

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

Society's Chronological Astronomical PaperS



From the Chair **By Bob Arr**

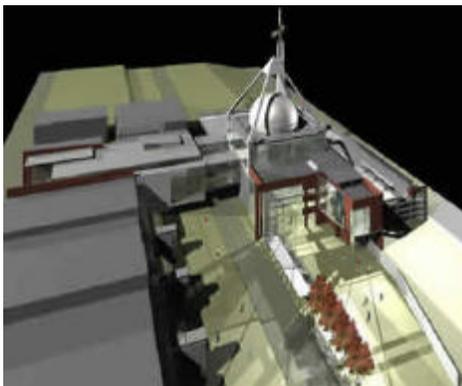
Garry Nolan has been a vital member of SMAS for 20 years. As an expert ATM, he has been instrumental in helping dozens of members learn to make their own telescopes, and his hospitality in hosting most of our cold-weather star parties at his home in Seymour is legendary. Recently, his mother passed away after a long illness. They had been extraordinarily close. Our condolences, Garry.

Astronomical League has told us that they will soon make available a new liability insurance policy for all their member clubs. The official announcement is scheduled to be in the May issue of The Reflector. Currently, such coverage costs \$327 annually, too expensive for us. But the new coverage will be less. How much less we don't yet know.

Such coverage is never appreciated until it's needed. A person injured from tripping over an eyepiece case in the dark at a Star Party could sue the entire club; it has happened elsewhere. If we invite the public to our Star Parties, we legally incur a reasonable responsibility for their welfare. That's why we currently do not issue public invitations to Star Parties. If the new coverage is affordable to us, this will change.

Many members have asked if we could start our meeting earlier. We are definitely trying to accomplish more during the meeting than we used to, and those with a long drive are getting home really late. We'll talk about it at the next meeting, and perhaps put it to a vote.

Presentation for March: Universe Knoxville



Randy Tyree, mayor of Knoxville from 1976 to 1983, will speak on the proposed Universe Knoxville at 8 pm on March 8. Mayor Tyree, a key player in the Knoxville Area Chamber Partnership (a city-county joint effort) is helping to bring this extraordinary vision to fruition as part of the Renaissance Knoxville and Knox County Commission's area development programs.

The centerpiece of the county's plan, Universe Knoxville, is a planetarium enhanced by virtual reality to include such features as narrated close encounters with the moon, the planets, distant galaxies and black holes. It is patterned after the Rose Center for Earth and Space (the new Hayden planetarium) at the American Museum of Natural History in New York City, from which developer Earl Worsham got the idea for what he terms a "totally exhilarating family entertainment and educational attraction."

"There's no other planetarium in the country that's in the same league with what we're proposing," Worsham boasts. Other elements of the complex would include a museum affiliated with the Smithsonian Institution, a much-needed new children's museum and exhibits from a TVA museum that's now tucked away in the basement of the TVA Towers.

ADAPTIVE OPTICS (PART 2)

By Michael Littleton

With natural guide stars, AO coverage of the sky is limited to less than 1% of the area of the sky at visual wavelengths and is biased to low galactic latitudes. One solution to this problem is to generate an artificial star near the target. This is accomplished using a laser guide star (LGS). A laser tuned to a wavelength of 589 nm generates the LGS.

The wavelength 589 nm is an absorption and emission line of sodium. The LGS is yellow-orange and at an altitude of approximately 90 km, which corresponds to a sodium-rich layer in the atmosphere. The light from the LGS does not interfere with imaging of the object of interest. It is easily filtered from the science beam of the telescope because the light is confined to a single wavelength different from the wavelength used for imaging the target.

The performance requirements for the laser are rigorous. The laser has to be powerful enough to put one million photons per square meter per second at the focus. This corresponds to a laser output power of 10 to 20 watts. Laser beam generation is inefficient and requires 50,000 watts of input energy for an output of 20 watts. Complicating the design, the additions of sophisticated optical components are required to get the correct wavelength making the lasers very expensive and custom made.

A 10 to 20 watt laser could blind aviators and damage sensors on surveillance satellites. Observatories using LGSs run infrared cameras in tandem with the telescope and shut the laser down upon approach of an aircraft. Also, the use of the laser must be coordinated with NORAD. NORAD gives the observatories a list of time slots when the laser must not be used because of the overhead passage of satellites.

