



## STAR FIELDS

Newsletter of the  
Amateur Telescope Makers of Boston  
Including the Bond Astronomical Club  
Established in 1934  
In the Interest of Telescope Making & Using

Vol. 24, No. 5 May 2012

### This Month's Meeting...

**Thursday, May 10<sup>th</sup>, 2011 at 8:00 PM**  
**Phillips Auditorium**

**Harvard-Smithsonian Center for Astrophysics**  
Parking at the CfA is allowed for the duration of  
the meeting.

Please join us for a pre-meeting dinner discussion at  
Changsho, 1712 Mass Ave, Cambridge, MA at  
6:00pm before the meeting.

### Transits of Venus

Robert Naeye

Transits of Venus across the face of the Sun (as seen from Earth) are among the rarest of predictable spectacles in astronomy. Unless medical science invents some way to extend human life well beyond 100 years, the June 5-6, 2012 transit of Venus will likely be the last one anyone alive today will ever see.

The next Venus transit won't take place until December 2117, 105 years from now. Transits of Venus always take place in pairs 8 years apart, with the pairs separated by long intervals of either 105.5 or 121.5 years. This talk will highlight the rare geometric alignments that must take place for transits of Venus to occur, and why they occur so infrequently and in a particular pattern. Included will be an historical overview of Venus transits, which scientists used to discover Venus's atmosphere and measure the distance between Earth and the Sun. Robert Naeye, who watched the entire 2004 Venus transit from the tomb of Cyrus the Great (founder of the Persian Empire) in Iran, will describe how to view the transit safely, and what you can expect to see when Venus crosses the disk of the Sun.

ATMoB member Robert Naeye is Editor in Chief of *Sky & Telescope*. He earned a Master's degree in science journalism

from Boston University in 1992, and later worked on the editorial staffs of *Discover* and *Astronomy* magazine. He served as Editor in Chief of *Mercury* magazine (published by the Astronomical Society of the Pacific) from 2000 to 2003, was a Senior Editor at *Sky & Telescope* from 2003 to 2007, and then became Senior Science Writer for the Astrophysics Science Division at NASA's Goddard Space Flight. He returned to *Sky & Telescope* in June 2008 where he currently serves as Editor in Chief.

### President's Message

We know that a rare transit of Venus will happen on June 5 of this year, and that if we miss this one, we've got to wait another 105 years. So, to help us get ready, member Bob Naeye will tell us about the significance and background of this event.

Kepler made the first actual more-or-less accurate prediction of a transit of Venus in 1627, but it wasn't until 1639 that the first purposeful observation of a transit was made by Jerimah Horrocks in England. He was able to observe the event by projecting the image of the sun on a card behind his telescope.

We know that previously Galileo and many others had made observations of the Sun directly without using projection, but fortunately Galileo reported in a letter to a colleague in 1612 that one of his students had developed a better way, the projection method, thereby providing Horrocks with the tool to make his observation some decades later. This was important, since a direct observation of the Sun of many hours- necessary because the exact time of the transit wasn't able to be predicted accurately- probably wouldn't have been feasible or safe.

Although it is an urban legend that Galileo had seriously damaged his eyesight by making direct observations of sunspots, this wasn't true. The blindness he experienced in at age 72- long after he had stopped observing the Sun directly- was reportedly brought on by a combination of run-of-the-mill cataracts and glaucoma. Ancient astronomers did know enough to avoid direct observations of the Sun when high in the sky, and instead limited looking at it when it was low and near the horizon where the atmosphere attenuates its glare. I was surprised to learn that Sun gazing was an ancient tradition in South East Asia, and persists up to this day. In ancient times this practice was exclusive to only the high priests and forbidden for 'ordinary' people. Even today, some adherents practice to be able to stare at the Sun for up to 45 minutes when it is low in the sky, and claim various psychological and health benefits. *For the record, I am NOT advising that this is a safe practice. Severe eye damage by looking at the Sun is well documented, and I am mentioning it here only because of its historic context and connection to the upcoming Venus transit.*

These days we have the luxury of using good solar filters to view the Sun safely through our telescopes. I hope that some of our members who have telescopes with very narrow band H-alpha filters, which are able to show flares and texture on the Sun surface, are considering using them to observe the upcoming transit. The last transit, in 2004, was the first one for which very narrow band solar filters were widely available. Fred Espenak, the well known NASA solar observer, has a great narrow band picture of the 2004 transit on his web site. But the Sun is now

much more active than it was then, and so there is a good chance to take an even better picture of the transit with large flares in the background! As for me, I've only got the standard high density filters which won't show this potentially spectacular detail to backdrop the transit, but even so, the sight should be a great one, and I'm looking forward to a clear Sunset that day.

