Smoky Mountain Astronomical Society

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S.C.R.A.P.S.

Society's **C**h**R**onological **A**stronomical **P**aper**S**

Dec. 2nd SMAS Holiday Party

Gondolier Restaurant
138 West End Ave., Farragut
7:00 pm

(Please See Directions on Page 4)

From the President - Mike Littleton

At our last meeting, Mike Fleenor gave a presentation on using a CCD camera to record the light fluctuations caused by an exo-solar planet in our line of sight with its parent star. This reminded me of how valuable it is for astronomers to have the ability to record the variability of stars. While the credit largely went to Edwin Hubble for showing that galaxies are "island universes" and not features of our galaxy, his work was based on work done by Henrietta Leavitt. In 1912, she reported the discovery of a period-luminosity relationship for Cepheid variable stars. This discovery stemmed from the study of variable stars in the Small Magellanic Cloud (SMC). Because of the great distance of the SMC, all stars are approximately the same distance and therefore, the stars absolute luminosity is directly related to its apparent luminosity. The distance and absolute luminosity to the prototype star, Delta Cephei, was known. This allowed Henrietta Leavitt to find the relationship of *absolute* luminosity and thus distance versus period of Cepheid variables. Hubble found Cepheids in M-31 and used the relationship to discover its great distance, which proved its galactic nature.

Cepheids are stars after core hydrogen burning stops and helium burning begins. The star is in transition in terms of luminosity and surface temperature. A Cepheid brightens and fades from cyclic expansion and contraction of its outer atmosphere. During the expansion and contraction, the star's gases heat up and cool down. The star's helium is the mechanism for the pulsation. The star cools and its gases are compressed. The compression heats the helium causing some of the helium to be ionized. Ionized helium is opaque and traps heat, which causes the star to expand. The star expands and cools causing the cycle to repeat.

Accurately measuring luminosity in the early Twentieth Century was quite a challenge! The human eye and the photographic plate were the only detectors that could be used with telescopes of the time. Both detectors are non-linear with respect to image brightness. For example, film suffers reciprocity failure during long exposures. Today the CCD camera is available to the professional and amateur astronomer alike. The CCD detector's response is linear with brightness and much more sensitive than film. Amateurs can do useful work on variable stars using a moderate-size telescope, a CCD camera, computer, and a specialized filter. For more information see the website of the American Association of Variable Star Observers, http://www.aavso.org/. It is an interesting way to spend time on one of East Tennessee's cloudy nights.

SMAS meeting of November 11, 2005 - Lee Erickson

The SMAS regular meeting of November 11, 2005.
There were 7 members including one newly joined member, Michael Reuter. Welcome Michael!
The meeting began at 7:30 as the 7:00 to 7:30 as pre-meeting open discussion wound down.

Mike Littleton announced that the Holiday party will be Friday Dec 2 at 7:00 at the Gondolier in Farragut. *(See directions page 4 - Editor)*
The holiday party will feature Astronomy Jeopardy! So bring your thinking caps and you appetite!

Mike Littleton asked if we club members would consider a dues increase by $5 or so to build up a little buffer in the treasure. The current dues are largely consumed by Astronomy League fees and the club liability insurance. Because the treasurer was not able to attend the meeting there was no opportunity to discuss projected finances and further discussion did not occur.

Mike Fleenor was our featured speaker. Mike explained that he has begun to use his wonderful observing skills on a new challenge. Mike is attempting to confirm some of the exo-planetary discoveries which are done with precision photometry. Some exo-planets are known because they eclipse their stars from our line of sight. Mike presented actual data he gathered on October 28, 2005 of the planetary transit of **TrES-1**. During this event, Mike measured a change in brightness of about 25 milli-magnitudes. For such accurate measurements of magnitude Mike uses a camera to image the target star and some reference stars near by. The reference starts which are chosen are near by, non variable, and similar in brightness to the target star. By measuring the reference stars you do not have to worry about instrument drift or varying atmospheric conduction's during the measurement. Mike still uses the best practices he has developed for taking his beautiful pictures of astronomical objects. Specifically he described how he uses dark frames and flat filed frames to improve the camera noise and special linearity. He uses a camera that does not have anti-blooming circuitry. Anti-blooming circuitry would defeat the purpose of measuring the relative brightness if some of the reference starts were brightness limited by anti-blooming circuitry in the camera. Mike says he tries for an exposure time to fill the "well" of the CCD to about 25%-30% of maximum. Mike says that he centers the image so that the light from the star falls on one single pixel in the camera. Mike also uses photometric filters R for Red, V for visual and B for blue to further improve the measurement of the reference and target stars. In response to questions about the flat field frame Mike says some people image the twilight sky, but that he uses a target he made of a white T shirt over the objective and then illuminates a white target in his observatory. 1000 thanks to Mike Fleenor for again inspiring us to explore the universe in new ways.

