

The Skyscraper

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The monthly publication of



Amateur Astronomical Society
of Rhode Island

47 Peepoad Road
North Scituate, RI 02857

www.theskyscrapers.org

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See back page for directions to
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Please submit items for the newsletter
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The Skyscraper

December 2005

December Meeting & Holiday Party with Dr. Barbara Welther

SATURDAY, DECEMBER 3RD AT NORTH SCITUATE COMMUNITY CENTER

LIFE AND SCIENCE AT

HARVARD COLLEGE OBSERVATORY A CENTURY AGO

Dr. Welther's area of expertise focuses on the history of astronomy in Europe and the United States during the 19th and 20th centuries. She places a particular emphasis on women's contributions to astronomy. Her most recent project was the writing and narration of the production "Annie and the Stars of Many Colors" which focuses on the life and major contributions of Annie Jump Cannon.

Directions to the Community Center: From Seagrave Observatory: North Scituate Community Center is the first building on the right side going south on Rt. 116, after the intersection of Rt. 6 Bypass (also Rt. 101) and Rt. 116, in N. Scituate. Famous Pizza is on the corner of that intersection. Parking is across the street from the Community Center.

DECEMBER 2005

3
SATURDAY

7:30PM **December Meeting &
Holiday Party**
North Scituate Community
Center

10
SATURDAY

8:00PM **Public Observing Night**
Seagrave Observatory

17
SATURDAY

8:00PM **Public Observing Night**
Seagrave Observatory

Note: There is no Public Observing scheduled during the meeting on Saturday, December 3 and during the Holiday weekends on December 24 and 31.

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President's Message

Dave Huestis, President

Can you believe it is almost the end of 2005? Where has the time gone? The weather was not conducive to allow much astronomical activity this year, so I'm happy to see 2005 slip away.

What I don't want to slip quickly away is our December monthly meeting and holiday party. Please be reminded that this meeting will be held at the North Scituate Community Center on Saturday, December 3. Start time is our usual 7:30 pm. However, instead of scheduling the business meeting first, we will promptly begin the evening with our featured speaker. Please arrive a little before 7:30 pm so we can begin the evening program as soon as possible.

Dr. Barbara Welther is an old friend of many Skyscraper members and we are pleased to have her return to visit us after a lengthy absence. Barbara's talk, *Life and Science At Harvard College Observatory a Century Ago*, is one you don't want to miss. Her area of expertise focuses on the history of astronomy in

Europe and the United States during the 19th and 20th centuries. She places a particular emphasis on women's contributions to astronomy. Barbara is an absolutely wonderful speaker.

Following Dr. Welther's lecture we will break for our holiday party. Many of our members have made contributions to insure there is plenty of food for our celebration. A great talk, great food, and good friends. What more could you ask for?

Following the party we will have a short business meeting. There are two motions that will need to be discussed and voted on under old business. If you didn't attend the last meeting, you can review the motions in the secretary's report in this issue of the Skyscraper.

And finally, I want to extend warm wishes from myself and our membership to member Ken Dore on a speedy recovery from his recent surgery. Ken is doing fine. He plans on attending the December meeting. Ken, you are in our thoughts. Get well soon.

Geminid Meteor Shower

Dave Huestis

I wish I had some good news about the final meteor shower of 2005, but the Geminids, which peak on the night of December 13-14, will unfortunately be quite diminished by an almost Full Moon (on the 15th). All but the brightest of this usually very productive meteor shower will be overshadowed by bright moonlight. Still, if the weather cooperates, I would recommend spending a half hour or so around midnight trying to catch a glimpse of a shooting star or two.

I make this suggestion because the Geminids have a peak rate of 60-75 meteors per hour. Despite the interfering moonlight you should have an opportunity to observe a handful of the brighter meteors streaking across the sky.

Geminids are fairly bright and moderate in speed, hitting our atmosphere at 21.75-miles per second. The Geminids are characterized by their multicolored display (65% being white, 26% yellow, and the remaining 9% blue, red and green). They also have a reputation for producing exploding

meteors called fireballs. The Geminids are the most dependable display because they are an old shower and therefore the individual meteors are evenly distributed throughout the meteor stream.

Good luck with the December Geminids.