Keep looking up,  
Bernie Kosicki

~ *Bernie Kosicki, President* ~

## April Meeting Minutes

Minutes of ATMOB meeting held 12 April 2012.

Meeting held in Phillips Auditorium, Harvard-Smithsonian Center for Astrophysics.

Bernie Kosicki, President: called the meeting to order at 8:00 PM.

Dan Falk, author of the books *Universe on a T-Shirt* and *In Search of Time*, science journalist, regular contributor to newspapers, television science programs, and radio gave a talk also titled "In Search of Time." Dan is currently spending a year with MIT as the recipient of a Knight Science Journalism Fellowship.



Photo by Al Takeda

Dan Falk at the April Meeting.

Dan pointed out that in the history of time keeping humans noted the passing of astronomical events and used these events to measure the passage of time. The Sun rises in the East, passes at its highest elevation and sets in the West. The day was one of the first units of time. However, days are of different length, some are longer as in summer and some are shorter as in winter. The Moon appears, passes through its phases, and returns to about its same phase in about the same number of days. So, the Moon was used to mark a longer period of time. Also the Sun changes its rising point on the horizon throughout time, sometimes moving to the south and sometimes moving to the north. These extreme positions of the Sun were observed by the ancient people to measure the passage of the seasons. These extreme positions are the solstices. The winter and summer solstices were noted by many early people as important events. Structures were built so that during a solstice, sunlight would reach an inner part of a

building, pass through a specific arches, line up with stones, etc. Religious beliefs were built around these astronomical events.

However a problem arises when time is marked by both the passage of a day and by the passage of the phases of the Moon, as some intervals between new moons have different numbers of days. Also, the number of new Moon events between solstices is different in some years. Early civilizations either ignored these variations of seasonal events or built religious practices around these differences. Early in the development of civilizations the incommensurable time spans of astronomical events were noted, and were contemplated by early civilizations.

More accurate time measurements were invented. Sundials used motions of shadows to measure passage of time, water clocks used movement of water, sand clocks operated as hour glasses, and so on. Early Chinese developed accurate water clocks. Europeans developed mechanical clocks during the years 1200-1300 and put them in churches and town halls to help regulate civic life. The early mechanical clocks used an escapement to regulate a weight driven set of gears, but their accuracy is was only about to 20 minutes per day.

The pendulum clock was introduced in the years around 1650, Galileo may have applied the pendulum to timekeeping, and Christian Huygens is often credited with inventing the pendulum clock. Pendulum clocks were improved to give an accuracy of about a few seconds per day. As their accuracy grew, the minute hand was added, followed by the second hand. Gearing regulated the relative rotation speed of the hands.

Isaac Newton described the principles of classical mechanics, part of which is finding that the force applied to an object is the product of its mass multiplied by its acceleration. The acceleration applied through time changes the velocity of the object, and so time is a key concept in mechanics. Also, the position of an object changes during the passage of time as the object moves with a velocity. The velocity may vary as time passes, so the passage of time becomes an even more important concept in mechanics. Newton effectively imagined a universal time, which ticks forward with the clocks of his day, uniformly throughout the Universe. Planets follow this movement of time, apples falling from a tree follow this movement of time, as does any object moving as a result of a force applied to it.

Newton's concept of a universally felt passage of time became the basic picture of time. The philosophical picture of a clockwork universe came from Newton's concept of a universal time. In a such a universe, the universe works like a good clock, wind it up or place the planets in motion, and they will continue forever. Even humanity's free will is constrained by the clockwork nature of the universe.

The study of electricity during in the 19<sup>th</sup> century was spurred by Alessandro Volta and his electric battery. With a battery, one could generate electric currents and study their effects. James Clerk Maxwell reduced the results of a century of experimental results into a of electrodynamics to what we now know as Maxwell's equations. Maxwell's equations were published between 1861-1862. A definitive book by Maxwell on his theory

of electricity and magnetism was published in 1873. Maxwell's theories contributed to the model of light as an electromagnetic wave, where the velocity of the electromagnetic wave is a constant.

Albert Einstein adopted the assumption that the speed of light is a constant, independent of the speed of the velocity of light and independent of the velocity of an observer who measures the speed of light. This assumption is based on Maxwell's result that the speed of light depends only on the electric and magnetic properties of space. Time must be different for each observer for the speed of light to be the same for all observers. This is the theory of Special Relativity.

