



## *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. 23, No. 11 December 2011**

### **This Month's Meeting...**

**Thursday, December 8<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.

### **The Event Horizon Telescope: Observing Black Holes with Schwarzschild-Radius Resolution**

Dr. Shep Doeleman

“It is now almost certain that at the center of our Milky Way Galaxy lies a super massive black hole, four million times more massive than our Sun. Because of its proximity to Earth, this object, known as Sagittarius A\*, presents astronomers with the best opportunity in the Universe to spatially resolve and image a black hole's event horizon. To do this requires using Very Long Baseline Interferometry (VLBI), the technique whereby radio telescopes around the world are linked together in a Global phased array. Very short wavelength VLBI observations have now confirmed structure on  $\sim 4$  Schwarzschild radius scales within SgrA\*, and have revealed time variability in this source on the same spatial scales. For the much more massive (6 billion solar mass) black hole powering the relativistic jet in M87, similarly compact structures have been detected. I will describe the instrumentation efforts that enable these observations, discuss what current and future VLBI observations can tell us about these super-massive black holes, and describe plans for assembling a submm-VLBI Event Horizon Telescope.”

Dr. Shep Doeleman is a Principal Research Scientist at MIT and Assistant Director of the MIT Haystack Observatory in Westford, MA. He received a BA in Physics from Reed College in Portland, OR, then spent a year in Antarctica working on upper atmospheric and particle physics experiments. He got his PhD at MIT working on VLBI, and now uses this technique to resolve the emission near the event horizon of super massive black holes.

## **President's Message**

This has turned out to be a month for MIT connections. In October, ATMoB was invited to give a lunchtime presentation about our club to the MIT folks on the hill. There were about 40 people in attendance, and all seemed interested in finding out what is going on in the white farmhouse that is our clubhouse. One byproduct was that I was able to briefly talk with Colin Lonsdale, the Director of Haystack, and to discuss the slow progress toward getting our lease renewed.

In reviewing all the activities that are going on in our club to get ready for the talk, I came up with the following list of what we do:

- *Science of astronomy* (including of course the professional scientists who give talks to members each month, and also the Friday night DVD sessions that John Maher has organized for the past few years on various astronomy subjects.)
- *Observing*, including both visual and CCD imaging observing, and also connections to professionals, such as, for example, AAVSO data collections and asteroid occultation observing.
- *Telescope making*. This is in our name, and early members had to make their own telescopes before they could observe. Some members continue this tradition on Thursday nights.
- *Education*, including of course, the 30 or so star parties that we conduct each year for area schools, and volunteer work that many members do in their local schools. Haystack places a lot of importance on outreach and has a number of its own outreach programs, and appreciates the work that we do as tenants on their property. Finally, although not an official ATMoB program, many members also work on their own to educate others and advocate for more responsible outdoor lighting.

The initiative that so many of our members show in organizing these efforts is truly impressive. We are very fortunate as a club to have so many very proactive and enthusiastic members, with very strong programs in each of these categories.

We had planned an Open House for our MIT neighbors on the hill, but unfortunately the October 27 snowstorm knocked out power and made a swamp of our observing field, so the original November 3 Open House was postponed. This event has now been rescheduled for November 30 with a cloud date of December 1- I hope that interested members will come by to meet with our MIT friends and show them the skies.

Finally, we have yet another MIT connection this month. Our speaker will be Dr. Shep Doelman from Haystack giving a talk on imaging the event horizon of black holes with Very Long Baseline Interferometry. This should be a very interesting presentation.

So, in spite of the MIT open house postponement, the club is making good connections with MIT, and we'll work to continue this into the future.

Keep looking up,  
~ **Bernie Kosicki, President** ~

## November Meeting Minutes

Minutes of ATMOB meeting held November 10, 2011



*Photo by Al Takeda*

*Gabor Furesz speaking at the November meeting*

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

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

Dr. Gabor Furesz of the Harvard Center for Astrophysics gave a talk concerning the design of a spectrograph for use in the Giant Magellan Telescope, a proposed approximately 30 meter (98.4 feet) diameter telescope to be used for exoplanet discovery. Gabor is actively working on the design of the spectrograph.

