

Observer Staff

Editor & Publisher:
Michael Frascinella

THE NHAS OBSERVER

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"All the news that fits in print"

October 2001

GALILEO CREEPS TOWARD Io 32

This month we have a special treat in that Wes Golomb, Galileo Ambassador for NASA, will offer a multimedia presentation on the latest findings of that amazing workhorse of a space probe, Galileo, in operation in Jupiter space since December 1995.

Recently, at the recommendation of a blue-ribbon panels of planetary scientists, NASA decided to plan a third and last mission extension, which includes five more flybys of the Jovian moons, including a flyby of Amalthea, which is inside the orbit of Io. Galileo's final orbit in August 2003 will end in a direct plunge into the crushing pressure of the giant planet's atmosphere.

On October 16, Galileo passes Io on its 32nd orbit of Jupiter, hence the headline of "Io 32."

The meeting will be under the dome so it should be especially engaging.

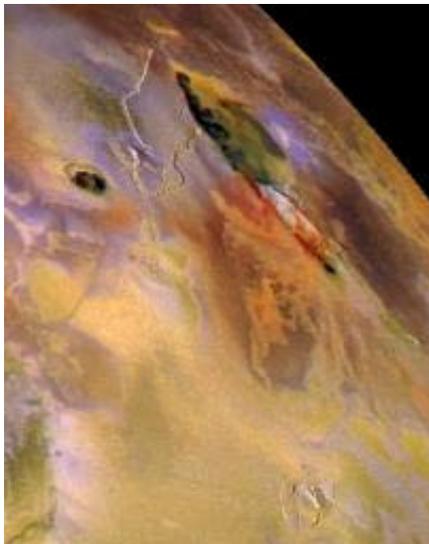
President's Message

Well, fall is upon us. If you have not done so lately, now is a good time to drag out your scope or binoculars.

The Great Square rises from the east and by month's end two of the sky showpieces, the Andromeda galaxy (M31) and the double cluster in Perseus (NGC 884 and 889) will on display at mid-evening.

For those who can make the midnight hour both the Pleiades and Saturn should be clear enough above the horizon for good viewing.

The annual Orionids meteor shower (spawned from Halley's comet) will peak in the early morning hours of Oct. 21st. The moon is a waxing crescent and will set that night by 11:00 p.m. making conditions favorable for viewing.



Zal Patera Region of Io

Finally, for the comet hunters out there, another LINEAR comet (C/2000 WM1) is projected to brighten to about 9th magnitude on a path through Auriga into Perseus by the end of the month. On Oct. 27th its projected path takes it about 20' south of the open cluster NGC1624.

★ John Pappas

Public Observing Highlights

October is the start of our school skywatch season. This is a great way for NHAS members to give back to the community! Think of it – you can be the first person to show a child the rings of Saturn, or the moons of Jupiter, [or your expensive Nagler eyepieces].

A number of large skywatches are planned soon, including Reed's Ferry (our largest at nearly 350 people) in Merrimack, NH on Oct. 17, Washington Street Elementary in Penacook on Oct. 22, and Mountain View Middle School in Goffstown on Nov. 5.

Hope to see you out there.

★ Ed Ting

Chet Raymo at CMP

REMINDER: Sky watchers can look forward to a presentation by astronomer, scientist, and author Chet Raymo on Saturday, October 27, at 3:30 p.m. at the Planetarium in Concord, NH. Call for reservations.

Dispelling Myths about Telescopes

NHAS member **Ed Dougherty** has offered to write a series of technical articles on telescopes. If you don't know Ed, he has been all of the following at different times in the past: a retired professional, and amateur astronomer, optician, machinist, and electrical engineer with sixty plus years of experience. He has designed equipment that has gone to the Moon, holds 33 patents, has attended Stellafane 51 times, and has built over 100 telescopes. He is presently one of the experts assisting members to make telescopes at "ATM True Grit" [NHAS ATM Committee].

Ed offers this introduction to his series of articles:

"In the last few years I have seen a surprising upsurge in the number of erroneous theories and 'old wives tales' that are accepted as fact! Many of these theories are actually harmful in that they cause scope owners to modify their instruments to their detriment, instead of their improvement, and cause the expenditure of many dollars.

(Cont'd. on p. 2)

Feature Story

How Big Is Your Diagonal? ... Page 2

The following series is a non-mathematical interpretation of what does and does not effect scope performance.

How Big Is That Diagonal in the Window, Part 1

One of the most commonly accepted axioms in the theories of amateur optics states, *"To get the finest images from our telescopes, we must decrease the size of the central obstruction to absolute minimum."* But the greatest astronomical images ever created come from the Hubble telescope with a mammoth 20-inch diameter secondary. And all professional telescopes have secondary mirrors measured in feet, and still work remarkably well. Is our assumption erroneous? Does diagonal size in truth matter?