And finally, the Winter Solstice occurs at 1:35 pm on December 21. Notice how far south the Sun arcs across the sky. Some forecasters are predicting another cold and snowy Winter for us in New England. Wouldn't it be nice if we could hibernate like bears?

Please note that Seagrave Observatory will be open to the public on only two Saturday nights in December due to holiday celebrations and other scheduled festivities. If the weather cooperates and snow cover doesn't close our parking lot, we will be open on the 10th and 17th. Check our website at <http://www.theskyscrapers.org> for snow cancellations. The observatory will be closed on December 3rd, 24th and 31st.

Happy holidays and clear skies to you all.

How I Became an Amateur Astronomer

Bill Guca

I don't remember becoming an amateur astronomer. In all my time on this planet, I haven't one memory of not appreciating the night sky; or the daytime sky for that matter. When does one cross the line from every day citizen to that strange creature who must venture into the night looking for who-knows- what, behind a star?

The term amateur astronomer to me suggests one who studies the sky without that study being financially sustaining. This hasn't always been true for me in my celestial adventure through life, as I did have a column in the Providence Journal titled *The Sky* for years. At that time, it was a matter survival. I was a poor freelance journalist. The sky, I hate to admit, was my bread and butter. When I found out it could earn me a partial living, I was even more appreciative. There was also a strange need to try and draw others into my mad avocation! However, it wasn't always like this. There was a simpler, less desperate time.

Remembering back to when I was a child, the night itself held a great fascination to my young senses. I found I loved the dark. It felt protective, a safe haven.

Living on the top floor of a three story tenement afforded me views of the sky in all four directions. The Moon especially caught my attention. As it rose in the east in its full phase, I would turn out the lights in my living room and watch the beam of lunar light slowly move across the walls and eventually onto the floor where I would lay, accepting of this odd silent friend outside my window. It didn't really matter to me what the moon was. Its light was strangely soothing. I would even play with my toys on the floor, in the moonlight!

Facing southward, or what I know now as southward, I would sit and watch the moon and stars travel across the sky during the magical night.

One of my most vivid dreams at this tender age is the brightest stars in that southward sky (probably the Orion, Canis Major area) actually coming down to my window, entering, and floating around the room! Just beautiful points of light, alighting like snowflakes.

In the waking hours, I would place a piece of a broken mirror on the window sill to reflect those stars trying to replicate my dream experience.

I think these very early feelings were the foundation of my life-long love of astronomy.

Another very special influence in becoming an astronomer was my dear mother. She too had a special affinity for the firmament and all of nature. Nature was, although she never actually said it, her religion. As I once revealed in a personal epitaph placed in the local newspaper on one anniversary of her passing: She loved the moon, the storms, and the twinkling summer stars.

One night, she took me out on the back porch, to the north facing side of our

venerable three-decker and pointed to the sky. There, a curtain of flowing color and beams of light silently undulated. I stood mesmerized as my mom explained they were the northern lights. She had once stood under them with her mother who told her they were caused by the reflection of sunlight off icebergs in the North Pole! Wow! My mind raced at six years old! That vision stuck with me for many years and many auroras. From that night on I wanted to learn more about this realm that held so much beauty. My mother knew everything about the sky I soon discovered. She showed me the Big Dipper and told me stories about the Milky Way.

By the time I was twelve, she had bought me my first astronomy book, *The Sky Observers Guide*. I explained to her the real reason the aurora borealis occurs, and silently thanked her for implanting a



vision that encouraged me to want to keep learning more about it.

Soon after, she and my older sister chipped in their hard earned-in-the-mills money to buy me my first telescope for Christmas. I was on my astronomical way, never to look back!

Today, amateur astronomy gives me the pleasure of good friends and technical exercise for my non-technical brain.

Skyscrapers and Seagrave Observatory has embraced and influenced me from a young teenager in 1963, who could have easily turned into a street punk, to the person I am now.

I actually grew up with some of my fellow star gazers here at Seagrave. I'm sure they too would agree with me that we've had the best of astronomical times!

