News from The Society for Astronomical Sciences

Vol. 2, Number 1

Preparations are well along for the 2004 Symposium

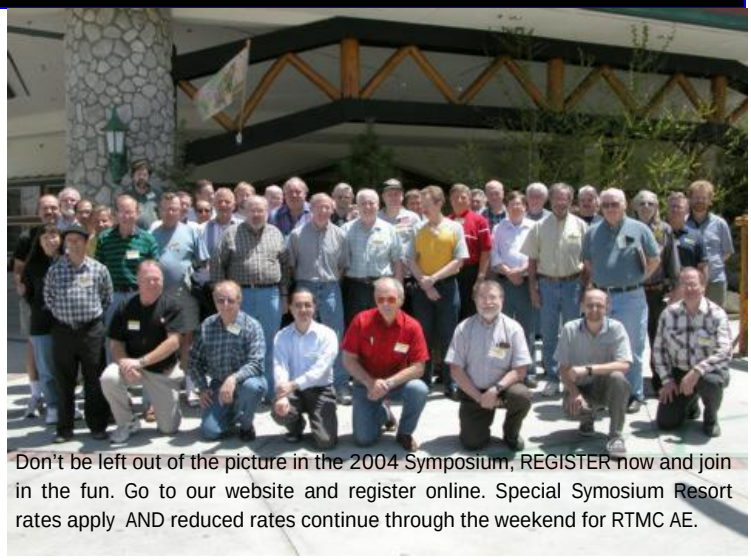
The 2004 Symposium on Telescope Sciences is very well along in its organization. The speaker list is essentially complete as you can peruse on page 2 of the Newsletter. As you will notice, we have a wide variety of speakers, both professional and amateurs, along with a nice mix of very interesting topics. This probably as full of list of speakers that we have had in many years.

The actual schedule and timing of the speakers is still being established.

Its not to late to put together a poster for presentation at the Symposium.

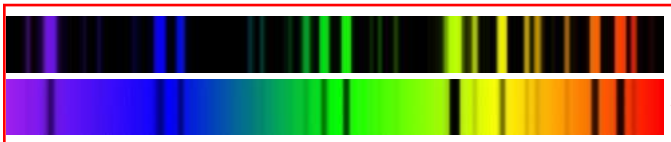
SPEAKERS TAKE NOTE:

Written articles to be published in the proceedings are due to the program committee by April 4. This is very important for those members who are unable to attend the Symposium, since membership in the SAS includes a copy of the Proceedings.



Don't be left out of the picture in the 2004 Symposium, REGISTER now and join in the fun. Go to our website and register online. Special Symosium Resort rates apply AND reduced rates continue through the weekend for RTMC AE.

In This Issue



Emission lines always have corresponding absorption lines: Kirchhoff's Laws

Time to Register for the 2004 SAS Symposium at NorthWoods Resort

As with past meetings, we have arranged special Symposium rates with Northwoods Resort which apply to the 2004 Symposium. You should register now with the Resort and be sure to mention the Symposium to get the special rates. These rates will apply through the weekend of RTMC for those of you who wish to attend that conference beginning Friday morning May 28th. Visit our website at the registration page and follow the links to Northwoods Resort to get the telephone number. It is very important that you both register NOW for the meeting and make your reservation at the Resort if you plan to stay at Northwoods.

We have a very full schedule of speakers this year so the session on Wednesday morning will likely begin earlier with coffee and opening remarks and end later than usual AM.

Important dates remaining in Preparation for the Symposium

April 4, 2004	Final papers submitted based on accepted abstracts
May 5, 2004	Anticipated printing run
May 26, 2004	Distribution at conference

Committee:

- Lee Snyder — Co-Chairman
- Robert Stephens — Co-Chairman
- Robert Gill — Audio Visual Webmaster
- Dave Kenyon — Program Co-Chairman
- Dale Mais — Program Co-Chairman, Newsletter editor
- Brian Warner— Program Co-Chairman

Advisors:

- Arne Henden
- Dirk Terrell

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Tentative Speakers for the 2004 Symposium on Telescope Science