Everything in nature has optical boundaries, such as air-to-metal, air-to-glass, or even air of one temperature to air of another temperature. All boundaries diffract or bend light from the intended path. The extent of a boundary, and magnitude of the energy impinging on it, will establish the magnitude of the displaced energy in the image plane.

The straight spider in a telescope consists of four relatively thin metal strips that support the secondary mirror, but they also diffract light. The diffraction from each side of a vane converges, then reinforces, and we see a single concentrated bright line for each in the final image.

Then why don't we see diffraction from the discontinuities caused by periphery of the objective, diagonal, eyepieces, aperture stops, and all other curved or irregular objects, and components in the optical path? What happened to all this misplaced energy? The laws of conservation of energy are omnipotent and cannot be compromised. The diffracted energy from all these items must be there, but where?

On encountering any discontinuity, light is diffracted, or bent. Energy diffracted by any object that constantly changes its track, will be redirected in changing directions, and is therefore deposited all over the image plane instead of concentrated in lines as with the straight spider vanes. The diffracted energy from all curved or irregular

surfaces, including stops, manifests itself as a brightening of the background, or loss of contrast. Obviously it is of paramount importance to minimize this displaced energy below the limit of detection.

As a first approximation, it would seem that a large three-inch diameter secondary obstruction would be a big offender. Intuition tells us that the small one-inch diagonal of a telescope designed specifically for high contrast planetary work would make a better telescope than one with a large three-inch diameter general-purpose secondary. But is this true? And if true is there a significant reduction in the background?

Consider a standard Schmidt-Cassegrain telescope (SCT) with an 11-inch primary mirror, and three-inch secondary mirror. The circumference of the primary is $11 \times \pi = 34.6$ inches of edge diffraction length. A three-inch diameter secondary yields $3 \times \pi = 9.4$ inches edge diffraction length for a total of 44.0 inches.

Then consider an 11-inch diameter planetary Newtonian telescope with only a one-inch diameter secondary, and a curved spider to eliminate diffraction spikes. This instrument also has 34.6 inches of primary edge diffraction length, and the one-inch diameter diagonal contributes a mere 3 inches diffraction length, less than 1/3 that of the SCT. But the spider consists of four half circles each 8.5 inches long $\times 2$ sides $\times 4$ vanes = 66 inches of diffracting edge for a total of 100.6 inches of edge.

Contrary to common belief, a Newtonian telescope that was specially designed to minimize obstructions, and intended for high contrast, planetary observing at considerable sacrifice in field of view, has 2.3 times greater diffraction-scattered energy in the image than the standard Schmidt-Cassegrain. Diffraction caused by a larger secondary is not the cause of the reported poor contrast. It is obvious that a change in our thinking is required concerning the design of high contrast planetary telescopes.

★ Ed Dougherty

(Continued next month)

ATM True Grit

ATMs met on Sept. 23rd [but not to withdraw cash]. **Barbara O'Connell**, **Dan Smoody**, and **Paul Norris** attended.

Dan made progress, and Paul ground a bit more. Barbara's pitch lap was unexpectedly converted, but her tool was OK. Larry seemed to be happy playing around in the dirt. He's not moving too quickly now. The oven is suspect.

Dan has the Portable tester.

ATMs met again on Sept. 30. In attendance were **Ed Dougherty**, **Don Weare**, **Dan Smoody**, and **Dave Davenport**.

Dan's mirror's figure is responding to polishing. Dave has moved on to the next finer grit.

The next meeting is October 21, 2001 at noon at the Lopez Grindorium.

★ Larry Lopez

Focus on Photography

The Sept. 28 meeting was held at YFOS. **Chase McNiss** demonstrated PhotoVista software on his new laptop. PhotoVista is a photo panorama software. With it you can easily take two or more photos and assemble them into one large panoramic view. The program is easy to use and works great at putting photos together. If you would like to try it you can download a demo copy from <http://www.mgi.com>.

Todd Miller gave a slide show of his latest photos. Todd demonstrated the effect of various exposure times on ISO 1600 slide film. The results were very interesting. Also **Tim Printy** review photos he had taken in Florida. His photos and slides were great, taken in Florida under clear skies.

Unfortunately we did not have good cloud-free, low-humidity skies that evening.

Our next meeting is on October 26 at 7:30 p.m. at the Whipple Free Public Library in New Boston. The meeting is open all members interested in astrophotography both new and experienced. For directions e-mail me at joemal50@aol.com.

★ Joe Malinowski

The Bottom Line

Here are the numbers for Oct. 8, 2001.