Some Bright Winter Double Stars

By Glenn Chaple

The winter night sky, dominated by mighty Orion, is rich with deep-sky splendors. If you can brave the cold, you'll be rewarded by some of the finest double and triple stars the night sky has to offer. I highly recommend you check out the following ten:

γ (gamma) Andromedae (Almach) magnitudes 2.3 and 5.1, separation 10.0 arcseconds. A stunning gold and blue pair. This is one of the most beautiful double stars in the entire night sky.

ι (iota) Cassiopeiae mags 4.7, 7.0, and 8.3, sep 2.5" and 7.3" Fine triple. A challenge for 3-inch scopes, because of the closeness of the mag 4.7 and 7.0 components.

ε (epsilon) Arietis mags 5.7 and 6.0, sep 1.4" Here's a neat test object for a 3-inch scope, because its separation lies at the theoretical limit for such an instrument.

ο² (omicron) Eridani mags 4.5 and 9.4, sep 83.4" A wide, unequal pair. The companion is one of the few white dwarf stars visible in small scopes. It's orbited by an 11th magnitude red dwarf, some 9" away.

β (beta) Orionis (Rigel) mags 0.1 and 6.7, sep 9.4" Small scope users will have a tough time

glimpsing the companion, which hides in the glare of the brilliant primary.

θ¹ (theta) Orionis mags 5.4, 6.6, 6.8, and 8.0v, sep 13.3", 13.1" and 16.8" The "Trapezium," located in the heart of the Orion Nebula (M42). This is easily the finest multiple star in the heavens. Two fainter Trapezium members can be seen in a 6-inch scope.

β Monocerotis mags 4.5, 5.2, and 6.1, sep 7.3" and 10.0" We follow the finest multiple star the night sky has to offer with what many observers regard as the most striking triple. An incredible sight at 120X. All white.

h3945 Canis Majoris mags 4.8 and 6.8, sep 26.6" Here's a gold and blue pair that rivals the much-celebrated Albireo. Absolutely beautiful!

α (alpha) Geminorum (Castor) mags 2.0 and 2.8, sep 4.4" A binary star that has been widening from a minimum separation of 1.8" in 1969. Now an easy sight in the smallest of scopes. Look for a 9th magnitude star 72.5" away. All three stars are spectroscopic binaries, making Castor a sextuple star!

κ Puppis mags 4.5 and 4.6, sep 9.9" A beautiful twin system, both white.

The Mystery of the Christmas Star

Dave Huestis

I can't believe it has been several years since I last wrote about the mystery of the Christmas Star. Most people are familiar with the biblical account of the event, particularly of the Magi and their travels to the little town of Bethlehem, led there by a brilliant star in the sky.

"Behold there came wise men from the east to

Jerusalem, saying, Where is he that is born King of the Jews? For we have seen his star in the east, and come to worship him..." Matthew 2:1-2

Many folks "faith"-fully believe that divine intervention led the Magi to the manger in Jerusalem. But what was the Star of Bethlehem? Can a natural astronomical event account for the appearance of

the Christmas Star almost 2000 years ago? Since this event occurred in the sky, astronomers are the best detectives to examine this mystery.

Several ideas have been proposed over the years to identify the source for the Star of Bethlehem's appearance. Due to historical references we can narrow our search to the years between 7 B.C. to 2 B.C. Some theories have consistently held up under careful scrutiny, while others have since been discarded.

For example, a very bright and exploding meteor, called a fireball, has been suggested. However, even large ones don't persist for days or months, and the Magi "followed" it for at least that long. A nova or supernova explosion of a star has also been proposed. It would be exceedingly bright, probably even visible during the daytime. Unfortunately for this theory, not even the astronomically observant Chinese recorded any such sky event during the years in question. The same applies to a variable star that periodically increases and decreases its brightness. These theories just don't meet all the criteria. However, there are three theories that do explain the star's appearance quite well, especially when taking into consideration the many astrological coincidences.

Yes, you will indeed note that I mentioned astrology. We must keep astrology in mind when examining the Christmas Star mystery. Why? The Magi were astrologers. They charted the stars because they, as well as the populace, believed sky happenings had a direct effect upon humankind. These events, if read correctly, could inform them of what was happening or what could happen. For the astrologers it was like a cosmic news bulletin, and they were waiting for the big story to break! That big story was foretold in a prophecy that the King of the Jews would be born in Bethlehem, and in Jewish tradition that a sign would appear two years before his birth.