A single LGS cannot be used to measure the large-scale distortions of the image or jitter. (Corrections for jitter are made with the tilt-tip mirror.) The reason is that jitter is caused by large air cells affecting both the outgoing laser beam as well as the incoming starlight. Up to three LGSs are needed to correct for jitter. A number of observatories have prototype AO systems using LGSs, but no observatory has a fully functional system yet.

In conventional AO using a LGS, the effect of turbulence "seen" by the monitoring of the guide star is assumed to be the same over the entire cylinder of light imaged by the primary mirror. In reality, the AO sensor only "sees" a cone of light formed with the LGS at the apex and the primary mirror at the base (cone effect). As the aperture increases, this assumption becomes poorer. In very large telescopes, the turbulence is a result of many atmospheric cells within this cylinder. To correct for all turbulence inside the cylinder, a number of large telescopes are scheduled to use a developing technology called multi-conjugate adaptive optics (MCAO). MCAO uses multiple LGSs, wavefront sensors, and "rubber" mirrors to make a 3-D model of atmospheric turbulence, which is reminiscent of medical tomography. Using the 3-D model MCAO corrects for turbulence "seen" by the entire primary mirror. MCAO is not a proven technology, but is still in the development phase.

MCAO determines the 3-D structure of turbulence in the cylinder formed by the telescopic view of astronomical objects using multiple LGSs. Because the cones of light from the multiple LGSs are oriented differently, the altitude of a turbulent cell is found by parallax. A prototype MCAO design has three "rubber" mirrors. One mirror corrects for turbulence close to the telescope, one for turbulence at 4 km, and the third mirror for turbulence at 8 km. The mirrors are "optically conjugated" to specific altitudes, hence the name.

A prototype MCAO system is scheduled for installation on the Gemini North Telescopes at Mauna Kea, Hawaii and Gemini South Telescope at Cerro Pachon, Chile. It is a system designed for use in the IR. The system is expected to perform Next Generation Space Telescope (NGST)-type science four years before the scheduled launch of the NGST. Some of the advantages of MCAO over conventional NGS or LGS AO are : (1) Increased sky coverage over NGS AO (»50% sky coverage) (2) Increased field of view with uniform AO correction over the entire field compared to conventional NGS and LGS AO (»2 arcminutes) (3) Increased performance on the optical axis with respect to conventional LGS AO and (4) Spectrographic performance similar to the NGST in the near IR

In the final install installment, I will discuss the current uses and future of AO.

AO descrambles starlight by analyzing the deformation of a star's image by the atmosphere. Astronomers use artificial stars when real stars are not nearby.

FEBRUARY MEETING

by Lee Erickson

The meeting began at 8:00 PM on February 8th at the Discovery Center, with a presentation by Ken Roy entitled "Ameliorating Climate Change using Giant Solar Sails". The presentation described how solar sails could be placed into orbit around the Sun between the Earth and the Sun and forced with the pressure of sunlight to orbit at the same period as the Earth. This proposal generated a lot of discussion among members and could have raged on for the whole evening, but at about 9:00 the discussion was terminated and the club business meeting was started.

There were 24 persons in attendance. Three persons were guests and one was a new member, Donald Dinkins. WELCOME DON!

Bob Arr presided. Janice Erickson presented a financial report summarizing from March 2001 to present.

Club monies began with a balance of \$283.78 in March 2001 and ended with a balance of \$669.30 on February 2002. Club income consisted of pledges for Sasquatch of \$431 and dues of \$672.33. Expenses consisted of Astronomy League dues of \$157.00, the PO box rental of \$55.00, check charges of \$1.75, Sasquatch repair and purchase of a ladder and a Telrad of \$384.67, miscellaneous supplies of \$7.66 and six months of newsletters expenses at \$111.73. Total income was \$1103.33 and total expenses were \$717.81.

Old Business

By special election, the position of Star Party Coordinator was filled by Shawn Grant. Congratulations Shawn, and thank you for offering to serve. Thanks to Sparky for dedicated service in the office in 2001.