In high school in Hungary, he built a spectrometer for his amateur Cassegrain telescope, and showed a picture of the scope on an equatorial mount and the spectrometer attached at the focal plane.

More recently he built a spectrometer for a 1.5m telescope that has become the workhorse instrument in the ground support follow up observations for the Kepler mission. Kepler records the intensities of a single group of stars, creating light curves for each one. Dips in the curves indicate possible eclipsing planets. The Kepler instrument is an orbiting Schmidt telescope with a 0.95m aperture and about a 12 degree diameter field of view. It is pointed at and records data from just a single group of stars for the duration of the mission. An array of 42 CCDs is in the focal surface of the telescope. Each CCD is 50x25 mm and has a resolution of 2,200x1,024 pixels. The CCDs are read out every three seconds to prevent saturation. The data are integrated for 30 minutes. The light curves of many stars are recorded by repeating intensity measurements frequently. The ground support

spectroscopy is used to measure Doppler shift of light from the star in order to confirm that a light curve with a dip is accompanied by changes in line of sight velocity of the star in order to confirm that the light curve is likely due to an orbiting planet, and not some other effect. The Kepler mission was launched in March, 2009 with an expected lifetime of four years.

Dr. Furesz also played crucial role in the commissioning of Hectochelle, a specialized spectrograph, for the 6.5m Multiple Mirror Telescope. This instrument has a very high resolution. About 240 optical fibers of about 25m in length connect the telescope to the spectrograph, so that it can record the spectra of 240 separate objects.

Currently he is working on a higher resolution spectrograph with a design goal of detecting star velocities of about 1 meter/second using the Giant Magellan Telescope. One set of proposed dimensions is a ground based telescope with seven mirrors each of about 5.4m in diameter. The telescope is expected to be operational in Chile in about ten years. The telescope will be connected to the spectrograph by optical fibers. The spectrograph is expected to weigh about 100 metric tons and to cost about one dollar per gram, for a total cost estimated at \$100 million.

Calibration of the spectrograph is currently under design. After his talk, Gabor showed a group of ATMOB members the laser comb calibration tool that he and others are working on in his lab at the CFA. In order to reach the planned design goal of measuring Doppler shifts due to in-line velocity of only 1 meter/second, the laser comb tool is expected to yield sub-pixel space resolution from the CCD detectors used for measuring the location of spectroscopic peaks.

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A business meeting was held after the talk.

The Secretary's Report of the October 13, 2011 meeting was given by Sidney Johnston.

Nanette Benoit gave the treasurer's report.  
Steve Clougherty gave the Clubhouse Report.

Steve stated that a lot of progress has been made on the C-14 observatory, specially noting that the roof is nearing completion. Next Saturday the planned work includes a door for the observatory, finish the roof, and pour concrete piers for a deck and stairs. Also it is time to erect the snow fence, and finish clearing a tree limb from the ice storm.

Eileen Myers took orders for the *Canadian Observer's Handbook 2012*.

Bruce Tinkler mentioned that he won an award for a children's story in a contest sponsored by Astronomy Today.

There was no old business.

There was no new business.

Bernie Kosicki reviewed the scheduled events and mentioned that the Club New Years Party is scheduled for December 31, 2011.

The meeting was adjourned at 9:50 PM.  
~ **Sidney Johnston, Secretary** ~

## Clubhouse Report

Since the September 24th report, the clubhouse has seen 17 members donate 58 work days during 11 visits.

The narrative that follows includes the number of members involved in parentheses.

10/6 (6) The home dome observatory roof material, purchased and delivered, was carefully cut and fitted to the cylindrical dome support ring; then disassembled and stored on the covered side porch.

10/8 (13) The November Star Field's Clubhouse report covered this day's activities in detail.

10/22(10) After a week's rest, work resumed on the observatory roof, removing the plastic protective covering.

The rubber membrane material was cut and fit to even greater precision to cover the plywood roof. The screened eave vents were installed as part of this process.

10/23 (3) Working with the roof covering material continued. Then the first winter snow storm of this season hit with a vengeance on 10/29. With downed trees and power by week's end but Internet connections continue to be serviced. Work resumed on 11/6. Most personal power had been restored.

