

Observer Staff

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THE NHAS OBSERVER

Newsletter of the New Hampshire Astronomical Society



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"All the news that fits in print"

November 2001

Intergalactic Microwaves

This month's speaker is **George "Pete" Peterson**. He will be presenting excerpts from a paper he is submitting to the American Journal of Physics. The paper is entitled "Contributions to the microwave background due to effects of the Local Bubble in the Milky Way".

A high school grasp of algebra, and physics is all that is needed to follow the discussion. For example,

$$F = \frac{m(v_1 - v_0)}{(t_1 - t_0)}$$

Mr. Peterson has presented various topics to the American Association of Physics, The Astronomical Society of Southern New England, Bates Linear Accelerator, and the Laboratory for Nuclear Science at MIT in Cambridge. His specialty is supernova theory.

President's Message

It's election time again. The NHAS has four officers (President, Vice President, Treasurer, and Secretary) and a three-member Board. Officers serve for one year, Board members serve for three years. At the November meeting we will open nominations for President, Vice President, Treasurer, Secretary, and one Board member for 2002.

Each of the current position holders will briefly described their duties and responsibilities during the meeting. Nominations will then remain open until the December 21st meeting. Elections will be held that night. Members in good standing (dues paid for 2002) may vote at the meeting.

If you are interested in taking a more active role in the organization, please consider running for one of the positions.

Peak for the 2001 Leonid meteor shower occurs during the early morning of November 18th. The moon is just

past new, so conditions (barring weather) should be excellent. Current predictions call for major activity over Asia with a reasonable amount of activity possible in the western hemisphere. (See "Leonids over NH.") During the early evening of Nov. 30, North American observers (that's us) will get a chance to view a lunar occultation of Saturn. Let's hope for clear skies.

★ John Pappas

Public Observing Highlights

CMP invites NHAS members to attend the unveiling of its new program, "Living With a Star," on Weds. Nov 7th. Local community leaders will be invited as well and seating is limited, so I am asking for RSVPs via e-mail in advance. Since the program concerns the sun, we will attempt solar viewing, weather permitting, during the daytime.

On Oct. 17th, twelve NHAS members came to our annual Reed's Ferry skywatch in Merrimack. Earlier in the day, teacher **Barbara DeVore** told her kids, "this is going to be one of the greatest nights of your lives." Then it clouded up. Duh! I spent most of the evening looking at the spire of the church behind the school and many of the kids seemed to enjoy themselves anyway.

A Coffee House on the 19th of Oct began well, but then thin wispy clouds moved in and we called it a night.

Luckily, club member **Roger Greenwood** got to check out the Veil, Dumbbell, and Ring nebulas through his brand new 18-in. Obsession scope before the clouds got too thick.

A skywatch on Oct 22nd at Washington Street School in Penacook was canceled due to poor weather.

On Oct. 29th, six NHAS members showed up at the VA Hospital in Manchester. Several patients came out after my short slide show to view the almost-full moon. Hearing the comments from these decorated veterans about the recent tragedies was a sobering experience.

On Sat. Nov. 3rd, a Girl Scout group came to YFOS for some stargazing, but the sky was either cloudy or overcast, so all we could offer were glimpses of the moon, Saturn, and a few stars.

★ Ed Ting

Leonids over NH

There are a number of models predicting the activity of the Leonid meteors this year. It will only be after the event has occurred that we will know which model best fits the activity seen. Hence it is really important for all observers to monitor the nights around November 17th, 18th, and 19th — before, during, and after the maximum.

Surprises can always occur. Consider the fireballs of 1998 — they arrived the night before anyone was expecting major Leonid activity. According to the Armagh Observatory website, the peak rate predicted for North and Central America is 2,500/hr at Nov. 18 10.01 UT (5.01 a.m. EST).

The radiant is near zeta Leonis (Adhafera) in the sickle of Leo. Find a clear dark sky and enjoy the show.

★ Lew Gramer

Feature Story

How Big Is That Diagonal?

(Part 2)Page 2

ATM True Grit

The ATMs met on Sunday Nov. 4 with **Ed Dougherty, Don Ware, John McLean, and Dan Smoody** present.

John tested his mirror. Don tested Dan's and Larry's pitch. Dan, Don, and Ed discussed Dan's ETX 60 and conversations to it. Tim Parker arrived later.

★ Larry Lopez

How Big Is That Diagonal in the Window, Part 2

[NHAS member Ed Dougherty offered to write a series of technical articles on telescopes. This is the second installment. – MAF]

As stated last month, one of the most commonly accepted axioms in the design of amateur optics claims that “to get good planetary images from our telescopes, we must decrease the size of the central obstruction to absolute minimum.”