Time influence even more unlikely conclusions as Einstein developed his theories around gravitation. In his model of gravitation, space is curved by the presence of matter, and objects travel along the shortest distances as they move through the curvature of space. As a result, the passage of light near a massive body is influenced by the curvature of space caused by the presence of the massive body.

Accordingly, time has gone from a measurement of the passing of days and seasons by ancient man to a variable quantity dependant upon each observer's frame of reference.

All experiments which have been devised to test Maxwell's result and Einstein's assumption that the speed of light is always the same have all been interpreted to confirm the idea that light always travels at a constant speed. The speed was first measured by Ole Rømer in about 1676 by his timing the eclipse of satellites of Jupiter, both when the Earth is nearest and farthest from Jupiter. Rømer measured about 22 minutes for the light from eclipses of Jupiter's satellites to cross the diameter of the Earth's orbit, where the presently determined value is closer to 16 minutes. The present value of the speed of light is measured to be about 300 million meters per second. A measurement of the speed of light using a telescope and accurate timing of eclipses of Jupiter's moons is a project that amateur astronomers can do by taking timing data over a period of about a year.

The present picture of time is a key concept in Quantum Mechanics, the behavior of small objects such as atomic structures, especially the interaction of electrons to form into clouds around nuclei to form atoms. The atoms bind together to form molecules from multiple atoms, etc. When special relativity is applied to the interactions between high energy electromagnetic waves, those having an energy greater than two masses of an electron, anti matter is created in a pair of an electron and a positron. Time in these theories is similar to Newton's picture of a time which advances continuously from the past through the present, and hopefully into the future. In Schrodinger's equation time advances continuously as an independent variable. In relativistic quantum electrodynamics causality is invoked to cleanly separate the past from the future.

The concept of time may again change as general relativity, the theory of the very large, and quantum mechanics, the theory of the very small, are further analyzed and someday their differences resolved.

Dan Falk's book, *In Search of Time*, carries the presentation by Dan further than his lecture.

Before the talk, Tom McDonagh gave the Membership Committee report. Tom was happy to report that the club has gained several new members. Membership is steady at about 290 members.

After the talk a short business meeting was held.

The Secretary's Report of the November meeting was given by Sidney Johnston.

Bernie Kosicki presented the treasurer's report prepared by Nanette Benoit.

Steve Clougherty gave the Clubhouse Committee Report and the Observing Committee Report. An Observing Committee meeting was held in which the budget for next year was discussed. The C-14 will soon be installed in the Home Dome. The last work party accomplished many needed tasks, including spreading gravel in the driveway and cleaning the telescope room. Steve thanked John Blomquist for his good work on the Schupman, including his providing of the G-11 mount.

Kelly Beatty mentioned the upcoming Astronomy Day event at the Clay Center.

Bernie Kosicki gave a schedule of events including star parties scheduled for the next month, and also mentioned the Board Meeting scheduled for 30 April 2012.

Bruce Tinkler gave a short anecdote about a student who came to a star party explicitly to thank him for attending an earlier star party and inspiring her to pursue a great interest in astronomy.

Mario Motta mentioned a book on light pollution and health in which he is an author. Also, Mario mentioned that a light pollution bill is making its way through the Massachusetts legislative process, and the bill is still active rather than being sent to "study," which is a way bills are killed.

Bob Naeye showed a new globe of the Moon, which Sky and Telescope has prepared from several hundred NASA photographs of both sides of the Moon. The globes are for sale on the Sky and Telescope web page.

There was no old business.

There was no new business.

The meeting was adjourned at 10:08 PM.

Refreshments were provided by Mike Hill.

~ *Sidney Johnston, Secretary* ~

## Clubhouse Report

A work party was held at the ATMob Clubhouse on Saturday April 7. A total of 18 members volunteered to help with several projects. Anna Hillier continued working with club historical

archiving. Harry Drake has transformed the library into a more user friendly environment. Observing manuals and star charts are now organized on the first floor book case which provides better access for the membership. Books in the second floor library are labeled and organized by subject. Several more boxes of surplus books, prints and DVD's were crated off to the monthly meeting where they were handed out to ATMOB members and friends. Thanks again to Harry for taking on this monumental project!

Cleanup around the clubhouse and observing field continued. Fortunately, we are in the "shoulder" period and the lawn was not quite ready to mow and snow shoveling is a distant memory. Gravel was spread around the driveway to fill in the largest potholes. A new supply of gravel will be needed later this year.

