instruments that are physically correct, as well as mathematically outstanding.

Optics polished only to amateur standards, but used for high power laser

applications will explode when the beam is directed at them. Since high power laser systems do work, it is obviously possible to make proper surfaces if enough time, money, and effort is expended.

Later issues will discuss other equally important difficulties with even the best optics. For best performance, we need laser quality optics in our telescopes.

★ Ed Dougherty

Leonids over NHAS

Here is a selection of excerpts of observations by NHAS members of the Nov. 17-18 Leonid meteor shower.

From Roger Greenwood: After a really memorable night/morning I managed to catch one meteor (out of a hundred exposures) in Orion. I used my Kodak DC 260 digital camera on a tripod with a 16-second exposure. See: http://www.rogergreenwood.com/Leonid_2001.html

What a great experience the Leonids have been.

From Barbara O'Connell: What a great crew we had at YFOS! Some 5-7 scopes, several cameras, a video camera. The observatory was open. Music was playing. Coffee was on. Lots of socializing and laughter. We ooh'd and ah'd until they were coming so fast we just noted the great ones. We also tried shouting directions or constellations but the brain was slow at 22 degrees Fahrenheit.

I saw several that reminded me of fireworks – streaking, splitting, or leaving a trail – but I couldn't see any color. There were three "awesome" ones that I saw where the trail lasted for 5-10 minutes later. It was a wonderful experience! A near perfect evening!

From Mike Stebbins: I was at YFOS from 2 a.m. to dawn, still seeing bright ones into the sunrise. We counted 11 per minute at 4:30 a.m., 21 per minute at 5:10 a.m., with a peak around 5:30 a.m. Impressive show, they came in clusters segregated to sections of the sky at times. Very bright and fast to slow with trails. After a while we stopped calling out the dim ones. This will be one to remember for a long time, it was a great night.

YFOS conditions: clear, no wind, very transparent, somewhat unsteady at horizons, temperature 27 degrees F,

about 15 people present, many scopes, music by Joel, both canned and live. **From Rich DeMidio:** We had some friends over and made a party of it. Also, I woke up the kids and my seven year old counted 66 while he was out. I stopped counting after 150. Just for giggles, I took out the camcorder and pointed it at Leo Major.

There were a few things worth mentioning. One trail lasted several seconds after many sightings. I saw six very bright ones that I would estimate at -1 or better in magnitude. A few reminded me of fireworks. A trail, then a huge white flash. Those had to be at least -3 in magnitude. I saw several with color, green mostly; I believe copper is the metal that causes the green. Everyone had a great time and the kids loved it.

From Michael Frascinella: On Sunday morning, Nov. 18, at 4 a.m. I was on my front yard in Bear Brook State Park and my son was already on the porch roof. I spread sleeping bags on the lawn and settled down for some observing. Friday night was clearer but I could easily see the Beehive in Cancer. The meteors were coming rapidly, sometimes three per second. My maximum one-minute count was 8/min. at around 5 a.m. The meteors varied from short, faint, blue, one- or two-degree streaks to bright, yellow fireballs, 10-15 degrees long. My counts dwindled to 5/min by 5:45 a.m. as the eastern sky brightened in response to the approaching daybreak. That's when I went in to catch some Zees before heading to a Men's Prayer Breakfast at 8 a.m.

From Steve Stefanik: I spent an hour outside from 4:30 to 5:30 a.m. EST 11/18/01 watching the Leonid meteor shower from my side stairs which face east-southeast. I counted 164 from "downtown" Manchester!

They seemed to arrive in pairs or threesomes. Most were short, fast, and greenish-yellow in color. Several were large with a more yellow-orange streak to them and a red-orange meteoroid "head" visible. One left a considerable "smoking train" which drifted in the breeze for several minutes.

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Leonids over NHAS (from page 3)
One split in two! All in all, I would estimate 200+ per hour. I don't know if I would call it a "storm" (more like a "hard rain") but it certainly was better than in past years.

From **Dave Davinport**: I did five observations with counts: 2:30 to 2:50 a.m. = 260/hr, 3:00 to 3:15 a.m. = 225/hr, 3:30 to 4:00 a.m. = 380/hr, 4:10 to 5:00 a.m. = 590 (I lost almost two full minutes when a newspaper carrier pointed high beams right at me. She decided to strike up a conversation with this obvious crazy person in a lawn chair and blanket at the edge of the road. I think I could have broke 600. Last count 5:00 to 5:15 a.m. = 500. My wife woke up around 3 a.m. and the best I could do was to get her to look out a window. The first and only meteor she saw was the brightest one of the night -- it streaked below Orion and had an arc-welding white/blue color. She said "Wow look at that!" then promptly went to bed. Most all the sizeable meteors I saw had an orange head and greenish tail. The bigger ones did seem to have a tendency to come in multiples. The longest continuous run of meteors in the sky was an even dozen over maybe four seconds.

