Smoky Mountain Astronomical Society

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August 2005

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

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

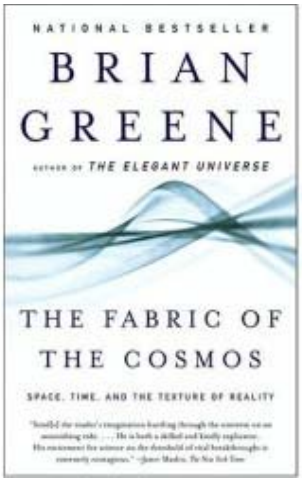
August 20th SMAS Picnic

Tamke-Allan Observatory,
Watts Bar Lake,
Roane County

Please contact Angela Quick, who is coordinating the menu.

From The President—Mike Littleton

Last year I was visiting my sister in Baltimore. It was one of those lazy Sunday mornings with everyone reading the newspaper. In the paper was a review of the book, *Fabric of the Cosmos*, by Brian Greene. I started praising the book in how it clearly explained relativity to the lay reader. When I broached the subject of special relativity with time slowing as velocity increases, my sister responded that was science fiction. This surprised me. I though somewhere in twenty years of formal education, (she has a Ph.D.) one would "bump" into the basic facts of something that revolutionized our view of the cosmos. On the other hand, why should this surprise me? The changes caused by special relatively are too small to affect our daily lives-or are they?



(Continued)

The Theory of Special Relativity describes things that move with a constant velocity. (BTW $E=mc^2$ has nothing to do with relativity. It is a result of light having momentum.) Imagine two kids in a moving minivan at a constant speed. The kids are tossing a ball from the front seat to the rear seat. (No doubt making mom angry.) The kids only see the ball moving with the speed of the throw. Someone looking at the ball from the street would see the ball moving with the velocity of the minivan plus or minus the velocity of the throw depending on the direction of the throw. Now give the kids Star Wars light sabers (flashlights) that they shine at each other. If the passengers in the minivan and the observer on the street measured the speed of the light from the light sabers, they would find it to be the same. How can this be-it just doesn't meet with our common-sense view of how things are?

We measure time by motion. The year is set by as the passage of the Earth around the Sun. Our clocks measure time by repetitive motion such the vibration in crystals or the cycles of a pendulum. We think of time as independent of space. It is not. Time and space are coupled at a fundamental level. The answer to our puzzle with the kids in the minivan is that the passage of time in the minivan is slower compared to the stationary observer (AKA time dilation). It is slower by just enough to make all observers agree on the velocity of light. Why do we not detect the difference in the passage of time? It is just too small. At 60 mph, a second to the passengers of the minivan is 99.99999999998% of the second as measured by the stationary observer.

OK, is special relativity science fiction? We have been sending spacecraft to the Moon and planets since the 1960's with only the predictions from Sir Isaac Newton. Shortly after the theory was published, scientists (Michelson and Morley) verified its predictions on time dilation using the motion of the Earth. Super accurate clocks have measured time dilation in jet aircraft compared to clocks located on the ground. Now back to relatively affecting everyday life. The military, aviation, and even the automotive industry are increasing their dependency on GPS. GPS locates position by a set of very accurate time signals from satellites. In order to get position with an error of a few meters, GPS time signals must get corrections to account for time dilation due to the satellites motion around the Earth. There are also corrections because of General Relativity, but that is another column.

2005-2006 SMAS Officers

Michael Littleton	*President*	Erik Iverson	*Vice President*
Ron Dinkins	*Treasurer*	Lee Erickson	*Secretary*
Mike Fleenor	*Webmaster*	Peter Bush	*Editor*

July Minutes—Mike Littleton

The July meeting of SMAS was held on July 8, 2005 at PSCC. There were 15 members present and a new member, Joe Little. Welcome to SMAS Joe!

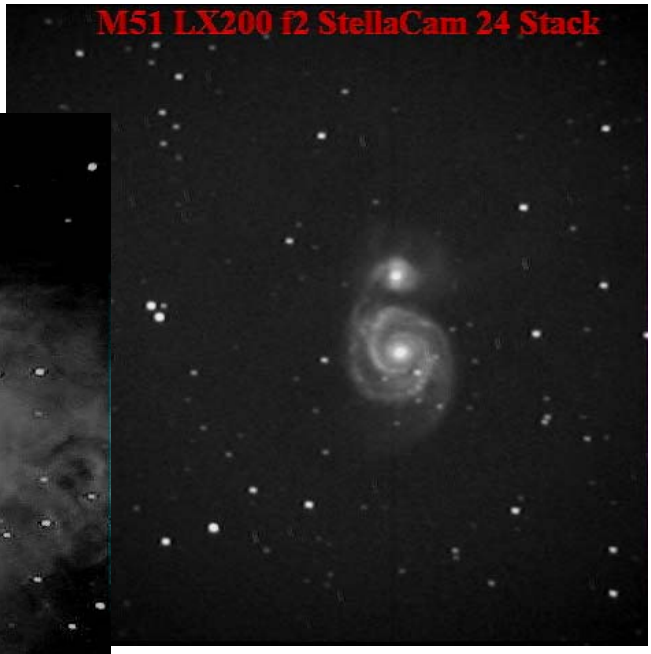
Mike Littleton gave an update on the project to upgrade SMAS's 20" dobsonian, AKA Sasquatch. In the motion approved last month, the upgrade was not to be started until there was a minimum of $500 in donations. At the time of the meeting there was slightly over $500 in cash plus the equivalent cash value of material donated by SMAS members. Mike Littleton granted authorization to proceed on the upgrade. Bob Arr is the manager of the project and is asking for help in the construction. If interested, please contact Bob.

