



**December 2006**

**Volume XXXVI, Issue 12**

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### ***Predawn Gathering Bejewels Morning Sky***



Image, Courtesy Phil Harrington

Looking east-southeast at approximately 6:30 AM on the morning of December 10<sup>th</sup>, Custer member, Phil Harrington captured this stunning view of Mars, Jupiter and Mercury bejeweling the morning sky. Set against a pre-dawn sky and flanked by 2<sup>nd</sup> magnitude Beta Scorpii (Graffias), the three planets would all be visible together in binoculars or a low-power, wide field telescope view. Mars, the faintest of the three, has the greatest separation and is at the 4:00 position; Jupiter is the brightest and on a horizontal line from Mars; Mercury completes the triangle with Graffias immediately to the upper left at the 11:00 position. While not technically a "Triple Conjunction", the event is noteworthy as the 1.1° separation was the closest huddling of three naked-eye planets between the years 1925 and 2053! Was it just such a view that the 3 Wise men saw back in the spring of 7 BC that is revered today as the Christmas star? Occurring in the constellation Pisces, a constellation of great significance, the triple conjunction of Jupiter and Saturn would be of a singular importance and an event whose rarity and prominence would be known only to the learned 3 as they were Astrologers and priests of Zoroaster. Please see inside for additional details and a discussion of the Christmas Star.

#### **Highlights for December 2006**

- Custer New Year's Eve Party, Sunday, December 31, 7:30 PM

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• Synopsis and select images from Custer's Holiday Party;		
• Update on NASA's New Horizons mission to Pluto;		
• Details on 20" Meade delivered to Montauk Observatory		

## Editor's Column

### Tom Madigan, Editor

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Cutoff for submissions is the 15<sup>th</sup> of the month preceding publication

Visit the new Custer Website at  
<http://www.custerobservatory.org>  
Custer Comment Archive:  
<http://www.tommadigan.net/custer>

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*"I have loved the stars too fondly to be fearful of the night."*

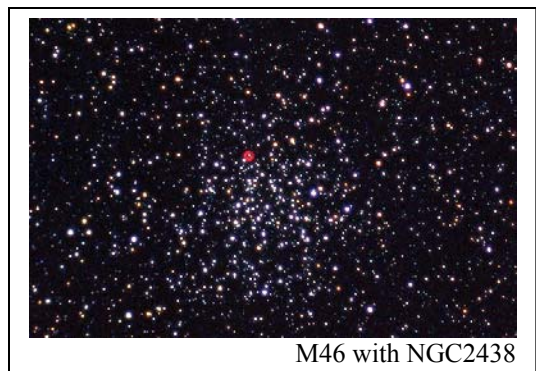
*Sarah Williams*

Bedecking the sky with their winter jewels of Rigel, Betelgeuse, Sirius and Procyon, Orion, Canis Major and Canis Minor are sparkling high above the southern horizon following sunset. After a casual glance to the south-southeast after sunset, one needn't look at the thermometer to know that winter is upon us. Under a truly dark sky, the ethereal winter Milky Way can be seen running past Orion northward through Cassiopeia. As these winter sights are all too familiar, we may tend overlook what treasures can be found here.

The haunting beauty of M-42 through a modest 6 inch reflector is a sight that will stay with one long after the telescope has been put away. Through a 6 inch, one can see dazzling Theta Orionis or the Trapezium dead center and, if the seeing conditions permit, a 5<sup>th</sup> and 6<sup>th</sup> star can be seen with the 4 hot, blue O and B type stars of the Trapezium whose intense UV radiation causes the nebula to shine. Using a lower magnification, a hint of purple and blue-green can be discerned under truly dark, clear skies.

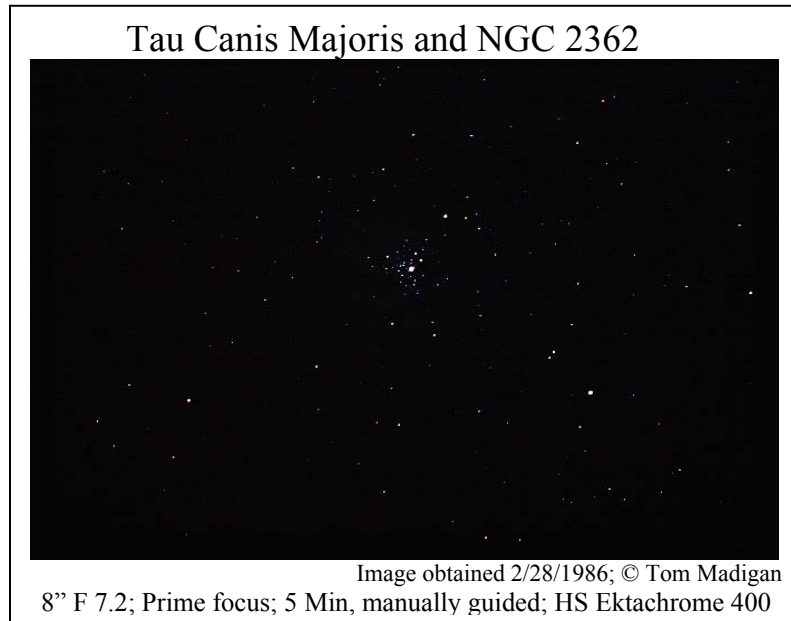
If placed at the center of the solar system, Betelgeuse, a red supergiant star, would engulf the orbit of Jupiter. In order for Betelgeuse to subtend the same angular size as the sun in the sky, one would need to be on a planet orbiting the star at a distance of 570 astronomical units!