Computation and testing will show that an obstruction in the optical path of an astronomical telescope actually will cause energy to be removed from the center of the Airy disk and spread into the surrounding rings, increasing the size of the smallest element that can be resolved. (To prove or disprove these claims, an article on conducting a blind test will appear later in the series).

But in real life, under actual operating conditions, does this really matter, or are there other conditions that will temper or mask the effects? Many great astronomical images have come from Keck, Kitt Peak, and other telescopes with secondaries as large as several feet, 30% to 40% that of the primary's diameter. How can such a large obstruction work so well if these assumptions are correct?

Consider that the resolution of a good, unobstructed, 12-inch diameter astronomical telescope mirror will be better than 0.2 arc-seconds. Then as a worst-case scenario, add a three-inch central obstruction to the system. As predicted, the center of the Airy pattern disappears and most of the energy is transported into the diffraction rings of a new pattern. Let us be extravagant and say the central obstruction made the smallest spot resolvable, a whopping 3 times that of the

Events in the Evolution of Our Universe

| Time | Event | Physical Description |
|------------------------|---|--|
| 0 seconds | Big Bang | |
| $< 10^{-43}$ sec. | Planck Era. Known laws of physics do not apply. Gravitational force is unified with all other basic forces. | $> 10^{32}$ degrees K Size $< 10^{-33}$ cm. |
| $< 10^{-35}$ sec. | Grand Unified Theory (GUT) Era Strong nuclear and electroweak forces are unified. | $> 10^{28}$ deg. K |
| 10^{-32} sec. | End of Inflation Era (period of extremely rapid expansion) | Size = 12 cm. |
| $< 10^{-11}$ sec. | Weak nuclear and electromagnetic forces are unified into an electroweak force. | $> 10^{15}$ deg. K |
| < 60 sec. | Basic building blocks of matter including quarks, neutrons and protons were formed. Most of the nuclei of helium present today (24% of all matter visible in the universe) were formed. | |
| 300,000 yr. | Normal, neutral atoms began to appear. Universe became transparent to radiation. | |
| 9×10^9 yr. | Sun and solar system were formed. | |
| 10.5×10^9 yr. | Simple life forms started on earth | |
| 14×10^9 yr. | Now (2001 AD) | 3 deg. K |

Table derived by Bill Enders, NHAS, from information in Mario Livio's book “The Accelerating Universe”, lectures by Paul Joss. MIT Professor of Physics on “Recent Developments in Astronomy and Astrophysics” and other sources.

Notes: 10^{-43} = decimal with 43 zeroes preceding the "1"
 10^{32} = "1" followed by 32 zeroes
 "<" means less than ; ">" means greater than

★ Bill Enders

unobstructed optic – much greater than real life.

Then consider that the absolute best seeing we can expect even in remote location is poorer than one arc-second. If we take the approximate 0.2 arc-second resolution of our primary mirror, and degrade it by three times, we come up with a worst possible case of 0.6 arc-seconds still fully resolvable with the central obstruction.

That means that the resolution of a 12-inch telescope with about a three-inch obstruction is still at least 2X better than that required to be classified as atmospherically limited. It will deliver planetary images as good as *any* similar scope with a smaller obstruction, everything else being equal.

This also means that a telescope with a central obstruction about 25-35% the diameter of the primary, in real life,

will perform equally as well, and deliver the same resolution on the actual sky as the same optics with a smaller obstruction. It is only when the obstruction becomes unreasonably large, or small, that performance is sacrificed.

Conclusion: It is true that a very large central obstruction will degrade the *theoretical* performance of a telescope, but in actual practice, 30-35% of the primary diameter is the magic number for the maximum allowable size for a secondary obstruction without visible degradation of performance. This size ratio, in a telescope with good optics, can resolve *at least twice* what the atmosphere can provide. It is a useless gesture to sacrifice field of view and other performance criteria in a futile attempt to increase resolution beyond
 (Diagonal cont'd. page 3)

Diagonal (from page 2)

this point. Low-profile focusers, and diagonals that are too small do not help in real life resolution. They only cause more difficulties.

As noted in Part 1 in last month's *NHAS Observer*, scattered light caused by a large 3-inch obstruction is not the cause of the often-reported poor contrast. Now we see that diffraction caused a larger secondary is not the culprit. What then is the cause of reported poor performance of Schmidt-Cassegrain and other telescopes with secondaries 30% the diameter of the primary?

Continued next month: Why amateur telescopes seem to be inferior to their larger professional cousins.

