

## Smoky Mountain Astronomical Society

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

Society's Chronological Astronomical Papers

Many a night I saw the Pleiades, rising thro' the  
mellow shade, Glitter like a swarm of fire-flies  
tangled in a silver braid.

-- Tennyson

From the President - Lee Erickson



A change to SMAS officers to announce: Bill Dittus and his wife Teresa are caring for their daughter Heather who has some medical difficulties. Bill informed me that he must curtail his SMAS activities for an indeterminate time. Per our constitution, and acting as President, I nominated Dennis Hutcheson to replace Bill. The Executive committee must approve such a replacement. (The Executive committee consists of all four officers (President, VP, Secretary and Treasurer. But not the Secretary, in this case.) VP Mike Littleton and Treasurer Scott Byers and I approved the nomination unanimously.

We all want to thank Bill Dittus for his previous efforts and wish Heather well. Thanks to Dennis for taking on the office of Secretary.

Other SMAS business. Date for the Holiday Banquet. At a previous meeting I announced that I had reserved the Gondolier banquet room again for December 14<sup>th</sup>, the second Friday in December. I have received feedback that it might be better to move it up a week to avoid other holiday activities such as the all-important shopping. We have done so in the past. I would like feedback by phone, direct email or by [smokymtnastro@yahoo.com](mailto:smokymtnastro@yahoo.com) or at the September 14<sup>th</sup> meeting. Let's decide then if we should move the date up to December 7<sup>th</sup> or even Saturday, December 8<sup>th</sup>. For how many members would Saturday be easier to attend?

Tom Webber, the Knoxville News Sentinel's Sky Guy mentioned us recently in his article on the August 28<sup>th</sup> lunar eclipse. Tim Hunt has committed to joining me that Tuesday morning for the eclipse in the parking lot of the Blount County Library. The Moon will set in eclipse as the sun rises and then I plan on a visit to some breakfast establishment (perhaps IHOP over near Home Depot.) I plan to be at the library at 4:00 for the start of the eclipse as the moon enters the umbra. However, I do not expect to be able to see the umbral component of the eclipse.

## Agenda for September 14, 2007 Meeting

**7:00 Meet and greet**

**Return checked out library books**

**7:30 Formal meeting begins.**

**Planning for the GSMNP and SMAS Star Party.**

**Demonstration of set up of the club's refractor on the mount  
donated by Dennis Hutcheson.**

**Time permitting Lee Erickson will have a short presentation on image  
processing with Paint Shop Pro.**

**Gastronomy to follow meeting.**

**Note: November and January meetings. We need programs. If you have something you could share with fellow SMAS members please let Mike Littleton or Lee Erickson know.**

## Minutes of August Meeting

We had 10 members present. These included all 4 Fleenors: Mike, the Principal XO planet hunter, wife Beth and daughters Olivia and Chloe. We also had 8 guests: Ed and Ku Adams, Jerry and Nancy Campbell, three Whittles, Dave, Tyler and Charles, and Zach Ingram. (The recent article in the Knoxville News Sentinel about Mike Fleenor's XO Planet Hunting brought these guests out.)

The meeting opened with Treasurer Scott Byers' semi-annual financial report. In summary, our club's finances are holding steady with respect to last year, Our total liquid assets are \$1042.16, virtually the same as last year at this time. All of our regular expenses have already been paid for this year. We had 25 members reported to the Astronomical League (to receive Reflector magazine).

David Fields spoke about the status of the light zoning initiative in Roane County. (*Ed. note: because of a completely unexpected political development, Dave later tabled his Night Sky initiative, recognizing the need for further basic public familiarization.*)

Our :45 minute program was devoted to XO Planet Hunting. Mike Fleenor described the state of the effort of professional and amateur scientists to find eXtra sOLar Planets. See the discussion of his program, below.

After the meeting, several members visited Chili's for the customary gastronomy.

## August Star Parties

The August 11 star party at Unicoi Crest was a great success.

We had a very dark sky and lots of visitors. The local media had been getting the word out that the Perseid meteor shower was peaking and lots of people went out of their way to come out to dark skies. Kenney and Shelia Pridgen meet Janice and me at Back Yard Burgers in Maryville. We ate and then departed about 7:30 for Unicoi Crest. We stopped along the way and invited people we met at the last overlook with restrooms before getting up to Unicoi to join us.

When we got to Unicoi Crest, Gary and Ann Bridges were already there and quite a lot of the public. I very much enjoyed talking to the visitors about the night sky, and Jupiter and Io were thoughtful enough to show us an Eclipse. Seeing the shadow of Io on Jupiter's cloud tops impressed our visitors.