The one theory that has been tossed around for many years was the Halley's Comet - Christmas Star connection. The one insurmountable problem with this explanation is that Halley appeared during 11 B.C., somewhat too early to be considered. Until a few years ago there were no other accounts of any bright comets during the time we're concerned with. However, ancient Chinese and Korean texts have recently revealed a bright comet in 5 B.C. If this were the only possible explanation, I'd say this one would get my support. But two other explanations tie things together much more nicely.

Today we know the positions of stars and the orbits of the planets to a great degree of accuracy.

With sophisticated software one can recreate the sky as it looked in the past from anywhere on the Earth's surface, or one can create what the sky will look like hundreds of years hence. This tool has been used in the search for the Christmas Star. In the past I have merely reported what other astronomers have discovered. A few years ago I recreated the skies of ancient Jerusalem on my home computer and have verified their findings. My observations and conclusions follow.

I started my inquiry by setting the sky clock back to 7 B.C., as well as selecting a very specific location, Jerusalem. During that year, the planets Jupiter and Saturn had three close encounters, called conjunctions. The closest, during December 7 B.C., occurred when the planets were two full moon diameters apart from each other. Unfortunately they did not appear as one bright object, as one must interpret the appearance of the Christmas Star.

Regardless, during March, 7 B.C., there was a heliacal rising of Jupiter and Saturn. They rose about the same time the sun did. This event was astrologically significant. Then in September of the same year, the planets rose acronychal, that is, they rose in the east as the sun set in the west. Astrologically the heliacal rising was thought to signify birth, while the acronychal rising was one of five principal positions the early astrologers, especially the Babylonians, highly regarded.

Later in 6 B.C., the planet Mars joined Jupiter and Saturn for a triple conjunction. Also significant was that this conjunction occurred in the constellation of Pisces (the sign of the Hebrews, and in the Jewish tradition the sign of Israel). Pisces, as well as Saturn, was the sign of the promised Messiah. Furthermore, the Jews considered Jupiter to be a royal symbol, and Saturn to be Israel's protector.

These coincidences are quite significant when you take into consideration the astrologer Magi who were waiting for a sign to appear among the stars. Despite Jupiter and Saturn not appearing as one bright object, the astrological coincidences seem to point to the year 7 or 6 B.C. for the appearance of the Christmas Star. However, a similar event has recently come to light that satisfies almost all the criteria, with one exception.

Beginning in 3 B.C. there were two conjunctions of Jupiter and Venus. What is more important, there were three conjunctions of Jupiter and the star Regulus in the constellation of Leo that same year. Jupiter and Regulus both meant "king," and Leo was a sign of

the tribe of Judah. Later on in 2 B.C. the planet Jupiter moved into the constellation of Virgo, the virgin, and remained in the belly of this sky pattern for a while.

The very observant and astrologically minded Magi would have interpreted this sign as the fulfillment of the prophecy ... the birth of the Jewish king. And since we know shepherds only tended to their flocks in night time during lambing in the spring, then the events in the spring of 3 or 2 B.C. seem to be a reasonable choice for the explanation of the Christmas Star. The one flaw with this explanation concerns King Herod. While no exact date is known for the king's death, he is believed to have died prior to April, 4 B.C.

Unless some new historical documents are uncovered, we may never know what transpired in the middle east two thousand years ago. Whatever was observed in the sky so long ago, I'm sure the dark skies of the day afforded both the Magi and the general populace a splendid view of the heavens. With the

Secretary's Report

Joel Cohen, Secretary

Monthly Meeting

November 4, 2005, Skyscrapers Meeting Hall

Meeting Start - 7:35 Meeting called to order by Dave Huestis, President. Dave noted that Steve Hubbard's mother had recently passed away and asked for a moment of silence. Dave also noted that this year's AstroAssembly was the best ever and asked for a round of applause for Ted Ferneza.

Secretary's Report - Accepted as published in the Skyscraper.

Treasurer's Report - Accepted as read and posted on the bulletin board.