★ Ed Dougherty

Web Uploads

Mike Stebbins posted this good news about light pollution on Oct. 29 in the NHAS newsgroup:

"After three years of dancing with the state, NHCRL via **Mike Pelletier** has gotten the state to produce a document on outdoor lighting. Technical Bulletin 16 will be sent to the towns in the next few days. A soft copy can be found on the web at:

<http://www.state.nh.us/osp/planning/guide/docs/TechBulletin16.pdf>

The document includes sample lighting ordinances. Take a look and feel free to pass this along to your local town leaders."

★ Barbara O'Connell

The Bottom Line

Here are the numbers for this month.

2001 members: 162

2002 members: 33

Club balance: \$8601.69

NHAS thanks the following people for their donations:

Chase McNiss Military Standardization Handbook

Michael D'Angelo \$10.00

★ Jim Warend

Looking Back at Last Month

Opening. **John Pappas** welcomed new members and visitors. **Chase McNiss** brought a few items for sale.

Book of the Month. None this month

Scope of the Month. None

Committees. **ATMs:** **Larry Lopez** noted that two people are still at the grinding stage and that the next meeting would be Oct. 21.

Web Comm: **Barbara O'Connell** said that some members can't access the online newsletter due to ISP problems (stone-age.com?). She said members should notify her if this persists.

Photo Comm: n/a

YFOS. **Larry Lopez** announced that excess lumber has been turned over to **Jim Young**. An older Celestron C14 is being considered for use on the observatory pier.

Public Observing. **Ed Ting** said the Rundlett Skywatch had a good turnout of kids and members. Outside lighting was a problem. He then reviewed all the upcoming events.

Dark Skies. Barbara O'Connell noted that the state is asking towns to start developing outdoor lighting ordinances, so you should talk to your local planning board about implementing dark sky ordinances.

Dark Skies. Nominees for the 2002 Election will be taken next month.

Treasury. **Jim Warend** counted 160 members, was taking 2002 renewals, and said our balance was \$8300. Jim thanked all the members who have donated time and materials to YFOS.

Evening Program. **Wes Golomb**, a member of the NASA/JPL Ambassador to Jupiter Program, presented a multimedia show on the long-running Galileo mission.

He showed a 1/2-hour video created in 1997 as a 10th-grade class project. These kids spent hours editing NASA videotapes, writing narrative, and selecting music. Years later, these students told him that the Galileo

project was their most memorable high school event.

Wes continued with a digital slide show about the exploration of Jupiter. As a testimony to engineering, when the high-gain antenna first

failed to deploy, NASA developed a method to store data on tape and then transmit the data at 160 bps using the low-gain antenna. (Today's modems are rated 56 Kbps.)

The geology of the Galilean moons was very intriguing, especially the evidence for water on Europa.

The evening ended as Wes read a dedication to his grandmother, **Rose Golomb**, who inspired his interest in astronomy, and with a reading of Walt Whitman's poem, "The Learned Astronomer."

★ Michael Frascinella

The Heavens Declare

Having produced the newsletter for these past three years, I am pleased to see members taking an interest in it by submitting articles about a variety of astronomical subjects, thereby adding to the value of the newsletter that you read every month.

To reduce unnecessary wear and tear on me, your editor, the *Observer* is moving to a real monthly publication cycle. Newsletters will be delivered during the first week of the month and be open for submissions two weeks in advance, not one week. That will give you more time to work on a submission.

The other change is that the newsletter will be made available for downloading via the NHAS website instead of being mailed. That should alleviate problems that some members have receiving e-mail attachments.

★ Michael Frascinella

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NHAS Upcoming Events**Intergalactic μ waves, Nov. 9, St. Anselm**

| Event | Date | Time | Location |
|-----------------------|---------|-----------|--|
| CMP Special Skywatch | Nov. 7 | 7-9 p.m. | Planetarium, Concord, NH ("Living With a Star" Skywatch) |
| November Meeting | Nov. 9 | 7:30 p.m. | St. Anselm's College, Goffstown, NH |
| Coffee House | Nov. 16 | dusk | YFOS |
| East Derry Skywatch | Nov. 29 | noon | East Derry Memorial Elementary School, Derry, NH |
| Colby-Sawyer Skywatch | Dec. 4 | 7-9 p.m. | Colby-Sawyer College, New London, NH |
| CMP Skywatch | Dec. 7 | 7-9 p.m. | Planetarium, Concord, NH |
| Coffee House | Dec. 14 | dusk | YFOS |
| December meeting | Dec. 21 | 7:30 p.m. | Planetarium, Concord, NH |