South-southwest of Sirius in Canis Major lies a beautiful open cluster, M-41. Stunning in binoculars or an RFT reflector, this object is another winter favorite. Puppis, south of Canis Major is another constellation that is often overlooked but is, nonetheless, home to a real gem. M-46, coined the "Jewel Box" cluster, contains a 10<sup>th</sup> magnitude planetary nebula that is easily visible in a 6 inch reflector. The beautiful, red smoke ring, NGC 2438, is gravitationally bound to the cluster and appears to



float in front of the background stars. M46 can be easily found by scanning due east of Sirius with a wide-field eyepiece. Once found, higher magnification will show the tiny, stunning smoke ring. This object truly is a Jewel Box.

Another stunning gem in this treasure chest that is the winter sky in and around Canis Major and Orion is Tau Canis Majoris, and the associated open cluster, NGC 2362. It is still uncertain if



this O8 spectral type star is gravitationally bound to the cluster. If it is, as mounting evidence seems to indicate, then Tau Canis Majoris would be one of the most luminous supergiant stars known with an absolute magnitude of -7.0 and an aggregate luminosity of 50,000 solar luminosities. This beautiful little cluster is a personal favorite, is made up of about 60 stars and is only about 25 million years old. To locate NGC 2362, scan approximately 1° northeast of Wezen (Delta Canis Majoris) and this neat little cluster will dance into view.

The month's issue of the Custer Comment is very late and for that I apologize. On December 17<sup>th</sup>, I sustained a serious, personal injury and only now, almost 2 weeks later, has some normalcy returned to my life. I will endeavor to publish next month's issue in as timely a manner as is possible.

Best to all for the holidays and the coming new year,

Tom

*Tom Madigan, Editor*

"If the stars should appear one night in a thousand years, how would men believe and adore."

*Ralph Waldo Emerson*  
From his essay "Nature"

## **Custer Jamboree 2006 DVD Reservation Form**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone: \_\_\_\_\_

Email address: \_\_\_\_\_

Number of sets desired: \_\_\_\_\_

Please remit \$10.00 for each set requested. Each set consists of 5 DVDs of each of the featured speakers:

- Dr. Ken Lanzetta, "Dark Energy, Dark Matter";
- Dr. David Helfand, "Intelligent Life in the Universe?";
- George Lomaga, "Shadow Across the Sun: 2006 Total Solar Eclipse";
- Robert Gendler, MD, "The Hybrid Image: A New Philosophy of Aesthetic Astroimaging";
- Tony Hoffmann, "On the Trail of Sungrazing Comets";

In addition to these 5 lectures, a 6<sup>th</sup> bonus, multi-media DVD of all the best images obtained at the jamboree will be included.

Please send this completed Reservation form with a check in the amount of \$10.00 for each set requested as a deposit, payable to **Custer Institute** to:

Custer Jamboree DVD Set  
c/o Tom Madigan  
99 North Summit Ave  
Patchogue, NY 11772

Electronic recipients will receive an email confirmation that their DVD set(s) have been reserved. All others will receive a telephone call.

**Note:** all proceeds go directly to Custer Institute in order to continue our outstanding programs, lecture series and service to our membership, to science and to the community at large. A portion of these proceeds are used to cover the cost of production and shipping.

## Gift Corner & Classifieds

**We Have Meteorites!**

**Great sets mounted in beautiful display cases. Perfect for gifts.**

**Custer coffee mugs, only \$4.**  
Do you have yours yet?

**Custer Dome Assembly and Raising DVD \$10.00**

2 Payment Options:  
1) Mail a check or money order, payable to Custer Institute, to this editor's address with a note indicating how many copies you would like; 2) Paypal to [CusterPaypal@yahoo.com](mailto:CusterPaypal@yahoo.com) followed by an email to this editor indicating the number of copies ordered and shipment instructions. Before shipment, I will confirm with Barbara that payment has been made. All my contact info is always published on page 3.

### An Evening With John Dobson

VHS or DVD format, \$10.00, \$3.75 S & H

On September 17, 2005, noted sidewalk astronomer and cosmologist, John Dobson, visited Custer. He presented his classic cosmic slide show, packed with information and delivered with inimitable wit; he shared stories about his life as a monk, secretly grinding mirrors, making telescopes and introducing the public to the wonders of the night sky. Board member, Rich Huber, filmed this memorable event and has made copies on VHS and DVD. Running time is approx. 90 minutes. The cost: \$10 with 25% of the proceeds going to John Dobson's San Francisco Sidewalk Astronomers Association and a nominal \$3.75 for shipping and handling. You can pay for your tape using Paypal by sending \$13.75 to [CusterPaypal@yahoo.com](mailto:CusterPaypal@yahoo.com) or by sending a check or money order (made payable to *Custer Institute*) to: Dobson at Custer, P.O. Box 1204, Southold, New York 11971. Please specify whether you would like VHS or DVD. If you have any questions, please contact Donna McCormick at [mccormick@scientific-consultants.com](mailto:mccormick@scientific-consultants.com).