11/6 (8) The melting snow made the observatory roof areas needing attention easily visible. The thaw allowed cement to be hand mixed and sunken sonotube support forms to be filled. Both jobs were tackled; and insulation with heating bulbs placed over each pour provided above freezing temperatures for the concrete to cure.

11/7 (3) Work on the Schupmann compound refractor continued at the eyepiece end.

11/10 (1) Insulating covering was removed to allow rain to hit the curing concrete.

11/12 (11) At the scheduled November work party the area was cleared, fallen limbs cut and moved, and grass was mowed for the last time this season. The snow fence was installed. Observatory deck wood was delivered. Propane and gasoline was replenished. And observatory roof work continued. On 11/13, Dave Prowten stated in an email that the observatory roof work was completed after another day's work.

Again a big thank you is in order to the following members who signed the logbook, for all their efforts. The number of days donated follows each name: S. Vallabha(4), A. Takeda(8), A. Swedlow(5), J. Small(3), S. Simunovic(2), J. Reed(5), D.

Prowten(7), E. Myers(1), J. Maher(1), R. Koolish(2), E. Johansson(2), M. Hill(1), P. Courtemanche(1), S. Clougherty(2), P. Cicchetti(6), B. Berger(2), and J. Blomquist(6).

As this report is written, a work session on 11/20 will allow the deck construction to proceed and door framing to be started. The December 10th work party should provide the time needed for the home dome observatory to become weather tight. Additional tree trimming and limb chipping would improve our eastern sky horizon along the road. Let's not mention snow. So please mark your calendar and join your fellow members on the Full Moon Saturday December 10th at 10AM. We'll spend an enjoyable day improving our clubhouse and enjoying a spaghetti lunch with all the trimmings.

~ **Clubhouse Committee Chairs** ~  
~ **John Reed, Steve Clougherty and Dave Prowten** ~

## Clubhouse Saturday Schedule

December 3	Jacobson & Sonowane
December 10	Cicchetti & McDonagh <b>Work Party #12</b>
December 17	
December 24	<b>Clubhouse CLOSED</b> <b>Christmas Eve</b>
December 31	<b>New Year's Eve Party</b>

## Thoreau on Astronomy

It is a perfectly cloudless and simple winter sky. A white moon, half full, in the pale or dull blue heaven and a whiteness like the reflection of snow, extending up from the horizon all around a quarter of the way up to the zenith. I imagine I can see it shooting up like an aurora. This is at 4 p.m. About the sun is only whiter than elsewhere, or there is only the faintest possible tinge of yellow there.

*Journal, 4 December 1856*

~ **Submitted by Tom Calderwood** ~

## ATMoB's Bruce Tinkler Wins Astronomy Magazine Sheldon Reynolds' "Feel Good" CD Contest

ATMoB's Bruce Tinkler Wins Astronomy Magazine Sheldon Reynolds' "Feel Good" CD Contest

Sheldon Reynolds is best-known as the lead guitarist and vocalist with *Earth, Wind & Fire* for 14 years. He has a great passion for music, but he also has a passion for astronomy and has recently joined the staff of *Astronomy Magazine* as a contributing editor. He says the magazine has fulfilled one of his life dreams - to share his love of the stars with a greater audience. He regularly

takes his telescope out to local parks to share the wonders of the night sky with his family and friends, and he enjoys astrophotography. To kick start his relationship with Astronomy's readers, Reynolds gave away signed copies of his Earth, Wind & Fire tribute CD, Feel Good. As Reynolds feels strongly about looking at our universe with what he calls "childlike wonder," so entrants in the contest had to submit a short paragraph (250 words maximum) sharing a moment when they paused to really appreciate the amazing beauty of the cosmos. My unpublished entry read:

*"My "childlike wonder" moment: I had not had my Meade ETX125 for very long when my brother came to visit. I took it out and set it up, fumbling to try and find things. It was a very chilly November night. Finally, I was able to center on a bright object in the sky. It was very out focus. As I brought it into focus, I knew right away that I had something special, the shape was not that of a star. When it came in to focus, I could not help but shout, "IT'S SATURN!!!" "YOU CAN SEE THE RINGS!!!" I was giddy and jumping up and down like a little kid. I had found Saturn for the first time in my own telescope! My brother was thrilled. I went inside to get my wife and sister-in-law. We all enjoyed the view until we got cold and headed inside to revel in our success."*