Name	Affiliation	Title/Topic
Benner, Lance	JPL	Contributions of Amateur Astronomers to support Radar Imaging of Near-Earth Asteroids
Buchheim, Bob	Altimira Observatory	Lessons from Bohemia (asteroid photometry techniques)
Castellano, Tim	NASA - Ames Research Center	Extrasolar Transit Research, Amateurs' Involvement
Crawford, Robert / Trueblood, Mark	Rincon Ranch Observatory/ Winer Observatory	Statistical Properties of a Two-Stage Procedure for Creating Sky Flats
Denny, Bob	DC3 Dreams	Dispatch Scheduling of Automated Telescopes
Dunham, David		Results of Asteroid Occultations
Harris, Alan W.	Space Science Institute **(Keynote)**	Asteroid Lightcurves, Amateur Involvement, Hot Directions
Henden, Arne	USNO - Flagstaff	Data Mining Recent Surveys and Catalogs?
Hoot, John		Uncool Science: Photometry and Astrometry with the modified web cameras and uncooled imagers
Hoot, John		Data Aquisition and Reduction Methods For Slitless Spectroscopy
Kaye, Thomas	Spectrashift	Spectroscopy/extrasolar planetary detection
Kowalski, Richard	Zephyr Hills Observatory	The ALPO NEO Photometry and Shape Modeling Program
Lucas, Gene		Modern Asteroid Occultation Observing Methods
Mais, Dale	Palomar College	Spectroscopic and Photometric Monitoring of Mira Variable Stars
James McGaha		NEOCP - Past, Present, and Future
Plait, Phil	Sonoma State Univ.	Pro-Am Collaborations: The GLAST Telescope Network
Price, Aaron	AAVSO	Blurring the Line: Amateurs as Observers and Data Analysts.
Warner, Brian	Palmer Divide Observatory	Title Pending
Wolf, Jurgen	NASA Ames Research Center	The Stratospheric Observatory for Infrared Astronomy (SOFIA)
Young, Donna	NASA	NASA's High-Energy Vision: Chandra and the X-Ray Universe

Don't forget this years Riverside Telescope Makers Conference....immediately following the SAS Symposium

RTMC ASTRONOMY EXPO

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Membership Information

Membership in your new Society for Astronomical Sciences (SAS).

As was pointed out with the last issue, it was felt that a modest membership fee would greatly help SAS to produce a better product for its members. This fee will be $25.00 per year, the same membership fee of the old IAPPP organization. What will this membership fee provide? Well for one thing it WILL NOT go to any committee members as part of their efforts within SAS. We volunteer our time for The Society.

Members will receive a discount for the registration fee each year for the Symposium at Big Bear. It will assure you that you will get a copy of the published proceedings each year, even if you do not attend the Symposium. It will help defray costs in bringing in outside speakers (professionals) to the symposium. This past meeting, as you all know, we had Arne Hendon and Dirk Terrell participate by giving workshops. Since we pay for their travel and hotel expenses, this adds up, but enriches the content of the meetings, and it is something we will continue to do and hopefully even expand.

Along these lines, we have had a nice announcement about the Society placed in the British magazine *Astronomy Now.* For those unfamiliar with this magazine, it is the leading magazine in Great Britain and one I have subscribed and contributed to for many years. In addition, the Working Group for Professional-Amateur Collaboration has placed information about SAS on their website (http://www.aas.org/wgpac/). This is a committee out of the American Astronomical Society. As of early November we have a total of 25 paid members.

Membership is annual and runs from July to June of the following year. To become a member, send $25 to: Society for Astronomical Sciences, 8300 Utica Avenue, Suite 105, Rancho Cucamonga, CA 91730. You may also join online at the registration page of the web site.

The SAS is a 501(c)(3) charitable organization.

Attentive conference attendees, 2003

The upcoming symposium will be held May 26 and 27, 2004. The speaker list is now complete and the final schedules are being established. There is still the opportunity to present a poster of your work, even if it's early on AND in progress

The 2004 meeting of the SAS will be held once again at the lovely Northwoods resort. Special rates are provided for those that wish to spend the night, both for the SAS meeting and RTMC meeting which follows

Society for Astronomical Sciences (SAS)

We thank our 2003 Sponsors whose support makes our meeting possible:

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Photometry of Galilean Satellite Eclipses

Tony Mallama

Galileo Galilei reported the earliest astrometric measurements of Io, Europa, Ganymede and Callisto in his Siderial Messenger almost 400 years ago. Ever since that time legions of astronomers have followed in his footsteps. Cassini published the first reasonably accurate ephemerides for the Galilean satellites in 1668. He also found that the highest quality astrometry was derived from timings of satellite eclipses in the shadow of Jupiter.