From **Joe Brophy**: I watched from 3:30 to 5:30 a.m. from my deck on Lake Sunapee with a great view. Beautiful evening, crystal clear. Around 4:30 a.m., I tried to count. They seemed to come in spurts and most were fleeting. A few left a long train, lasting maybe a second or two. One, nearly overhead, exploded with a bright flash, and trailed off in an easterly direction. The newspapers said the shower would produce about 70 meteors a minute. My count was less than that, and I forgot what I counted. Oh well, it was fun.

From **Lew Gramer**: I was in China, together with members of the Dutch Meteor Society. We observed and lived at Xinglong Station, 120 km northeast of Beijing.

I observed rates of 40/minute, and sustained rates above 20/minute. But my longest contiguous period above 20 meteors/min was only 10 minutes. Seeing a meteor storm for the first time in my life, unquestionably, was a personal zenith for me.

For more meteor news go to <http://www.nammeters.org>.

Web Uploads

A temporary outage **not** due to our ISP has been rectified (see separate e-mail).

★ Barbara O'Connell

The Bottom Line

Here are the numbers for the 2002 membership year.

2002 members: 77

Club balance: \$9,260 [this is not far below the Dow-Jones average--MAF]

★ Jim Warena

Looking Back at Last Month

Opening. John Pappas welcomed members and visitors to the meeting.

Joe Derek brought some photos from a website called Terra Server.

Book of the Month. Larry Lopez brought a few library books.

Scope of the Month. Mike Townsend demonstrated a 5-inch 1250 mm Celestron scope circa 1974. It had a non-coated corrector and mechanical slow motion controls. Images were not as bright as current C5 units but it was mechanically very good. It sat on a Super Polaris mount, which was very reliable and durable.

Club scope : Still with Mike Pelletier

Committees. ATMs: Larry Lopez said they are halting for the year.

Web Comm: Barbara O'Connell announced the first newsletter delivered via the NHAS website and asked members to notify her if they have a problem accessing it.

Photo Comm: A few members attended the last meeting of the year.

YFOS. Larry Lopez said they were going into winter mode. A new heater is to be installed in the warming room and the mount on the 16-inch scope is being upgraded.

Some members decided to hold a Leonid meteor watch at YFOS.

Public Observing. Ed Ting assured us that most of the big events were over and thanked those who helped with

each event. Ed noted that the special CMP event was attended by well-heeled visitors, but many did not take advantage of the NHAS scopes.

Treasury. Jim Warena put the club balance at \$8839, peak 2001 membership at 163, and 2002 enrollment at 57.

2002 Nominations. John Pappas asked each officer to give job descriptions after which the following nominations were made and accepted:

Secretary: Michael Frascinella

Treasurer: Jim Warena

V.P.: Joel Harris, Todd Miller, Joe Derek

President: Joel Harris, Mike Stebbins, Todd Miller

Board: Chase McNiss, John Pappas, John Blackwell

Nominees are still in a state of flux.



Evening Program. George Peterson presented a somewhat technical discussion of his investigations that a 180-light-year diameter gas shell surrounding us may be the remnant of one or more nearby supernovas. He quoted 25 light years as the minimum safe distance from such an event. He is hoping for geological studies of ice samples to show layers of dust from these events.

★ Michael Frascinella

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E-mail your articles to the Editor.
Phone if you have a late submission.

CHANGE OF ADDRESS

Notify the Treasurer. Include your full name and new street address.

If changing an e-mail address, specify whether you want to add, modify, or delete an e-mail address.

*Merry Christmas to all and a
Happy New Year!*

How to Join N.H.A.S.

Write to us:
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Manchester, NH 03105-1001
Attn: Treasurer

Send E-mail to:
Treasurer@nhastro.com

Use our web site:
<http://www.nhastro.com/>

2001 Officers (one last time!)

President:: John Pappas President@nhastro.com

Vice Pres.: Joel Harris VP@nhastro.com

Treasurer: Jim Warena Treasurer@nhastro.com

Secretary: Michael Frascinella Secretary@nhastro.com

**New Hampshire Astronomical Society
P.O. Box 1001
Manchester, NH 03105-1001**

Eclipse over Africa, Planetarium

NHAS Upcoming Events

Event	Date	Time	Location
CMP Skywatch	Dec. 7	5 p.m.	Yes, 5 p.m. Planetarium, NH
CMP "Legislative Invitational" Skywatch	Dec. 12	7-9 p.m.	Planetarium, NH
Coffee House	Dec. 14	7 p.m.	YFOS, NH
Boy Scout Skywatch	Dec. 20	7 p.m.	St Luke's Church, Derry, NH
December meeting	Dec. 21	7:30 p.m.	Planetarium, Concord, NH