### Custer T-Shirts



Image, courtesy Tom Madigan

The editor's daughter, Kaitlin, sporting a Custer T-Shirt at Horton Point Lighthouse on Jamboree '05 night! The shirts are 100% heavy-weight cotton, machine-washable, and are available in adult sizes S-M-L-XL-XXL. The cost is \$12 plus \$3.75 S & H and the shirts are available only while supplies last. Custer would also like to *thank the East End Shirt Company* in Port Jefferson for their generosity and for having done an excellent job in producing such fine quality shirts on such short notice.

We have Susan Harder's patented & dark sky friendly **PARSHIELD®** Outdoor Floodlight Shields

for PAR 38 type bulbs. Controls glare, reduces light trespass & allows you to direct the light where you need it. Two shields per box in your choice of Off White or Bronze finish. \$20.00, tax incl.

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By  
*Phil Harrington & Ed Pascuzzi*

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**PARALLAX**

By  
*Alan W. Hirshfeld*

We also have a limited number of copies of this excellent volume by 2003-Jamboree guest speaker Alan Hirshfeld. Quantities are limited so hurry and add this well-written and informative volume to your collection while supplies last.

## Heavenly Events To Watch For December 2006

“ Beacon of the twilight hour  
Herald of the dawn,  
In fading brilliance lingering  
When companion stars are gone.

So faithful in your vigil  
And in calm serenity;  
A pure and virgin soul upon  
The rim of eternity. “

- Ellen Frances Bernhardt

During the first half of December, a fantastic alignment of three planets, low in the east-southeast after daybreak, brings a sudden end to the rather bleak planetary showing we've seen this fall. On the 10<sup>th</sup> this conclave becomes the most compact threesome of naked-eye planets to be seen until 2053. As MERCURY drops from morning to morning, dimmer MARS and brighter JUPITER spring up to greet it. Bring good binoculars and/or telescope with an eyepiece with wide field of view! An unrestricted view down to the horizon will be needed to see these three. And don't forget to explore SATURN which is well up in the south in Leo at daybreak. This leaves only VENUS, just beginning to make herself known very low in the southwest after sunset, as "evening star".

- 3 A quick check with good binoculars or telescope around 10 PM would show Alcyone, the brightest of the Pleiades, squeezing just beneath the south pole of the nearly-full Moon. Other stars in the Pleiades have already been occulted, but the Moon's overbearing brilliance would make their reappearances hard to see.
- 4 The Full Cold Moon rises shortly before sunset this evening.
- 6 Saturn is just 5° west-northwest of the star Regulus in Leo, but today it begins to retrograde back westward toward Leo's border with Cancer. Saturn will reach opposition on February 10.
- 7 Scan the east-southeast horizon after daybreak, starting about an hour before sunrise. Soon Mercury (-0.6 magnitude) should appear, with the much dimmer (1.5 magnitude) Mars about 2½° directly beneath it, followed by the brighter (-1.7 magnitude) Jupiter just below and to the left of Mars. By Saturday morning, December 9, the 3 planets will fit within a 1½° field of view!
- 8 Earliest sunset around this date, about 4:30 PM.
- 10 This is the dawn of two celestial campfires, not to be left unobserved! Daybreak comes around 5:30 AM, and by that time Saturn is getting ready to squeeze beneath the waning gibbous Moon, and its change of position relative to the south lunar pole will be quite evident. Meanwhile, around 6 AM, just over the east-southeast horizon Jupiter, Mercury and Mars rise together within a 1.1° field of view - the closest huddling of three naked-eye planets between the years 1925 and 2053! Jupiter, the brightest, is close beneath Mercury, and Mars, the dimmest, is to their right. (Tomorrow morning Jupiter will be the highest of the three.)
- 13 Dress warmly after supper, go outside and face northeast, lie back and settle in for a night of Geminid meteors. This generous and reliable meteor display should build during the night, degraded only somewhat when the fat crescent Moon appears around 11 PM. And if you're still functioning at daybreak, top off the night with the rising Jupiter, with Mars 1½° beneath it, and maybe glimpse the fading Mercury 5° lower.
- 18 After daybreak the thin waning crescent Moon rises to the right of Jupiter and Mars.
- 18 Algol, β (Beta) Persei, is in mid-eclipse at 10:34 PM, and again at 7:23 PM on the 21<sup>st</sup>.
- 21 Winter begins at 7:22 PM tonight.
- 22 No moonlight to further dim the usually-faint Ursid meteors streaking out of the northern sky tonight.
- 30 Sergei Korolyov, designer of Sputnik 1 (launched Oct. 4, 1957), was born 100 years ago today.

*Prepared by Robert Chapin*

## ***Brookhaven Lighting Ordinance Enacted***

Astronomers, Dark Sky Advocates, Environmentalists and Aesthetically minded, sensible people will be pleased to know that Brookhaven Township has enacted the first-of-its-kind Lighting Ordinance in this, the largest township in Suffolk County and in all of Long Island. The votes were tallied as follows:

**4 yeas:** Councilman Kevin McCarrick, Councilman Tim Mazzei, Councilwoman Carol Bissonette and Councilwoman Kathleen Walsh;

**2 abstentions:** Connie Kepert and Supervisor Brian X. Foley;

**1 exit-in-protest:** Councilman Steve Fiore-Rosenfeld.

The bill received bi-partisan support with the net yeas totaling 4, thus carrying the motion. The ordinance becomes effective on or about June 8<sup>th</sup>, 2007, 6 months from it's registration with the New York State Secretary of State.