The door to the new home dome is complete, save for a lock and final coat of stain. Sergio Simunovic machined parts for the sliding dome door. The pier is now ready to accept the Paramount and C-14 telescope. This project will continue throughout the season. The Shupmann telescope is in very good working order thanks to John Blomquist who added a dew shield and heating element to the front objective.

A clubhouse committee meeting was held later in the afternoon to hammer out a budget for the upcoming year. Thanks to all who attended and contributed their ideas. Eileen Myers prepared tacos for the crew during the work party and also re-stocked the soda and snacks.

We would like to thank the following people for their help during the month of April:

Harry Drake, Joshua Ashenberg, Anna Hillier, Sai Vallabha, Paul Cicchetti, Paul Catemali, Sergio Simunovic, Steve Clougherty, Art Swedlow, Al Tekeda, John Blomquist, John Reed, Dick Koolish, Nina Craven, John Maher, Eileen Myers, Bernie Kosicki, Sidney Johnson and Dave Prowten.

~ **Clubhouse Committee Chairs** ~

~ **John Reed, Steve Clougherty and Dave Prowten** ~

### Clubhouse Saturday Schedule

May 12	Jacobson & Johansson
May 19	Maerz & Panaswich
May 26	Cicchetti & Reed
June 2	McDonagh & Wolf <b>Work Party #6</b>
June 9	Evans & Lumenello
June 16	Takeda & Prowten
June 23	Leacu & Rounseville
June 30	Paquin & Small <b>Work Party #7</b>

## Thoreau on Astronomy

I see that all is not garden and cultivated field and crops, that there are square rods in Middlesex County as purely primitive and wild as they were a thousand years ago, which have escaped the plow and the axe and the scythe and the cranberry-rake, little oases of wildness in the desert of our civilization, wild as a square rod on the moon, supposing it to be uninhabited. I believe

almost in the personality of such planetary matter, fell something akin to reverence for it, can even worship it terrine, titanic matter extant in my day. We are so different we admire each other, we healthily attract one another. I love it as a maiden. Those spots are meteoric, acrolitic, and such matter has in all ages been worshiped. Aye, when we are lifted out of the slime and film of our habitual life, we see the whole globe to be an aerolite, and reverence it as such, and make pilgrimages to it, far off as it is. How happens that we reverence the stones which fall from another planet, and not the stones which belong to this - another globe, not this - heaven, and to earth? Are not the stones in Hodge's wall as good as the aerolite at Mecca? Is not our broad back-door-stone as good as any corner-stone in heaven?

Journal, 30 August 1856

~ **Submitted by Tom Calderwood** ~

## Membership Report

Membership count as of 04/29/2012 is at 299 individuals

Same time last year: 293

Please seek out and welcome our newest members!

Chris Massa  
Geoffrey Reid  
Hamid Maghani

Steven Hoeschele  
James Frasher

Membership dues do not cover the costs of maintaining our clubhouse and observatory, running meetings, conducting public outreach programs, and publishing our newsletter. Please consider a donation to allow the membership dues to remain at their current level. Members wishing to receive the printed Star Fields are urged to donate \$5.00 to defray mailing costs. ATMOB is a 501c(3) charitable organization and donations are tax-deductible. Please consider contributing whatever you can.

~ **Tom McDonagh, Membership Secretary** ~

## Schupman Upgrades

I tested the "heater support ring" I made for the Schupman during the New Member Orientation night in the recent past. The ring allowed support for the heater strip. The heater strip was then able, through conduction, to gently heat the lens cell sufficiently to keep it dry all evening. A question came up during the evening of whether or not the heated ring would cause "heat dance" while observing or perhaps imaging. While this was not evident during observing that night, I thought the idea worth consideration and then devised an alternative.



In the original application, the stainless ring fits tightly around the raised ridge of the cell right next to the lens itself, as seen in photo above to the left. The double ridge construction of the bare



cell is seen in photo to the right. I have fashioned a similar stainless ring to fit snugly to the outer circumference of the cell, again as shown in the same image.



To insulate the heated ring from the light path I fashioned a "foam-core" dew shield, as designed by Al Takeda, and included 3 cut out areas to accommodate the heads of the cell's hold down bolts.

The stainless ring is fitted to the outside of the cell and the foam core shield is carefully inserted inside (below). This should prevent heat dance from corrupting the image at the eyepiece or at a potential camera when imaging. This theory still has to be tested.



At the end of any observing/photography session, the original lens cap for the Schupman will fit nicely inside the attached stainless ring. There will be no need to remove the stainless ring, only remove the foam core insulating shield. The Bunji (sp) cord strap that already holds the lens cap in place will still hold it all together.