Trustee's Report - Jack Szelka said that the buildings had held up well during the recent rain and wind storms. Jack also mentioned the increasing issues with the drives for both the 16" and 12" Meade telescopes and that we should consider budgeting for maintenance.

Upcoming Speakers - Glenn Jackson reported that upcoming speakers included Dr. Barbara Welther for December, Gerry Dyck for January, Ron Dantowitz for February, and Dr. Arthur Upgren for April.

Librarian/Historian's Report - No specific report other than that the library is open for check ins/outs

New Business - Bob Horton moved that we appropriate funds to have both Meade Telescope drives sent out for reconditioning. The amount should be up to \$1300 to cover the repair of both telescopes. The motion was seconded and passed unanimously.

Glenn Jackson read the following proposed amendment to the By Laws to change the dues structure.

sophisticated software available today you too can recreate the skies of history. I used The Sky, version 4, for my travels back in time a few years ago. Recently I revisited those ancient skies using TheSky6 software and verified my previous observations. At least the skies on my computer are always clear ones!

In conclusion, one may wonder why Christmas is celebrated on December 25th. When the Christians were under the heel of the Roman Empire their religion was declared illegal. They had to worship in private. During this time though, the Romans celebrated the winter solstice with a week-long festival, Saturnalia, centered on December 25. The Christians decided to hold their religious observance at the same time to escape persecution. The 25th of December was chosen, and in 313 A.D. when Emperor Constantine accepted Christianity for himself and his kingdom, he retained that date for the celebration of Christmas.

Happy Holidays to you all and keep your eyes to the skies!

In order to prevent confusion as a result of our pro-rated dues structure, the executive board hereby proposes the following amendment to Skyscrapers Bylaws:

Article I Fiscal Year and Dues, Section 2.

Section 2. Dues are payable in April for the dues year then beginning. The annual dues shall be: \$10.00 for Junior Members; \$40.00 for Members; \$50.00 for Family Members; and \$10.00 for Senior Citizen Members. **Persons elected to membership during the second half of the fiscal year (October - March) shall pay 50% of the foregoing amounts for that initial year, then renew their memberships the following April for the full amount.** Persons making donations over and above the foregoing amounts shall be called Contributing Members. Four distinguished categories of Contributing Members shall be designated: Sponsors (\$60); Supporters (\$100); Patrons (\$250); and Benefactors (\$500).

Section 2 amendment will read:

Section 2. Dues are payable in April for the dues year then beginning. The annual dues shall be: \$10.00 for Junior Members; \$40.00 for Members; \$50.00 for Family Members; and \$10.00 for Senior Citizen Members. **Persons applying for membership during the months of April through December pay the above stated annual dues for the current fiscal year (April - March). Persons applying for membership during the months of January through March pay the above stated annual dues, but their membership extends through the next fiscal year.** Persons making donations over and above the foregoing amounts shall be called Contributing Members. Four distinguished categories of Contributing Members shall be designated: Sponsors (\$60); Supporters (\$100); Patrons (\$250); and Benefactors (\$500).

Proposed Bylaws Change

Old Business - none

Good of the Organization - Gerry Dyck observed an active sunspot group with a looped prominence and explained the images he saw. He later showed pictures of what he observed in both a sun filter and an H-Alpha filter. Gerry mentioned his trip to New Mexico Skies had been very interesting and noted the presence of a German amateur, Hans Gunter Diedrich. Mike DiToro mentioned that he had received a CD-ROM of Bill Sheehan's AstroAssembly presentation and that it was available for copies.

Bill Kirby mentioned the numerous reports of Taurids so bright that they were reported as UFO sightings.

Dave reported that Tom Kane's widow was advertising his 10" Meade LX 200 GPS and accessories were for sale for a reasonable offer. Bob Napier announced that he would entertain starting an imaging class using the club's SBIG ST9E camera. Bob asked that those interested send him their e-mail addresses.

Dave asked that those attending meetings sign in the attendance record book. Dave made mention that the December Meeting is on Saturday, December 3 and at the Scituate Community Center on Route 116. Further, the December Meeting is the Holiday Meeting with the special buffet table.