2001 members: 155

2002 members: 11

Club Balance: \$8110.00 (balanced)

NHAS thanks the following people for their donations:

John Pierce \$2.50

Steve Stefanik one lawnmower

★ Jim Warend

Looking Back at Last Month

Opening. **John Pappas** opened by asking for a minute of silence for those who suffered loss on September 11th. He then circulated a few items received in the mail.

Book of the Month. **Larry Lopez** brought *Amateur Telescope Making 1* and said "you need to read this book and give us a book report!"

Scope of the Month. **Ed Ting** reviewed the Meade ETX 60 mm f/5.8 scope bought by **Joe Malinowski** for his newborn nephew. [I've seen that done with football equipment-MAF] This computer-controlled scope uses one or two star alignment (use two).

The weirdest feature is that the focuser moves the front lens. Near the zenith, the mount hits the focus knob. Optics are average. Overall the computer controller sets expectations too high for a lens system not much bigger than binoculars.

To borrow the club scope, send e-mail to **John Pappas**.

Committees. ATMs: **Larry Lopez** said the next meeting would be Sept. 23. Several people are at the pitch lap stage. He also advised members to wait until spring before starting a new mirror. His barn is not heated.

Web Comm: **Barbara O'Connell** was at a wedding but she has recently revamped the NHCRL web site (dealing with light pollution).

Photo Comm: n/a

YFOS. Site Coordinator **Larry Lopez** discussed the latest improvements to the site, such as addition of GFI outlets and wiring. Members should plug their scopes into the observatory outlets.

Mike Stebbins requested the site

committee to consider repairing the bearings on the club 16-inch Dob.

Public Observing. **Ed Ting** asked for member support for the many fall events lined up including Rundlett School, Concord, on Oct. 4 and Reed's Ferry School, Merrimack, Oct. 17.

Treasury. **Jim Warend** reported about an \$8000 balance and 150 members. He reminded us to make out magazine renewal checks to the correct publisher's name.

Evening Program. **Ed Ting** presented the "Best and Worst in Telescope Equipment." First he recounted his excellent trip to the Black Forest Star Party in PA on Sept. 16. Next he reviewed common questions about buying telescopes and binoculars.



Ed with the Billion Mile Telescope

Foremost, you should avoid anything in department stores, shopping networks, and web auction sites. "How powerful is it?" was the most frequent but least important question he has encountered. Best refractor: Astro-Physics AP 155 Best Newtonian Dobsonian: anything that has a Zambuto mirror, like the

Starmasters. The 18-in. and 20-in. Obsession are also recommended.

Best catadioptric: Astro-Physics 10-in. Maksutov.

Best affordable Schmidt-Cassegrain: Celestron C9.25

Best eyepieces: Televue, University Optics Orthoscopes

Best mount: Vixen or Celestron Grand Polaris or older Super Polaris, Losmandy GM8 or G11

He showed a photo of a neighbor's 36-in. f/5 Obsession Scope. Climbing the ladder was scary. He concluded with a photo of what his garage looked like last fall (like Rivers Camera Shop!) and cautioned "Don't buy too much stuff." Next came **Joel Harris** with a video of a lunar occultation using the camera's zoom lens. It was clearly visible but the star was near the limit of sensitivity.

For a finale, **Bob Sletten** projected digital photos he took during the meeting.

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

Galileo Mission, Oct. 12, Planetarium**NHAS Upcoming Events**

| Event | Date | Time | Location |
|------------------------|-------------|-------------|---|
| October meeting | Oct. 12 | 7:30 p.m. | Planetarium, Concord, NH |
| Reed's Ferry Skywatch | Oct. 17 | 7-9 p.m. | Reed's Ferry School, Merrimack, NH |
| Coffee House | Oct. 19 | dusk | YFOS site |
| ATM Meeting | Oct. 21 | noon | Lopez Barn, New Boston, NH |
| Penacook Skywatch | Oct. 23 | 7-9 p.m. | Washington St. School, Penacook, NH |
| Photo Comm. | Oct. 26 | 7:30 p.m. | Whipple Free Public Library, New Boston, NH |
| Manchester VA Skywatch | Oct. 29 | 7-8:30 p.m. | Manchester VA Hospital, Smyth Rd., Manchester, NH |
| CMP Skywatch | Nov. 2 | 7-9 p.m. | Planetarium, Concord, NH |
| Mountain View Skywatch | Nov. 5 | 7-9 p.m. | Mountain View Middle School, Goffstown, NH |
| CMP Special Skywatch | Nov. 7 | 7-9 p.m. | Planetarium, Concord, NH (new sky show) |
| Nov. Meeting | Nov. 9 | 7:30 p.m. | St. Anselm's College, Goffstown, NH |