Hopefully the club will allow funding to purchase a four channel dew heater controller and a couple of appropriate length heater straps for the objective and typical eyepieces so that this will be operational this season.

*All photos by John Blomquist*  
~ **John Blomquist** ~

## Sky Object of the Month

### Porrima – a binary star in Virgo

Compiling a list of the finest double stars for backyard telescopes is always a work in progress. The list is forever in flux, because many showpiece double stars are binary systems that periodically close to the point where they can't be resolved by small-aperture telescopes.

Such is the case with Porrima (gamma [ $\gamma$ ] Virginis). In 1970, a compilation of the finest double stars would have included this striking pair of nearly identical magnitude 3.5 spectral class F0

stars. Back then these stellar twins were separated by 4.6", an easy "kill" for the smallest of telescopes. The situation changed rapidly as the two stars began to close together. Between 2002 and 2007, they were within an arc-second of each other – all but impossible to resolve with anything but the largest telescopes. Porrima disappeared from the double star A-List.

A comeback is in the works! Porrima A and B are separating and are nearly 2" apart – within the grasp of a good 3-inch scope under seeing conditions that permit a steady image at a magnification of 120X or more. Saturn is currently visiting Porrima's neighborhood. If the Ringed Planet is sporting an unusually crisp image, try your luck with Porrima.

I found an amazing Youtube clip of Porrima, taken by the North Carolina astroimager Michael C. Phillips through his 14-inch f/4.5 Newtonian reflector. Check it out at:  
<http://www.youtube.com/watch?v=yQb5AdQoW38>.

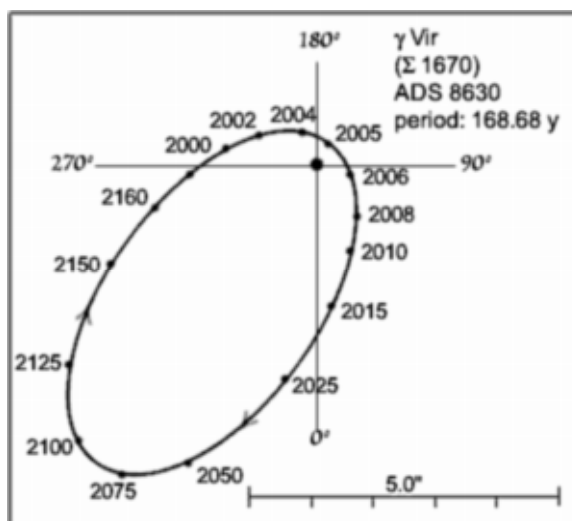


Chart by Richard Dibon-Smith  
(<http://www.dibonsmith.com>)

Orbit of gamma Virginis,

~ *Glenn Chaple* ~

## For Sale

For Sale: (1) Super Polaris Mount, adjustable wooden tripod, and accessories including illuminated polar bore scope, MD-6 drive controller, battery holder, cigarette lighter power cord, and more. Generally excellent condition. \$400 OBO. (2) Takahashi FS-102 refractor OTA with TeleVue 2-inch star diagonal, Tenba carrying case. \$1600 OBO. (3) TeleVue Pronto refractor with wooden Panoramic mount and 12mm Radian eyepiece. \$750 OBO. Contact Elaine Kile at [starbird@gis.net](mailto:starbird@gis.net) or (w) 781-259-2161. Local buyers only.

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## June Star Fields DEADLINE

Noon, Sunday, June 17th

Email articles to the newsletter editor at  
[newsletter@atmob.org](mailto:newsletter@atmob.org)

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**POSTMASTER NOTE: First Class Postage**

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**How to Find Us...**

**Web Page: <http://www.atmob.org>**

**MEETINGS:** Held the second Thursday of each month (September to July) at 8:00PM in the Phillips Auditorium, Harvard-Smithsonian Center for Astrophysics, 60 Garden St., Cambridge MA. For INCLEMENT WEATHER CANCELLATION listen to WBZ (1030 AM)

**CLUBHOUSE: Latitude 42° 36.5' N Longitude 71° 29.8' W**

The Tom Britton Clubhouse is open every Saturday from 7 p.m. to late evening. It is the white farmhouse on the grounds of MIT's Haystack Observatory in Westford, MA. Take Rt. 3 North from Rt. 128 or Rt. 495 to Exit 33 and proceed West on Rt. 40 for five miles. Turn right at the MIT Lincoln Lab, Haystack Observatory at the Groton town line. Proceed to the farmhouse on left side of the road. Clubhouse attendance varies with the weather. It is wise to call in advance: (978) 692-8708.

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