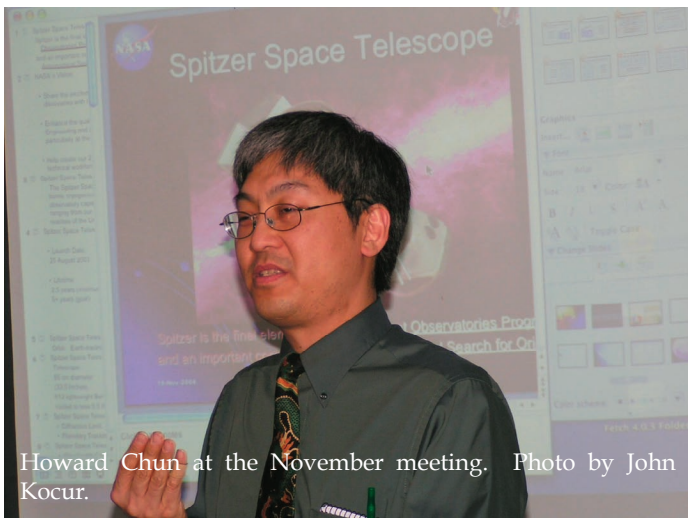
As such, there was an appeal for donations to help defray the cost of the Holiday Refreshments. Checks may be sent to Dolores Rinaldi.

Dave offered thanks to both Tracey Haley for his recent contribution of an article written for the

Skyscraper and to Bill Guca for an upcoming article. Dave also offered a hearty thanks to all who participated in making this year's Astro Assembly the extremely well received program that it was.

Dave also noted the excellent views of Mars through the Clark that the skies are treating us to this year.

Adjournment - approximately 8:25 pm



Howard Chun at the November meeting. Photo by John Kocur.

Following adjournment and a short break for refreshments, Glenn introduced this month's speaker, Howard Chun. Howard is a high school physics teacher from Cranston East High School whose proposed observational astronomy science project was accepted for inclusion in a NASA outreach

program utilizing the Spitzer Space Telescope. The Spitzer Instrument formerly called SIRTIF reads Infra Red emissions from an orbit above Earth.

Howard was one of 12 teachers of a group of 50 to 60 finalists awarded 3 hour blocks of observing time on the Spitzer instrument. Howard was attempting to measure the mass of brown dwarf stars that are too small to create enough fusion reactions to be observed in visible light. Howard was also able to include two students in his trip to JPL.

Eboard Meeting, November 14, 2005 Richard Arnold, Acting Secretary

Secretary's report to be posted in the meeting hall at a later date.

Treasurer's report to be posted in the meeting hall at a later date.

Old Business.

Ted Ferneza reported on the great success of the Astro Assembly 2005. While there are some minor expenses to be accounted for there seems to be an income of about 1000 dollars realized even though expenses were higher than usual. About 140 guests were counted with about 110 for the dinner.

Some members expressed a desire to have a working budget prior to the final planning stages of future Astro Assemblies. This would set the guide lines for future planners and would of course be revised for each Astro Assembly.

Glen Jackson reported that there were speakers lined up for all months from December to June of 2006 except for March and June. He was waiting to hear from one speaker as to when it would be convenient for that speaker between the two dates.

Bob Horton reported that he was waiting for a written statement from Meade in regard to refurbishing the 12 inch and 16 inch S.C. telescopes. There seems to be an insurance program available for 300 dollars plus shipping for the 12 inch and 600 dollars for the 16 inch which would insure that the scope would operate well for at least one year from the time of refurbishing. The trustees are considering this program.

Dave Huestis mentioned that Paul Valeli would like to clean the Alvin Clark lens.

New Business.

Dave Brinegar a new member asked if there would be some one or individuals interested in an observation program which he is currently trying to get approved. It would apparently consist of triangulating the position of artificial satellites at different times and might require some travel to remote sites with equipment

Jack Selka reported that the trustees would repair a loose floor board in the 12 inch Pattern observatory and that there would not be public nights on December 3, 24 or 31 since there were not any people signed up to attend the scopes on those nights.

Bill Kirby has the projector for the Presentation by Barbara Welther and will see that is up and running at the Comm. Center on the December 3, 2005 meeting.

Good of the Organization

Ted Ferneza says he will bring the screen to the Comm. Center

for that function. Someone needs to volunteer to do that for January also.