Special recognition is accorded to the following:

- Brookhaven Town Councilman Kevin McCarrick in sponsoring the bill and his legislative aide, John Kruetz, who, with Councilman McCarrick, worked so hard to bring the bill to fruition;
- Brookhaven Town Councilman Timothy Mazzei for voting to support the legislation;
- Brookhaven Town Councilwoman Carol Bissonette for voting to support the legislation;
- Even though he abstained from voting on the bill, Brookhaven Town Supervisor Brian X. Foley is recognized for allowing the bill to go to the floor for a full vote amid much pressure to the contrary;
- Susan Harder of East Hampton for her tireless advocacy of this legislation, her expert testimony, her passion for dark skies and for her dogged determination in the face of considerable pressure to the contrary;
- Philip Harrington, David Cohen, Alan Stadler and Tom Madigan in their roles as expert witnesses, consultants and speakers;
- LIPA Chairman Richard Kessel who supported the legislation and who has been a pro-active voice and advocate for a sensible, dark sky policy in an industry whose philosophy runs contrary.

The legislation, as passed, still does not address a number of critical issues. As such, subsequent legislation is planned to amend and complete the ordinance. That legislation will include, but is not limited to, the regulation of: 1). obnoxious and offensive service station lighting; 2). streetlights; 3). non-essential lighting; 4). specifics to luminaire pole height and aggregate radiative output (lumens). The following is the official press release as published on the Brookhaven Township website:

<http://www.brookhaven.org/PressRoom/tabid/56/mid/970/newsid970/210/Default.aspx>:

## McCarrick Enacts Exterior Lighting Standards

### Historic Legislation Will Protect The Environment And Improve Quality Of Life

(Farmingville, NY)- Brookhaven Councilman Kevin McCarrick announced that the Brookhaven Town Board approved a local law he sponsored to establish outdoor lighting standards throughout Brookhaven Town.

“Light trespass has a negative impact upon our environment and human health” McCarrick Said, “not only is improper lighting inefficient, but it also contributes to wasteful abuse of fossil fuels that threatens air quality.” McCarrick pointed out that his research to curb abusive lighting practices was a culmination of his survey of statues throughout the nation and came together with the efforts of a study group of individuals who hail from all areas of Brookhaven Town and Suffolk County.

“The study group found that contrary to popular belief improper lighting and ill conceived lighting practices do not increase security benefits nor do they make our streets safer,” McCarrick noted “we discovered that in fact security and visual lighting objectives can be better met with properly designed and installed shielded lighting that use less electricity.” “Brookhaven’s new outdoor lighting law is not only an excellent adjunct to their energy efficiency policies; it will contribute to improving the town’s nighttime safety and appearance,” said Susan Harder who participated in the study group, “Over time, the night sky over Brookhaven will reveal more stars, the residents’ rightful heritage. Since Brookhaven is a large township, this will set an example for all communities and it will be easier for “dark sky advocates” and their legislators to enact laws protecting residents and businesses from light pollution.”

“I would like to thank the efforts of Susan Harder from East Hampton, David Cohn- Setauket, Phil Harrington – Miller Place, Tom Madigan of Patchogue and Alan Stadler - Ridge. These individuals who are experts in this field gave of their time freely to ensure that the measure enacted today became reality.”

McCarrick explained that he is already working on an educational program to make the program more user friendly in order to allow members of the public a better understanding of how the program works as well as reaching compliance “I want to be sure that everyone has a clear understanding of what the town is trying to achieve and how easy the law was constructed for people to comply with its requirements.”

Posted on Friday, December 08, 2006 (Archive on Thursday, February 08, 2007)

**Editor:** Rather than publish the ordinance in its entirety, the full document is available for download at <http://www.tommadigan.net/custer/BrookhavenFinalForLegalReview.pdf>. For those who are reading a hardcopy version of this document and who would like a copy of the ordinance, send an email or hardcopy, written request to the editor (contact information on page 3), requesting a printed version of the ordinance.

## What Was The Christmas Star?

By Tom Madigan

Both my eldest son and younger daughter asked me on two separate occasions over the Christmas weekend, why do we celebrate Christmas on December 25<sup>th</sup> and what was the Christmas star. The answers to both of these questions overlap and are inexorably intertwined; each has a very important astronomical component; each involves a bit of history and each involves a bit of imagination! As well, they're part of the greater Christmas story, a timeless story that has been told throughout the world and down through the ages. Having just witnessed the breathtaking spectacle of Mercury, Jupiter and Mars bejeweling the clear, crisp pre-dawn sky, suspended like tiny diamonds above the east-southeast horizon, an event occurring serendipitously during the Christmas season, I say there isn't a better time than the present to answer these two very important questions.



### December 25<sup>th</sup> Celebration of Christmas

With the merriment of the Christmas season, where many are engaged in decorating their homes and preparing for the holiday and the coming new year, the question as to *why* we celebrate Christmas on December 25<sup>th</sup> rarely gets asked. Even a brief exploration of this question will cause one to quickly conclude that Jesus was *not* born on December 25<sup>th</sup> in the year 0.