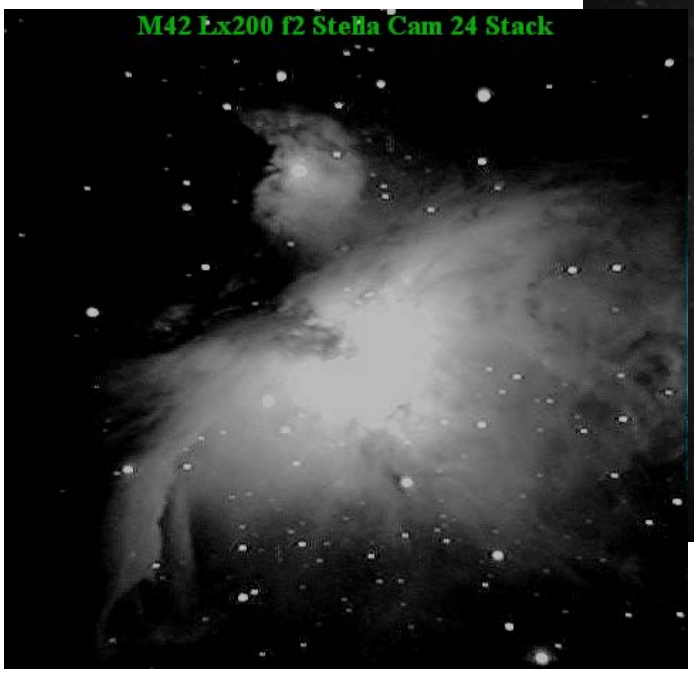
SMAS is planning a public program on naked-eye astronomy of the fall sky on 10/8/05 at Cades Cove in the Smoky Mountain National Park. There will also have telescopic viewing of selected astronomical objects for the public. Mike Littleton is coordinating with the park rangers in setting up the program. The park is providing a stipend to SMAS for the program. If you are interested in participating in the program, please contact Mike. For more information on Cades Cove see the following website, http://www.mypigeonforge.com/cades_cove-paidsearch.asp

Roy Morrow has bought a lot in Arizona's Sky Village. Sky Village is a community dedicated to astronomy and offers some of the darkest skies in North America. For more information on Sky Village, see their website at http://arizonaskyvillage.com/. Roy also gave a presentation on astro-imaging using a Stella CAM video camera. (*See pictures page 4*) The Stella Cam integrates a preset number of frames into a single image. The sensitivity of the camera allows imaging of about two magnitudes fainter compared to visual sensitivity with the same size telescope. Roy stores his images on a DVD recorder in the field and processes images using a computer at home. Resolution with the Stella Cam is not quite as good as a CCD camera, but the equipment is simpler to use and cheaper.

Dave Fields gave an update on the control of light pollution at TAO. There is construction under way of single-family homes below the observatory near Watts Bar Lake. The developer has deed restrictions to minimize the impact of these homes on local light pollution.

The annual SMAS picnic is August 20th at TAO. The main course will be barbecue pork. Other dishes or cash donations are needed for the menu. Please contact Angela Quick, who is coordinating the picnic.





Roy Morrow's Stella Cam

The Wiz

Hey Wiz,

Ain't this "seeing" business getting out of hand? Every time someone's el cheapo modified achromat can't resolve the craterlets in Tycho, all I hear is "Oh it's that damn seeing again!" We all know that's boloney. Don't we?

N. Lerr

Dear Nag,

No eyepiece can resolve the craterlets in Tycho when the seeing is bad.
No modified achromat can resolve them when the seeing is good.
At best, good seeing occurs only 1 out of 10 nights, although it improves slightly as the atmosphere cools late at night.

Eyepieces come pretty close to being a perfect example of the old saw, You Get What You Pay For. But if the best eyepieces in the world are only going to deliver the great views 1 night out of 10, how cost effective is that? The advantage goes to discretionary income, of course, but M22 is magnificent in every eyepiece.

Here's a link to Earth Sciences Picture of the Day, showing noctilucent clouds – the willowy wisps that often lace the sky at dusk. Scroll down to the bottom of the page, and click "NLC animation". If you have dial up, it will take a while to load, but I think you'll find it worth the wait.

http://www.digitalsky.org.uk/20050622/2005-06-22.html

As the filaments stream by, think: Why are they filamentary in the first place? The answer is an astronomer's touchstone: it is because the high altitude wind is gracefully turbulent, caused by irregular currents rising from the warm daytime surface. The vertical movement is just enough to cause the lower water vapor to move up slightly where it condenses because it is cooler, only to sink back down moments later into air warm enough to re-absorb the droplets.