Dear Wiz,

I've been saving and saving, and I finally got a hundred dollars to spend on my eyepieces. What should I get?

B. Holinmypokit

Dear Bernie,

That's a tough question, and it depends on a lot of things a beginner might not think of, such as what you like to observe, where you will observe and whether or not you wear glasses. Here's a recent exchange of posts on Starry Night that might help explain. (Reprinted with permission)

--- In starrynights@yahoogroups.com,

Ok, I'm new.....

I bought a TV-85 refractor, a Nagler 22mm, 12mm, 7mm and 3.5mm along with a 2.5x Powermate barlow. Now, I go to look at the moon....I start out with the Nagler 12 and find that when the moon is to the near edge of the eyepiece field , the edges of the moon start getting a greenish yellow layer on them!

It happens the most with the Nagler 12 but I can still see some with the 22 as well. It seems that the 7 and the 3.5 have way less , if any. The reason I bought the 22 and 12 was to get a full 82 degree wide field of view right?? Is this due to the eyepieces (12 mostly and then the 22) or is it the scope? I'm really upset that a $350.00 (12) eyepiece looks so bad at the edges.....

-Dave

Dave,

A TV-85 is a wonderful scope and your collection of eyepieces covers a wide range of magnifications. Naglers are great eyepieces when used for the right observing conditions. They are optimized for wide and fairly flat fields with minimal distortion.

However, they are not optimized for full color correction at the edge of the field. Naglers and the TV-85 are a perfect combination for beautiful wide-field vistas of deep-sky objects (especially open star clusters and scanning the milky way). The moon is the toughest object you can subject this setup to.

(Continued)

Being very bright, the moon is best viewed with a long-focus refractor (preferably an APO) and simple eyepieces such as plossls, orthoscopics, monocentric triplets, etc. These will give you beautiful contrasty views with little or no color (with narrow field-of-views as a trade-off).

I use a 5.5" F/7 APO refractor for much of my observing and love my Naglers and Radians for deep-sky observing. When observing the planets and moon however, I use my TMB monocentrics and University Orthoscopics primarily. I definitely see color near the edge of the FOV when using my Naglers and TeleVue Radians on the moon, so I reserve these eyepieces primarily for deep-sky work and the planets occasionally. The Orthos and Monos are very limited for deep-sky use due to their narrow FOVs (40 and 30 degrees). As the old saying goes, use the right tool for the job. Ultra wide-field eyepieces are great, but they aren't the best eyepiece for every object.

- Mike

My personal recommendation is this: don't buy any eyepiece at all. You've joined an astronomy club, SMAS. Use it to learn what works for you! Other members will happily let you try out their eyepieces at star parties. If you'll keep a small log of them, after a few star parties you'll know what you can get for your money and be able to make a reasonable decision.

You might also take a look at our website How-to article, *How To Select Eyepieces.*

Da Wiz

Directions

Gondolier Restaurant
130 West End Ave., Farragut

From Kingston Pike, turn north on West End Avenue. Gondolier is 1/2 block on the right.

(Note: West End Ave and Concord Road are the same road. It just changes its name at Kingston Pike. West End Ave. is also the entrance road for Farragut High School.)

Please don't confuse this Gondolier with another Gondolier on Cedar Bluff road, fairly nearby.

December 2005

SUN	MON	TUE	WED	THU	FRI	SAT
UTK—roof of Neilson Physics Building on The Hill at UT 1st & 3rd Fridays TAO —Tamke-Allan Observatory Public Stargaze Watts Bar Lake, Roane County 1st & 3rd Saturdays				1 *New Moon*	2 **SMAS Holiday Party Gondolier 7 pm** UTK	3 TAO
4	5	6	7	8	9	10
11	12	13	14	15 *Full Moon*	16 UTK	17 TAO
18	19	20	21 Winter Solstice	22	23	24
25 Christmas 	26	27	28	29	30	31 New Year's Eve