As the night progressed, Gary lent me his laser pointer and I used it to compare and contrast a photo of a galaxy with a strong dust lane with the central bulge of our galaxy overhead. I think it worked well. There were about 20 persons including 7 SMAS members at the peak. I was especially proud of the 12? year old girl and 6? year old boy who were there and who eventually learned to track objects with Sasquatch.



Tim Hunt, Dennis Hutcheson and Lee Erickson demonstrate their differing concerns for coiffure as they assemble Sasquatch.

The star party of Aug 18<sup>th</sup> at Look rock was hindered by poor visibility but we had some fun anyway. Tim Hunt was snapping photos with his new digital camera. Duane Dunlap was there with his short focal length refractor. I liked the view of the “coat hanger” asterism through Duane's telescope. We had about 7 members present, but for fear of leaving out someone I may have forgotten, I will forego naming anyone.

~~~~ Lee Erickson

**Mike Fleenor**

**XO**



**By**

**Lee Erickson  
and  
Bob Arr**

In his presentation at the August 10 meeting, Mike Fleenor described how some professional and amateur astronomers are currently searching for eXtra sOLar planets, that is, planets outside our solar system. There are 5 or 6 groups employing various techniques trying to discover these XO planets.

Mike is one of 9 amateur astronomers world-wide composing the group actually called "XO". The project is run by NASA. Mike's observational data has contributed to the discovery of two of the three planets that XO has discovered so far. The XO project is attempting to find planets which happen to be transiting, i.e., crossing between their parent star and the line of sight of observers here on Earth. That's only a small portion of the available stars, but it opens a big door to discovery.

The XO project has three major components. First is a professionally built initial sky survey component, which does automated imaging of the sky over very wide fields. Its purpose is to detect candidate stars – those who show unexplained regular light variation, the hallmark of a transiting planet. The telescopes that do this look far and wide, but their resolution is poor. When candidate stars are identified, this triggers the next component, the amateurs, to dig in. It's their job to record the light curves of the candidate stars.

The amateurs use a high resolution, relative photometric method. Very small changes in the brightness of the candidate star is measured simultaneously with several other nearby stars of similar brightness for comparison. Variations in the light signals that are similar in both the candidate star and the comparison stars indicate some common attenuation, such as a transiting cloud. But if the candidate star varies and the comparison stars do not, that is interpreted as a good possibility of transit by a planet. The precise shape of the light curve become critical: it will deliver the signature of a transiting planet.

Recording the light curves is the "drudge work" in the process. A single candidate star may have to be monitored for weeks on end to detect a legitimate variation pattern, sometimes 24/7 (by amateur telescopes located around the globe acting in relays). Their data is combined digitally via the Internet.

Continued on next page

Once the amateurs have identified transit events consistent with planets, the third component begins. The professionals then use their very large telescopes to perform radial velocity measurements of the light from the stars thought to have the XO planet, looking for the characteristic Doppler shift of a planet sized object. The results are subject to scientific peer review and if it passes review (that is, if other astronomers repeat and confirm the measurements) the Astrophysical Journal recognizes the new planet. The three planets discovered to date by the XO team are named XO1, XO2 and XO3 in honor of the discovery teams.

It simply isn't feasible to dedicate large telescopes' time to the minutia of recording light curves, but there are a fair number of amateur setups that have the capability. Mike's is one. These are expensive hobbies, of course, but they do real science, and their operators are selected with great care by NASA. And clearly, their efforts are paying off.

In this article, we are indebted to Mike's website for our illustrations.

For an indepth look at Mike's XO activity, see

<http://www.mikefleenor.com/exoplanet/research.htm>



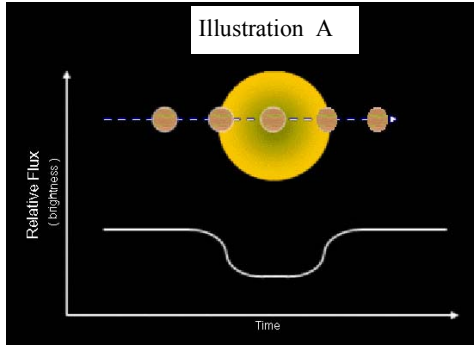
**In Mike's back yard,  
In the heart of West Knoxville**

**SCRAPS depends  
Upon its friends**

**Help!  
Help!**

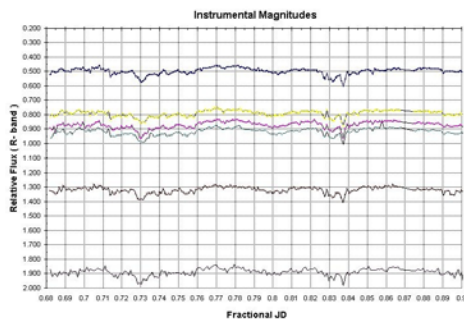
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## XO IN A NUTSHELL...



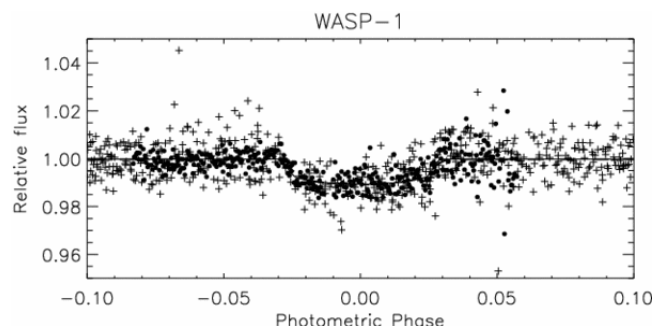
XO is limited to looking for big planets, close to their stars (meaning they orbit fast), that from earth are seen to transit their stars. Size-wise, a Sun-Jupiter proportion would be typical. When the planet transits its star, it blocks a detectable percentage of the star's light.

Once the amateur XO hunters have a candidate, they begin a time-lapse observation, recording that star's light curve, sensed by CCD. Several nearby stars (perhaps 5) are also included for comparison. A computer plots the variations of all 6 stars simultaneously and automatically. One night's recording might look like this:



What causes so many wiggles? Probably clouds, or atmospheric irregularities, but the fact that it happens to all 6 stars simultaneously clearly shows that it is not a process unique to the candidate star alone. The computer subtracts these shared "excursions" from the data, and these wiggling lines straighten out dramatically.

Except for one, which has an excursion that won't go away. This one definitely merits more study.



And lo and behold, plotting the data points from extended and repeated observations finally produces a graph of compelling evidence. Compare it with the ideal light curve in Illustration A, above. XO's job is done. It's time to get the big professional telescopes to take a close look!



### July's Question of the Month

Why was it so puzzling?

Because nobody understood the question. Maybe you'd like to be Editor?

Thanks to Jim Kaler's Skylights

The question is, if an observer in the Arctic Circle sees the sun above the horizon for 24 hours, does that mean that his Antarctic counterpart (on the same meridian at the equivalent southern latitude) cannot see the sun because it is below his horizon?

Answer: Yes, of course, everyone recognizes this.

And when the northern observer finally sees the sun dip below the horizon, does his southern buddy finally see it slip up above his horizon for an identical time?

Answer: Yes.

Whichever way you answer, are there any exceptions?


Answer: in real life, refraction and the fact that the sun is close enough to be seen as a disk would cause an overlap in the times. But the puzzler said to disregard these effects, so the answer is No.

No winners, so the \$50 first prize money goes unclaimed.





# September 2007

| SUN                                                                                                                                                                                     | MON | TUE            | WED                                                                                                                                                                                                                                               | THU | FRI                                 | SAT                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------|------------------------------------------|
| UTK—roof of Neilson Physics Building<br>on The Hill at UT<br>1st & 3rd Fridays<br>TAO—Tamke-Allan Observatory<br>Public Stargaze<br>Watts Bar Lake, Roane County<br>1st & 3rd Saturdays |     |                |                                                                                                                                                                                                                                                   |     |                                     | 1<br><br><br><br>TAO                     |
| 2                                                                                                                                                                                       | 3   | 4              | 5                                                                                                                                                                                                                                                 | 6   | 7<br>UTK                            | 8 SMAS<br>Star<br>Party<br>UC            |
| 9                                                                                                                                                                                       | 10  | 11<br>New Moon | 12                                                                                                                                                                                                                                                | 13  | 14 SMAS<br>Meeting<br>PSTCC<br>7 pm | 15 SMAS<br>Star<br>Party<br>LR #1<br>TAO |
| 16                                                                                                                                                                                      | 17  | 18             | 19                                                                                                                                                                                                                                                | 20  | 21<br>UTK                           | 22                                       |
| 23<br>Autumn<br>begins<br>                                                                           | 24  | 25             | 26                                                                                                                                                                                                                                                | 27  | 28                                  | 29                                       |
| 30<br><br>SCRAPS depends<br>Upon its friends                                                                                                                                            |     | Help!<br>Help! | <div style="border: 2px solid #8B0000; padding: 5px; text-align: center;"> <p>For it's a long, long while from May to December<br/>             But the days grow short when you reach September<br/>             ~~~ Maxwell Anderson</p> </div> |     |                                     |                                          |