Eclipse timings are still the most accurate method of doing satellite astrometry today, apart from space probe observations such as the recent Galileo mission. Earlier this year I published astrometric results based upon Hubble Space Telescope images [1] where the accuracy was found to be about 0.04 arc second. While this is good accuracy, amateurs can actually do better than this with careful CCD photometry of eclipses.

I began monitoring Galilean satellites eclipses in 1990 and several amateurs including Bruce Krobusek, Don Collins and Peter Nelson joined in a few years later. We have been able to estimate the accuracy of our data through internal comparisons with one-another, and through external comparisons with Galileo spacecraft results from 1996 through 2002. Our accuracy is about 0.01 arc seconds when converted from a timing measurement into an angular unit [2].

We use 8 to 12-inch telescopes that give a scale of about one arc second per pixel behind V filters. A rapid series of images is acquired during the eclipse, each containing another satellite as a luminosity reference, and each timed to about 0.2 seconds accuracy. After the eclipse, the images are bias subtracted and flat field corrected. Then a special Windows program takes the satellite-plus-sky brightness and subtracts the sky background. A tailored program was written because extra care has to be exercised with the high gradient sky background in the vicinity of Jupiter, and in order to track the two satellites as they move relative to one-another.

Once the photometric data are extracted by the observers, I put the results through another program that converts the photometry into astrometry. This is based on least-squares fitting between the observed light curve and a model light curve. The model takes into account the albedo features on the eclipsed satellite, the shape of Jupiter's shadow, and the placement of the Sun and Earth [3]. Figure 1 illustrates an observed light curve in panel *'a'*, the model light curve in panel *'b'*, and the fitting between them in panel *'c'*. The vertical dashed line is the moment of observed half-luminosity, while the solid line is the geometrical half-phase of the model eclipse. In this particular eclipse the geometrical phase was more advanced than the photometric phase as shown in panel *'c'*. See Figure 1, page 5

We have maintained a reasonably continuous record of the differences between the satellites' observed positions and their predicted locations over the past 14 years. Eclipses of Io normally occur within about 5 to 10 seconds of their predicted time. However those of Europa (see Figure 2, page 5), Ganymede and Callisto are typically much farther off schedule, sometimes by nearly a minute. We can occasionally detect changes in the residuals over the course of just one observing season as happened for Europa in 1997. These have been seen for Ganymede as well.

I believe that Galilean satellite eclipse data is more valuable right now than ever before, due to the ending of the Galileo orbiter mission and because plans are underway at NASA for the Jupiter Icy Moons Orbiter mission. The new mission will require very precise ephemerides in order to put JIMO into orbit around Europa and the other moons. Additionally, astronomers are seeking to understand the tidal forces that may be sustaining a liquid ocean on Europa where life could exist, by studying the orbits. Between JIMO and theoretical studies there will be a lot of professional interest in our observations in the coming years. See Figure 2, page 5

You may be wondering why I am writing this article for the Newsletter of the Society for Astronomical Sciences. As an early member of IAPPP I have followed the Society since it branched off of IAPPP as its western wing. I know that many of the members are serious and highly skilled in CCD photometry. So this article is in the form of an invitation to members of the Society to add Galilean satellite eclipse photometry to your observing plans.

Since most of the current Galilean photometrists are located in the eastern US, contributions from western observers would be especially helpful in covering eclipses that we can not see. Additionally, since some members of the Society use scripted observing it might be possible to increase the seasonal coverage by including more pre-dawn observations. I hope to hear from you if you would like to contribute to Galilean satellite research.

References:

[1] Mallama, A., Aelion, H. M. and Mallama, C.A., 2004 "Jovian satellite positions from Hubble Space Telescope images" *Icarus* 167 320-329.

[2] Mallama, A., D.F. Collins, P. Nelson, J. Park, and B.A. Krobusek, 2000 "Precise timings of Galilean satellite eclipses and assessment of the E5 ephemeris" *Icarus* 147 348-352.

[3] Mallama, A. 1991 "Light curve model for the Galilean satellites during jovian eclipse" *Icarus* 92 324-331.

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Speaking of moons, the rover Opportunity recently caught one of the moons of Mars, occulting the sun.

Figure 1 (top) and Figure 2 (bottom) for article on page 4