I was surprised to hear last week by email from Karri Ferron, Astronomy Assistant Editor, that I had one of the winning entries. Just the day of the November ATMoB meeting, the signed CD arrived. I was privileged to be able to share about the experience at the meeting. The five lucky winners were cited by Astronomy as follows: "Julia Fedorova of Maryland for her story about a night under the stars providing perspective in her life; Kathleen Allison Johnson of Wisconsin for her poem about seeing the night sky from a red-eye flight; Melinda J. Ketelsen of Arizona for her story of seeing the night sky for the first time after cataract removal surgery; Robert Mathieson of Ontario, Canada, for his story about seeing the Man in the Moon for the first time; and Bruce Tinkler of Massachusetts for his story about his first time seeing Saturn through his new telescope."

Details on the contest are online at:  
<http://www.astronomy.com/feelgood>

~ Bruce Tinkler ~

## Sky Object of the Month

The magnitude system works quite well for quantifying the brightness of stars. We know that a 6th magnitude star will be barely visible to the unaided eye from rural areas, yet easily seen in even the smallest of telescopes.

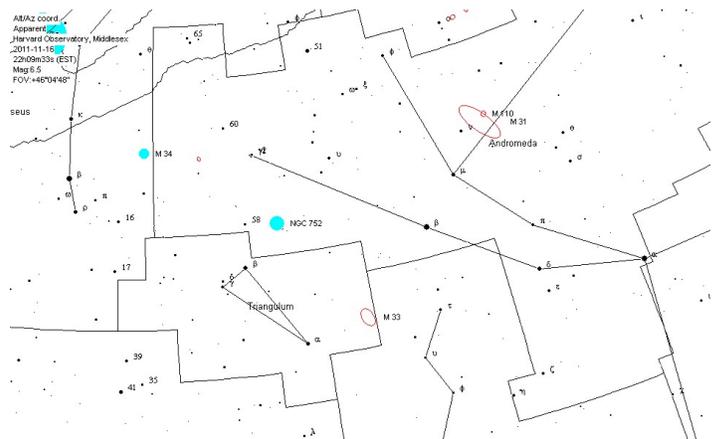
The magnitude system doesn't work as well for deep-sky objects. Consider the spiral galaxy M33 in Triangulum. Listed as a 6th magnitude object, it's notoriously difficult to view in telescopes. M33 is elusive because its light is spread over an area four times that of the full moon. Defocus a 6th magnitude star until it's that large and you'll get the idea.

Another reason why M33 is such a demanding target is its location in a star-poor region of the late autumn sky. I usually find it by training my telescope on an area roughly 4 1/2 degrees west and slightly north of alpha (α) Trianguli. You can also trace an imaginary line from the Andromeda Galaxy (M31) to the star beta (β) Andromedae, then extend an equal distance beyond (refer to the accompanying finder chart). In either case, begin a low power sweep of the area until you encounter a large, faint glow.

The key to observing M33 is to use an eyepiece that affords a field of view of at least 1 1/2 to 2 degrees. One of the best views I've had of M33 was with a 4-inch f/4 RFT (the Edmund Astroscan) and a magnifying power of 16X. I've spotted it with 7X50 binoculars, and some observers even report seeing it with the unaided eye. The key, of course, is to conduct a search for M33 from a dark-sky site on a clear, moonless evening.

Numerous sources credit the discovery of M33 to Messier himself (in 1764); however evidence exists that the true discoverer may have been the Italian astronomer Giovanni Battista Hodierna over a century earlier.

M33 is part of the Local Group of galaxies that includes our Milky Way and the Andromeda Galaxy. It's approximately half the size of the Milky Way and lies about 2.9 million light-years away.



Finder chart for M33

~ Glenn Chaple ~

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### January Star Fields DEADLINE

Noon, Sunday, December 18

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 [www.atmob.org](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.