New Business

Steve Rothschild described the club library, which is housed in a rolling cart. The library is kept at the Discovery Center. Wayne Thompson agreed to collect, edit and if needed, author some introduction to astronomy materials. These would be references for beginners, answering common questions of beginners. Bob Arr and Wayne have met and considered what the goal of this function should be. A club decision should be made as to whether the goal of this activity is (a) primarily to create the best organized one-stop "how to" site we can (with much referencing, linking to, or copying [with permission and giving credit to] other sites), or (b) to use it as a way to involve members by inviting them to research and create original articles about some topic. Please send your suggestion to Wayne or Bob. If you have topics you would like to write on, please contact Wayne at 865-637-6084 or email at wthomps4@utk.edu.

Ron Dinkins recounted how Mike Fleenor's mentoring helped him and encouraged others to make themselves available to help those new to the hobby. Mike Fleenor stressed that great expertise is not a requirement, but willingness to mentor is more important. Bob Arr announce that Tom Rimmell will act as a Ombudsman to determine what level of support to offer newcomers. Bob Arr, Bill Burgess, Ron Dinkins, Rob Feldhege, Mike Fleenor, Shawn Grant, John Sparks and Tom Rimmell all volunteered to be Mentors. Ken Ferguson agreed to put together a beginners' course to present to new members when ever there is sufficient demand. This course would be given in one of the classrooms in the Discovery Center at a date and time to be determined.

Sparky presented a Lunar Wars Ribbon the Lee Erickson and a Planetary Telescope Ribbon to Bill Burgess. Bob Arr announced we have been given a complete library of Sky and Telescope from 1972 to 1993. If anyone has from 1993 to present and would like to find them a home, our library would welcome them. Bill Burgess accepted the challenge of project coordinator for making telescopes for kids. Bill displayed a prototype 6-inch Dob. Bill will provide workspace for the assembly project.

INCREASE YOUR IQ!

The brain like muscles requires exercise to stay fit. Do some mental exercise and share your astronomical experience with the rest of SMAS and everyone on the Internet by writing an article for SCRAPs. Contact Mike Littleton at (865) 671-1022 or email littleton@ix.netcom.com.

March Star Party

BY SHAWN GRANT

Thanks for making me the new Star Party Coordinator. I'm honored, and I will do my best to make the activities rewarding.

We will have two star parties each month. Come to either one or both. Each month I will list a few items of interest to see for the month. They will be arranged in categories called Easy, Moderate, Challenge and For Sasquatch. Also, I will list events and comets that can be seen during star party time.

March has two great dates for a star parties. The first date will be the 9th. The Sun sets at 18:39 and the moon doesn't rise until most of us will be in bed. The other date will be the 16th. There will be a thin crescent moon but it will set early in the evening. It will be a beautiful warm up to an evening of observing. The location for both dates will be Look Rock.

The Easy List has a comet on it. Comet Ikeya-Zhang will be bright, estimated at magnitude 4.9. The comet will be low in the west in the constellation Pisces. This will be the first object you want to spot because it will set soon. I will bring charts to help you find it. Of course Jupiter and Saturn will be on the Easy List. On the 9th look for the Great Red spot to be visible just before midnight and on the 16th GRS will be visible half an hour after midnight. The easy deep sky object is the Beehive, M44, in the constellation Cancer. This is an open cluster that is nice in binoculars and telescope with a wide angle eyepiece.

The Moderate List consists of M48, M46, M47, NGC 2438 and NGC 2392 (Eskimo Nebula). The Challenge List consists of NGC 2246, the Rosette Nebula, NGC 2261, Basel 7, and the Cone Nebula. For Sasquatch, we will be to try to see how many galaxies we can spot within the open cluster M44. Charts will be provided to help find some of the more obscure objects. Of course everyone is more than welcome to work on their own projects.

If anyone needs directions, a ride, or would like meet and follow to a star party give me a call at 470-9439.

Clear skies and see you there.

Roane State Community College Observatory

Dr. Dave Fields, director of the RSCC observatory 5 miles south of Harriman, has renewed his invitation to members of SMAS to use his facility to observe. High above Watts Bar Lake, the site has an excellent dark location, a new building/classroom, a separate dome with 8" refractor, a large paved viewing area, piers for telescopes with 110v outlets, and plenty of parking. For SMASers in west Knox county and farther west, it's really a wonderful place to observe--newbies, mentors and grandfathers alike. Dave is a former member of SMAS.