As the earth travels about the sun, orbiting once every 365 days, its surface receives regular but changing amounts of sunlight throughout the year. This changing of the seasons is caused by the 23.5 ° tilt of the earth's polar axis. This tilt, with the corresponding change in how much of the sun's radiant energy we receive, is the principle reason we experience seasonal temperature changes. The angle at which the sun's energy strikes the earth's surface is called the *Angle of Insolation*. The smaller the Angle of Insolation, the less radiant energy strikes the surface and the cooler the corresponding temperature will be at that point. Conversely, the greater the Angle of Insolation, the warmer the corresponding temperature will be. In the Northern hemisphere, the greatest Angle of Insolation occurs at the Summer Solstice, during late June, when the sun is at its highest point in the sky. Conversely, the smallest Angle of Insolation occurs at the Winter Solstice, during late December, when the sun is at its lowest point in the sky. This yearly cycle, where the altitude of the sun at mid-day can be traced from its northern most point at the Summer Solstice to southern most point at the Winter Solstice, was not lost on the ancients, specifically, for the question at hand, on the Romans. When integrated with the earth's yearly orbit about the sun, this mid-day point will trace out a figure 8 set on its end. This shape is called The Analemma ( <http://www.analeia.net/analemma> ).

For 6 days starting on December 17<sup>th</sup>, with the Winter Solstice at the midpoint of this annual ritual, the Romans celebrated the feast of Saturnalia, paying homage to their god of the Harvest, Saturn, for he has smiled on them and is returning (from this day forward to the

Summer Solstice, the daily path of the sun at mid-day will progressively move north), ending the cold, bleak winter and, with his return, the promise of a bountiful harvest. By the 25<sup>th</sup> of December it was obvious that the sun had reached its southern-most point and was returning.

Since all laws, rules, edicts and proscriptions were either severely curtailed or completely waived during these 6 days of merriment, the early Christians took advantage of this period of laxity and celebrated the birth of Jesus. The Christians would simply blend in with the rest, taking part in the celebration. This practice would continue until Christianity was declared the state religion by the newly converted emperor, Constantine. With the Edict of Milan in 313, Constantine lifted the proscription against other, non-pagan religions, effectively ending the Roman persecution of the Christians. The celebration of Jesus' birth on the 25<sup>th</sup> of December continued and was officially adopted by the Roman Empire and the church as the day the world would celebrate the birth of Jesus. It remains as such to this day.

### The "Christmas Star"

For many of us, the notion of a special star, heralding a singular birth that would forever alter the course of human history, evokes deep emotions, producing an enchanted connection between our daily lives, lived out on this Pale Blue dot, and a vast and wonderful cosmos, whose depths and mysteries we're just beginning to plumb and explore. What was the Christmas Star? Was it a super nova, a comet, a meteor or, perhaps, a singular miracle? Such a star would have meaning to those who knew the sky and whose insight would lead them to understand the significance of such an event. It, therefore, was probably not a super nova as such an event would have been recorded much in the same way as the Crab Nebula, M-1, was recorded by the Chinese in 1054 and would have been seen across the globe. Further, there are no such records of such an event for that point in human history, nor are there any observable super nova remnants that date back 2,000 years. Was it a comet? It probably wasn't a comet because comets were considered harbingers of doom. In fact, the word "disaster" is, historically, associated with comets and is derived from "dis" as to "be opposed to" or "to rend asunder" and "aster" as having its origins in the firmament. What about a meteor? It probably wasn't a meteor because meteors occur rather frequently, are observable by all and are transitory. Having eliminated some of the seemingly likely suspects, we must now invoke history and scripture, specifically scripture according to St. Matthew, to continue our inquiry. While scripture according to St. Luke makes reference to the birth of Jesus, those references don't mention the "Star" per se and, therefore, will only be used to set a marker on the historical timeline;

- Matthew 2:1--2: *"In the time of King Herod, after Jesus was born in Bethlehem of Judea, wise men from the East came to Jerusalem, asking, "Where is the child who has been born king of the Jews? For we **observed his star at its rising**, and have come to pay him homage."*
- Matthew 2:7--10: *"Then Herod secretly called for the wise men and learned from them the exact time when the star had appeared. Then he sent them to Bethlehem, saying, "Go and search diligently for the child; and when you have found him, bring me word so that I may also go and pay him homage." When they had heard the king, they set out; and there, ahead of them, **went the star that they had seen at its rising, until it stopped** over the place where the child was. When they saw **that the star had stopped**, they were overwhelmed with joy."*

- Luke 2:8: “*And there were in the same country shepherds abiding in the field, keeping watch over their flock by night.*”

From these excerpts we can infer 4 things:

1. An event of historic significance was marked by some singular astronomical event [an astronomical event in this context is any observable event that occurs in the nighttime sky] that wasn't transitory and that occurred over time (use of the words and phrases such as “*rising*”, “*star had stopped*” and “*went the star*”);
2. the event occurred during the reign of King Herod (37 BC – 4 BC);
3. it occurred during the warmer months (shepherds would *only* be with their flocks by night during the warmer months; historically that would have been during the Spring);
4. the wise men were from points east of Jerusalem;