Ted Ferneza also mentioned that there were star parties planned for Friday Nov 17th, Wednesday Nov 26th and Dec 7th 2005 also a Wednesday night.

Members suggested that a fee of 2 dollars per person could be asked for as a donation from now on due to increased expenses.

Dave Huestis mentioned that an old time member of Skyscrapers, John Briggs, would like to borrow the spectroscope from Skyscrapers to teach his class. At this time this has not been approved. Members felt that taking this instrument, which belonged to Frank Seagraves, to a different location was not a good thing. Perhaps the class could come to the observatory and some of the members of skyscrapers could attend the class simultaneously.

Bob Napier mentioned that the OBSERVER uses the wrong name for SEAGRAVE OBSERVATORY and that the name they do use SCITUATE OBSERVATORY is the name he uses for his personnel scopes.

Delores Rinaldi collected some donations for the refreshments at the upcoming Christmas Party

Adjournment -9:00 PM

Monthly income for 11/11 - 11/19

INCOME

Uncategorized 60.00

Astro Assembly 2005;MEAL 17.00

Astro Assembly 2005;REG 25.00

deposits

dues 60.00

TOTAL deposits 60.00

Donation Star Party-Charitable Donations - Cash 90.00

donations Library-Charitable Donations - Cash 150.00

TOTAL INCOME 402.00

EXPENSES

Uncategorized 60.00

electric 29.74

insurance 2,307.00

TOTAL EXPENSES 2,396.74

OVERALL TOTAL -1,994.74

=====

Account Balances

ASSETS

Cash and Bank Accounts

checking acct 1,488.10

savings 13,021.94

TOTAL Cash and Bank Accounts 14,510.04

TOTAL ASSETS 14,510.04

LIABILITIES 0.00

OVERALL TOTAL 14,510.04



Top: Ted Ferneza gives a demonstration during a star party on November 2nd. Middle: Scouts get to look through the 16" telescope on November 2nd. Photos by Jack Szelka. Bottom: president Dave Huestis sits with a school group during a star party hosted at Seagrave Observatory on November 10th.

Voices from the Cacophony

By Trudy E. Bell and Dr. Tony Phillips

Around 2015, NASA and the European Space Agency plan to launch one of the biggest and most exacting space experiments ever flown: LISA, the Laser Interferometer Space Antenna.

LISA will consist of three spacecraft flying in a triangular formation behind Earth. Each spacecraft will beam a laser at the other two, continuously measuring their mutual separation. The spacecraft will be a mind-boggling 5 million kilometers apart (12 times the Earth-Moon distance) yet they will monitor their mutual separation to one billionth of a centimeter, smaller than an atom's diameter.

LISA's mission is to detect gravitational waves—ripples in space-time caused by the Universe's most violent events: galaxies colliding with other galaxies, supermassive black holes gobbling each other, and even echoes still ricocheting from the Big Bang that created the Universe. By studying the shape, frequency, and timing of gravitational waves, astronomers believe they can learn what's happening deep inside these acts of celestial violence.

The problem is, no one has ever directly detected gravitational waves: they're still a theoretical prediction. So no one truly knows what they "sound" like.

Furthermore, theorists expect the Universe to be booming with thousands of sources of gravitational waves. Unlike a regular telescope that can point to one part of the sky at a time, LISA receives gravitational waves from many directions at once. It's a cacophony. Astronomers must figure how to distinguish one signal from another. An outburst is detected! Was it caused by two neutron stars colliding over here or a pair of supermassive black holes tearing each other apart in colliding galaxies over there?

"It's a profound data-analysis problem that ground-based astronomers don't encounter," says E. Sterl Phinney,