An hour later, when the vertical currents peter out, the visible filaments disappear. But the wind that blew them does not: it continues to blow, in graceful filaments of uneven density. True, you can't see them. At least not directly. But look in your eyepiece.

Fine details are blurred. Their light has been faintly refracted by the many irregular density changes they had to traverse. Starlight coming straight down from zenith doesn't have to go through so much atmosphere, so seeing is better there. But within 30° of the horizon, nothing looks good. And it's not the fault of a modified achromat.

Winds always become more laminar when the earth cools at night. And this always results in improved seeing. Please note, I'm talking about the wee hours of the morning. It takes a lot of stargazing to learn these effects from experience. But they are real.

Da Wiz

Sasquatch Progress Report 1 – Bob Arr

In rebuilding Sasquatch, we have already passed the "gathering" stage, where we procure all the materials we will need. The only component not already on-hand on August 1 is the 1.25" aluminum tubing, but it is expected to be delivered within a week.

Brent Holt has completed the mirror cell, and it is absolutely a work of art. Stainless steel art, that is. And he has already begun work on the new 4-vane spider and secondary collimating mechanism (aluminum, of course).

All of the Baltic Birch plywood is rough cut, and in fact about half of it has already been cut to its final dimension. Gluing of the four extra thick pieces (altitude bearings, rocker box sides and base) is almost complete. Only one piece gets glued per day, because it must cure for 24 hours under the weight of a 1000 pound press – my pool table.

Assembling the mirror box and rocker box must take a back seat to fabricating some smaller, integral parts first, such as the truss pole connectors and electrical interface. Yes, Sas will have a 12 volt 7 amp hour dc battery in the basement to power the secondary heater, and any other electrical components.

By August 10, I expect to be into edge rounding, sanding and finishing. These take a lot of work, and I will be asking for help, an hour or two at a time. In finishing, we are at the mercy of drying time, and it is not unusual to have to wait two (sometimes three!) days before another coat can be applied. It would not surprise me if finishing took a month.

Thanks to all the donors so far, but please realize that if you haven't made a donation yet, it isn't too late! When you get to look through Sas, you will realize what a treasure it is. Our whole effort is to make it very transportable and easy to use, which means that all our members can check it out for their personal star parties as well as the club's star parties.

We are an astronomy club. We like to look at stars and the amazing objects in the night sky. Unless you are very, very rich (or have friends who are), you'll never see wonders such as Sas can deliver.

(*Photos next page*)

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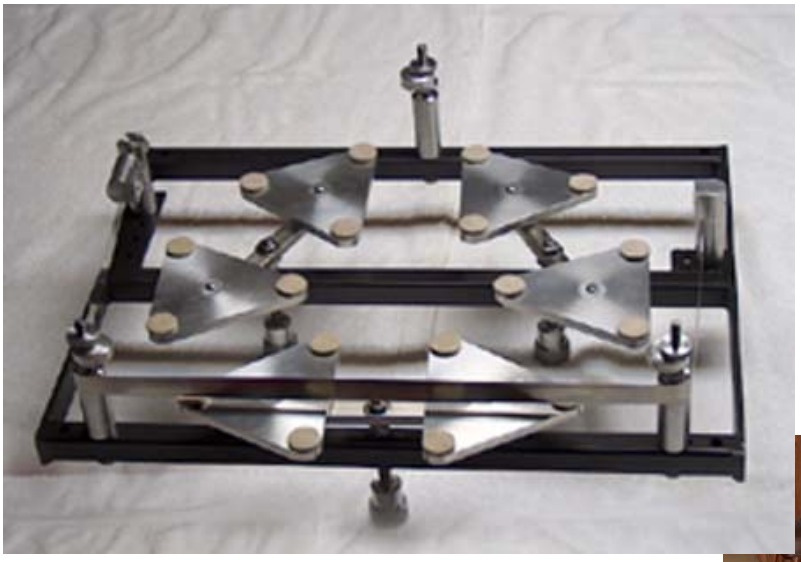
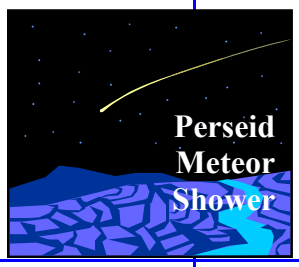


Our wonderful, new, stainless steel mirror cell

The 1000 lb press in action.
That's the rocker box floor getting squeezed.

Here are the rest of the parts. Some assembly (and finishing) required. Note the large rolls of black and white 4x8 sheets of ABS and Glassboard. That's the only size they come in.

August 2005

SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5 *New Moon* UTK	6 **SMAS Star Party Unicoi Crest** **TAO**
7	8	9	10	11  	12	13
14	15	16	17	18	19 *Full Moon* UTK	20 **SMAS Picnic @ TAO** 
21	22	23	24	25	26 Heritage Planetarium 7:00 PM Galaxies	27
28	29	30	31			

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