Website: www.rsccln.us/obs/

Email: fieldsde@aol.com

Phone: (865) 882-4533 (RSCC Math-Sciences Division)

For Sale or Wanted

Wanted

An equatorial mount and tripod sufficient to carry a 4-inch refractor of about 15-pounds. It will be used with a SMAS "loaner" telescope.

Contact: Tom Rimmell at 983-7834 or email trimmell@chartertn.net.

Fix Sticking Dobsonians BY THE WIZ

Dear Wiz,

My dob has been giving some wonderful views of the gas giants. However, especially at higher powers, it is noticeably sticky and jerky. That is, when I move it, it has too much resistance; and when it moves, it moves suddenly, jerking the planet out of the field of view. I have tried Armor All and wax on both axes. This has helped, but not solved the problem. Can you help? S. Wicket

Dear Sticky, You didn't mention in which axis it is sticky. For the azimuth, take the ground board off and clean the white glass board very well with alcohol. Also clean off the mating teflon pads. These parts need to be periodically cleaned on all dobs, and this must be done before adding any lubricant. After clean and dry, apply a light coating of Armor All Protectant TM on the white glass board, and a thin coating of white candle wax on the teflon pads.

For altitude, clean both the bearings and the pad/bumpers very well, then put a little white candle wax on the pads/bumpers. If that isn't enough, you may wish to try moving the pads/bumpers a little closer together. Use caution doing this, as it can easily reduce the friction too much and the tube won't stay put as you change eyepieces.

Stay loose. The Wiz

(Thanks to Steve Carroll of Starmaster Telescopes)

TMArmor All Products Corp.

SMAS OFFICES MARCH 2002

Elected staff

Chairman	Bob Arr	681-3999
Vice-chairman	Tom Rimmell	983-7834
Secretary	Lee Erickson	977-1242
Treasurer	Jan Erickson	977-1242
ALCOR	Sparky Sparks	522-0750
Star Party Organizer	Shawn Grant	470-9439

Pool

Vanessa Pelham, Jack McConnell, Shawn GrantRobb Feldhege, Becky Feldhege, Tammy BurgessRichard Hobart

Mentors

Brent Holt, Don Carron, Gene Johnson, Ron Dinkins

Appointed staff

Newsletter editor	Mike Littleton	671-1022
Webmaster	Mike Fleenor	675-5488
Internet astronomy	Robb Feldhege	(865) 428-4370
Librarian	Steve Rothschild	379-5251
Presentations impresario	Bill Dargan	609-1292
Publicity	Tammy Burgess	691-8838
Greeter/nametags	Richard Hobart	947-3231
Night sky	Charles Ferguson	521-5686
UT liaison	Jack McConnell	675-2127
How-to books	Wayne Thompson	637-6084
Newcomer ombudsman	Tom Rimmell	983-7834
Newcomer's course	Ken Ferguson	521-5686

Project leaders

Kids' telescopes	Bill Burgess	691-8838
Chief of mentors	Ron Dinkins	(865) 376-4646



March 2002

	SUN	MON	TUE	WED	THU	FRI	SAT
Chair: Bob Arr						1 UTK	2
Vice Chair: Tom Rimmell							
ALCOR: John Sparks	3	4	5	6 Last Qt.	7	8 SMAS Mtg	9 Star Party
Secretary: Lee Erickson	10	11	12	13	14 New	15 UTK	16 Star Party
Treasurer: Janice Erickson	17	18	19	20	21	22 1st Qt.	23
Star Party Organizer: Shawn Grant	24	25	26	27	28 Full	29	30
SCRAPS Editor: Mike Littleton	31						

SCHEDULE OF EVENTS

- **3/8/02** SMAS meeting sits at 8:29 PM and sets 8 PM at the Discovery Center: The Guest Speaker is former mayor of Knoxville Randy Tyree on Universe Knoxville at 3:48 AM; Saturn transits at 6:32 PM and sets at 1:40 AM
- **3/16/02** Star party at Look Rock
- **3/9/02** Star party at Look Rock
- **3/1/02 & 3/15/02** Public observing from the roof of the Physics Building at UTK
- **3/15/02** Mars sets at 10:28 PM; Jupiter tran-

SMAS Website:
<http://www.smokymtnastro.org/>

Webmaster:
Mike Fleenor