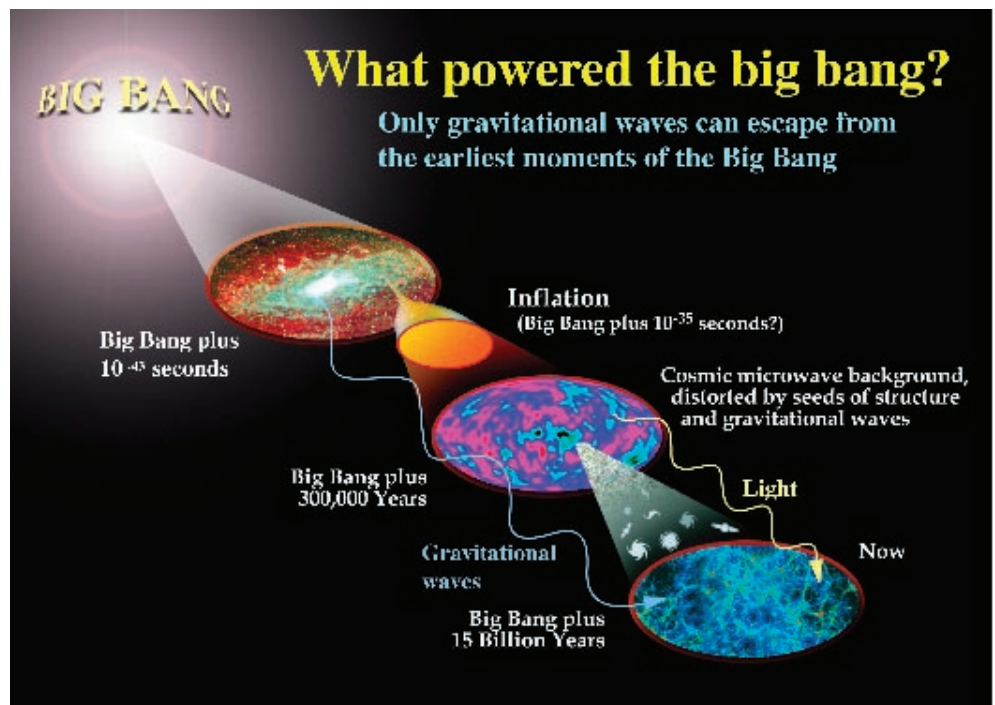
professor of theoretical physics at the California Institute of Technology in Pasadena.

Profound, but not hopeless: "We have lots of good ideas and plans that work—in theory," he says. "The goal now is to prove that they actually work under real conditions, and to make sure we haven't forgotten something."

To that end, theorists and instrument-designers have been spending time together brainstorming, testing ideas, scrutinizing plans, figuring out how they'll pluck individual voices from the cacophony. And they're making progress on computer codes to do the job.

Says Bonny Schumaker, a member of the LISA team at the Jet Propulsion Laboratory: "It's a challenge more than a problem, and in fact, when overcome, a gift of information from the universe."

For more info about LISA, see lisa.nasa.gov. Kids can learn about black holes and play the new "Black Hole Rescue!" game on The Space Place Web site at <http://spaceplace.nasa.gov/en/kids/blackhole/>



LISA will be able to detect gravitational waves from as far back as 10^{-36} second after the Big Bang, far earlier than any telescope can detect.

Directions to Seagrave Memorial Observatory

From the Providence area:

Take Rt. 6 West to Interstate 295 in Johnston and proceed west on Rt. 6 to Scituate. In Scituate bear right off Rt. 6 onto Rt. 101. Turn right onto Rt. 116 North. Peeptoad Road is the first left off Rt. 116.

From Coventry/West Warwick area:

Take Rt. 116 North. Peeptoad Road is the first left after crossing Rt. 101.

From Southern Rhode Island:

Take Interstate 95 North. Exit onto Interstate 295 North in Warwick (left exit.) Exit to Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.

From Northern Rhode Island:

Take Rt. 116 South. Follow Rt. 116 thru Greenville. Turn left at Knight's Farm intersection (Rt. 116 turns left) and follow Rt. 116. Watch for Peeptoad Road on the right.

From Connecticut:

- Take Rt. 44 East to Greenville and turn right on Rt. 116 South. Turn left at Knight's Farm intersection (Rt. 116 turn left) and follow Rt. 116. Watch for Peeptoad Road on the right.
- Take Rt. 6 East toward Rhode Island; bear left on Rt. 101 East and continue to intersection with Rt. 116. Turn left; Peeptoad Road is the first left off Rt. 116.

From Massachusetts:

Take Interstate 295 South (off Interstate 95 in Attleboro.) Exit onto Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.



47 PEEPTOAD ROAD
NORTH SCITUATE, RI 02857