Since the 3 wise men or Magi traveled from points east to Jerusalem, they were most likely Persian and were educated observers of the sky. 2,000 years ago they didn't have GPS or Google and anyone who traveled outside of their village relied on the sky to navigate. Since they were knowledgeable of the sky and, obviously, attached meaning and significance to celestial events that had a corresponding terrestrial analog, they were most likely Astrologers. In fact, history shows that they were Astrologers and priests of Zoroaster. Since we have now established the identity of the 3 wise men, what of the star? Taken in context, the Star was not a static event, was not instantaneous, occurred over time and was known to the Magi. Since they were learned men and were well aware of celestial events, we should look to those objects in the sky whose behavior and movement would be known to the Magi: the planets and their position against the background stars. There were 2 significant events that occurred in the spring of 7 BC and 6 BC and would have caught the attention of the magi. A triple conjunction of Jupiter and Saturn occurred in late May of 7 BC, a time of year when the nighttime temperature would have been mild, a time of year when the shepherds would have “*tended to their flocks by night*”. This rare event not only occurred once every 900 years, but also occurred in Pisces, a constellation of significance to the Jews. The near-triple conjunction of Mars, Jupiter and Saturn that occurred in 6 BC, while it occurs only once every 800 years and occurred in Pisces at that point in history, can be discounted because it occurred in February, a time of year when the nights were still cool, precluding any nocturnal grazing.

It is outside the scope of this treatise to consider whether the “Star” appeared *because* of the birth of Jesus or was it simply a timeline marker used by Matthew. Was the term “Star” used to describe the triple conjunction in Pisces or was it merely a metaphor, a symbol of a great event without any astronomical analog? Was it a singular event that occurred outside of science and history to herald the birth of One Who would change the course of human history? Have we answered the question: What was the star of Bethlehem? We have shown what it could have been and what it was not. The answer to these questions, dear reader, lies with you. Science can take us just so far, beyond that, we rely on faith. Did a triple conjunction occur in the spring of 7 BC? Yes, but only you can answer the question: was that the Christmas Star? All things considered, it is more important to focus on what the star signifies, rather than what it was:

***Peace on earth and good will to all.***

## **Upcoming Programs and Highlights**

### **New Year's Eve Under the Stars**

We had so much fun last year that we decided to do it again. Festivities will include buffet and champagne, dancing to live music by Ahmad Ali and Henry Goode, and maybe a special sky show at midnight ;).

When: Sunday, December 31, 7:30 PM;

Where: Custer Institute, Main Bayview Road, Southold;

Suggested donation:

- \$10 for Custer Members;
- \$15 for Non-Members;
- Free for children 13 and under;

### **Saving Hubble**

As reported in last month's issue of the Custer Comment and during a widely publicized press event with a whose-who of officials and politicians in attendance, NASA has officially committed to SM4, the final, planned servicing mission to the Hubble Space Telescope. While it appears that the hard-fought fight to restore SM4 to the Space Shuttle's agenda will have a happy ending, it is still worthwhile and instructive to review and recognize the hard work of so many whose efforts will have brought SM4 to fruition in 2008. Custer will host David Gaynes, Independent film director and director of *Saving Hubble*, a film that documents Hubble's history and its challenges going forward. David will discuss these issues and more and will present clips from the film. To raise money for completion of the film, there will be a silent auction of space-based art and photography from the film. For more information and to view a trailer, please visit the film's website at <http://www.savinghubble.com>. As always, refreshments will be available.

When: Saturday, January 6<sup>th</sup>, 2007, 7:30 PM

Where: Custer Institute, Main Bayview Road, Southold;

Suggested donation:

- \$8 Custer Members;
- \$10 Non-Members;
- Free for all children 13 & under.

### **2007 North Fork Winterfest**

The East End Arts Council is sponsoring the second annual Winterfest. any businesses, nonprofits, and other attractions from Riverhead to Orient will be hold special events and offer discounts. Custer is proud to be one of the participants. Check <http://www.liwinterfest.com> for details or stop by Custer for an official map and program information.

### **2007 Schedule in Brief**

Saturday, February 3<sup>rd</sup>, 2007, Telescope Clinic;

Saturday, April 21, 2007, Custer's Family Astronomy Day;

Saturday, June 9, 2007, Custer's Annual Meeting and BBQ;

Weekend of October 20, 2007, Custer's 29th Annual Astronomy Jamboree;

## **Winter 2007 Class Schedule**

### Introduction to Astronomy

Introduction, Saturday, January 13<sup>th</sup>, 2007

**Instructor: Kurt Massey**, Member, Custer Board of Directors & Observatory Committee Member.

Topics covered will include history and types of astronomy, observational techniques, astrophotography and finding your way around the night sky.

Naked Eye Astronomy, Saturday, January 20<sup>th</sup>, 2007

**Instructor: Phil Harrington**, 9-Time Author, contributing editor, Astronomy Magazine and Professor of Astronomy at Dowling College.

Topics covered will include the kind and nature of phenomena that are visible with the naked eye and/or through binoculars.

The Sun And Stars, Saturday, January 27<sup>th</sup>, 2007

**Instructor: Tom Madigan**, Custer Comment Editor, former staff astronomer and lecturer at the Vanderbilt Planetarium, Fellow of the Royal Astronomical Society and member of the Adjunct Faculty at Suffolk County Community College.

Topics will include the nature and dynamics of the sun, leading into a discussion of stellar evolution, the H-R diagram, Supernovae, Neutron Stars and Black Holes.

The Planets, Saturday, February 3<sup>rd</sup>, 2007

**Instructor: David Cohn**, Director, Tupper Planetarium

Topics will include the kinds of planets and their formation, solar systems, extra-solar planets, asteroids, comets, current space missions and findings.

Galaxies & Deep Space Objects, Saturday, February 10<sup>th</sup>, 2007

**Instructor: Mike Inglis, PhD**, associate professor of astronomy, Suffolk County Community College and Fellow of the Royal Astronomical Society

Topics will include types of galaxies, black holes, star clusters, nebulae, magnetars, pulsars, and more.

Cosmology, Saturday, February 17<sup>th</sup>, 2007

**Instructor: Jeffrey Katz, PhD**, Custer Observatory Director

Topics will include the Big bang theory, the expanding universe, dark energy & matter, relativity, cosmic string theory, exobiology and quantum phenomena.

**Registration for Custer's 2006-2007 Winter Course Offering is Required.**

Cost schedule is as follows:

Custer members: \$45 for the entire class or \$10 per session;

Non-members: \$60 for the entire class or \$13 per session.

Payment via check or money order (made payable to Custer Institute) or through Paypal (to the account of [CusterPaypal@yahoo.com](mailto:CusterPaypal@yahoo.com)).

Send the form below to: Custer Institute, P.O. Box 1204, Southold, NY 11971. For additional information please contact Donna McCormick at [CusterDonna@yahoo.com](mailto:CusterDonna@yahoo.com) or call 631-765-2626.

If you're not already, please consider becoming a member of Custer, a 501(c)(3) Not-For-Profit Corporation in New York State (est. 1927). We are staffed by volunteers, and rely on dues, proceeds from events, and the generosity of the community for our survival. Your membership will not only help us continue to provide educational, cultural, and research programs, but will support our current efforts to expand our facility and services.

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I am not a Member: ; I wish to enroll in the full class at \$60, or the following sessions at \$13 each:  1/13,  1/20,  1/27,  2/3,  2/10,  2/17;

I would like to join Custer:  \$45 Individual;  \$60 Family;  \$25 Senior (65+);  \$25 Junior (12-18);  \$25 Full-time Student

I have made payment via Paypal or  enclosed my check/money order (payable to Custer Inst.) for \$ \_\_\_\_\_.

**Note:** Confirmation of registration will only be sent by email. Please mail your completed form to: Custer Institute, PO Box 1204, Southold, NY 11971.

**New members please note:** the *full edition* of the Custer Comment, Custer's monthly Journal, is *only* available to those who have the ability to receive it electronically. If you did not include your email address or do not have access to a computer, email or the Internet, then you will receive a single page, highlights edition. ***By submitting your membership application with payment, you're eligible to receive the discounted membership price at all Custer events!***

## Telescope Clinic

Whether you just received the gift of a telescope, or have had one that you've been trying to get to work optimally, this event is for you. Bring your telescope to Custer and you'll receive personalized instruction on how to use it. Custer Board and Observatory Committee Member, Rich Huber, will lead the training team.

When: Saturday, February 3<sup>rd</sup>, 2007, 8:00 – 10:00 PM;  
Where: Custer Institute, Main Bayview Road, Southold;

Minimum suggested donation:

- \$5 Custer Members;
- \$10 Non-Members.

## Registration Form For Winter '07 Events

Name \_\_\_\_\_ Email \_\_\_\_\_  
Street Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ Phone \_\_\_\_\_

### New Year's Eve Party

I am a Custer Member: Please reserve \_\_\_\_\_ tickets at \$15 each TOTAL \$ \_\_\_\_\_  
I am not a Member: Please reserve \_\_\_\_\_ tickets at \$25 each TOTAL \$ \_\_\_\_\_

### 1/6 Saving Hubble

I am a Custer Member: Please reserve \_\_\_\_\_ tickets at \$8 each TOTAL \$ \_\_\_\_\_  
I am not a Member: Please reserve \_\_\_\_\_ tickets at \$10 each TOTAL \$ \_\_\_\_\_

### 2/3 Telescope Clinic

I am a Custer Member: Please reserve \_\_\_\_\_ tickets at \$5 each TOTAL \$ \_\_\_\_\_  
I am not a Member: Please reserve \_\_\_\_\_ tickets at \$10 each TOTAL \$ \_\_\_\_\_

### Join Now And Save On Ticket Prices

If you're not already a member, please consider joining. Custer Institute is a 501(c)(3) Not-For-Profit Corporation in New York State (est. 1927). We are staffed by volunteers, and rely on dues, proceeds from events, and the generosity of the community for our survival. Your membership will not only help us continue to provide educational, cultural, and research programs, but will support our current efforts to expand our facility and services. By submitting your membership application with payment, you're ***eligible to receive the discounted membership price*** at all Custer events! Please review the membership application on the previous page.

## **Upcoming Friday Night Lectures at SUNY, Stony Brook**

The Stony Brook "Open Night" Lecture Series Continues With this last of the Friday Night Lectures

"Environmental Threats to Long Island's Central Pine Barrens"

**Genre:** Geology;

**When:** Friday, January 26, 2007, 7:30 PM;

**Where:** ESS Building, Room 001

**Instructor:** Prof. Gil Hanson, Department of Geosciences

Global warming, sea level rise, acid rain, and ground level ozone are environmental threats to the sustainability of Long Island's Central Pine Barrens.

As a result of global warming the climate of Long Island may be more like that of eastern Georgia by the end of this century. This will of course have a huge effect on ecological communities that are adapted to cooler climates.

With the expected sea level rise the water table will also rise. Since the shallow streams and ponds in the Pine Barrens are dominantly groundwater fed, changes in the level of the water table may have dramatic effects on the ecology of these bodies.

Acid rain is allowing aluminum in the soil to mobilize and replace other base cations on the soil. Highly mobile aluminum in acidic soils is toxic to plant growth, and hence can have a deleterious effect on overall ecosystem health.

Ground level ozone is known to cause foliar damage and reduced rate of growth in plants. There were more than thirty days in 2005 when there was acute exposure for plants in Suffolk County. Ground level ozone is mainly a result of sunlight interacting with motor vehicle exhaust.

In this presentation Professor Hanson will discuss these environmental threats and suggest monitoring programs that are necessary to evaluate them. Also, little is known about microclimates in the Pine Barrens, as no detailed study of the climates has been conducted. Monitoring will enable us to understand the differences between the microclimates of each distinct ecosystem in the Pine Barrens region and which factors are critical to sustainability.

**Editor:** As soon as the new schedule for 2007 is available from Stony Brook, I'll publish it.

## **Observational Astronomy**

A new course offered at Suffolk County Community College

<b>Course Code:</b>	ES 57
<b>Instructor:</b>	Michael Inglis, PhD
<b>When:</b>	Spring 2007; Schedule to be determined;
<b>Pre-requisites:</b>	MA23 & ES21 or ES22 or at discretion of Instructor

### **Course Aims and Objectives**

This course is intended to provide students with a detailed understanding of astronomical methods, detectors and technologies used for observational astronomy. Case studies show the relevance of the techniques to small telescopes and professional satellite and ground-based observing.

The practical sessions are designed to give students training in observational techniques, incorporating the use of telescopes and astronomical detectors; to give training in the recording, analysis, and presentation of scientific data.

### **Syllabus and Content**

#### **Co-ordinate systems**

The Horizon System, RA and DEC. Galactic latitude and longitude.

#### **Atmospheric Effects**

The effects of the atmosphere on observations - extinction, air mass, refraction, dispersion, seeing. Sky background radiation.

#### **Telescopes**

Limits to resolution. Limiting magnitude. Characteristics of good observing sites. Telescope mountings and focuses. Optical aberrations. Planning an observing programme.

#### **Filters**

H-alpha, H-beta, and Oxygen III filters and their particular fields of application. Colored filters for planetary work

#### **Photometry**

Photometric techniques. Magnitudes and photometric systems, astronomical applications.

#### **Detectors**

Single-pixel and multi-pixel detectors. CCD Cameras, Digital Cameras. Photography. Photomultiplier tubes. Infrared arrays. Bolometers. Radio and X-Ray Telescopes,. Signal-to-noise ratio.

#### **Spectroscopy**

Optical Spectroscopy. Types of spectroscopes. Spectral Line formation

#### **Experimental and observational work**

We will use both the Departments large collection of telescopes and detectors. In addition, several computer-based astronomy simulations/experiments will be used. Each student is required to plan and carry out two observational experiments. The experiments will normally consist of a number of familiarization exercises to develop the student's practical skills before tackling the formally assessed work. The experiments will be written up as a formal report supported by a detailed log of the student's activities during their familiarization exercises and evidence that they have planned the main experiment. Evidence of the raw data logging must be included in an appendix to the main report.

- The first experiment involves photometric observations of stars that can be completed indoors using artificial stars. Data analysis will be used to process the observations to produce a colour-colour diagram and HR diagram of the data. Students are expected to use Excel or a similar package. An elementary treatment of errors is expected.
- The second experiment requires students to obtain CCD images using a telescope and CCD combination. Data processing techniques will be used to illustrate how astronomical images are processed.

In the event of inclement weather prohibiting observational work, archival material will be available for the student.

### ***Teaching and Learning Strategy***

Lectures, tutorials/problems classes, and case studies.

Laboratory teaching takes place at the Ammerman Campus Astronomy Laboratory. Experiments, logbook, and formal reports are designed to develop the students' experimental/observational and transferable skills.

Case studies enable students to see how the fundamental techniques apply both to observing with small telescopes and for professional use and will be used to illustrate current developments in satellite and ground-based telescopes and detectors. Tutorials based on the case studies will highlight the structure of scientific articles and emphasize the need for selectivity when reporting and summarizing.

### ***Course outcomes***

The student will be able to:

1. Explain the principles of observational techniques and astronomical detectors.
2. Solve problems involving topics found in the syllabus.
3. Select appropriate techniques and detectors for a variety of observational programmes.
4. Extract and summarize relevant information from a given text or case study.
5. Carry out a variety of quantitative observing techniques at optical wavelengths.
6. Record, analyze, present and report astronomical data with the aid of suitable IT packages.

Recommended Text:

Norton, Andrew J. [Ed.], (2005) *Observing the Universe* Cambridge University press

### **Supplementary Texts:**

Kitchin, C.R., (1998) *Telescopes and Techniques*, Springer

Clarke, (1988), *Astronomy: Principles and Practice*, Adam

<http://mac.cweb.com/mdiastro>

<http://www3.sunysuffolk.edu/index.asp>

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