News from the Society for Astronomical Sciences

Vol. 12 No.4 (December, 2014)

Plan Ahead for SAS 2015 Symposium

The 2015 Symposium of the Society for Astronomical Sciences will be held **June 11-12-13** (Thurs-Fri-Saturday) in Ontario, CA at the Ontario Airport Hotel. This is the same location as the 2014 Symposium.

Registration details and hotel arrangements will be available on the SAS website shortly.

Call for Papers: SAS 2015 Symposium

Abstracts are now being accepted for the SAS 2015 Symposium on Telescope Science. Topics on a full range of small-telescope science are welcome: research results from amateurs and students, pro-am collaborations, science education, recent professional results on relevant targets (e.g. small solar system bodies, planets, variable stars), small-telescope instrumentation, and special uses of astronomical data. Refer to prior years' Symposium presentations for examples of the wide range of topics that are of interest to the SAS.

The Symposium includes both paper presentations, and poster papers. The Abstract submission deadline for paper presentations is

Abstracts due: March 15, 2015.

Abstracts must be submitted via the on-line submission form, available at the SYMPOSIUM tab on the SAS website. Authors are welcome to submit more than one Abstract, although in general only one will be accepted for a presentation. There is no limit on the number of poster papers.

Authors will be notified of acceptance no later than March 31, 2015.

Final papers must be submitted via upload onto the on-line submission system. The format requirements and MS Word template are available on the SAS website (www.SocAstroSci.org).

The due date for submission of accepted papers is:

Final Papers due: April 26, 2015.

All accepted papers will be included in the Symposium Proceedings. Poster paper authors are encouraged to prepare either a summary, or a formal written paper, which will be included in the Proceedings.

As in prior years, the technical presentations will be recorded and made freely available on the SAS website. If you prefer that your presentation not be recorded, inform the audio-visual team at the time of the Symposium and we'll comply with your request.

Three ways to phone home ... Halfway up the walkway to the observing floor of the 100-inch Hooker Telescope (Mt. Wilson), you'll find this history of telecommunications. Photo by Bob Buchheim

Workshop Videos

The SAS-2014 Symposium featured a half-day workshop on *Supernova Discovery and Science* (presented by Tim Puckett and Dr. Michael Richmond), plus three short classes on *Spectrum Processing* (by Tom Field), *Signal-to-Noise Ratio* (by Bob Buchheim) and *Photometric Transforms* (by Dr. Arne Henden).

Equipment problems prevented us from recording the Supernova workshop and Arne's "Transforms" class (which is a shame, because they were both really good).

Videos of Tom's *Spectrum Processing* class and Bob's *Signal-to-Noise Ratio* class are both freely available on the SAS website.

The following workshop videos from past years are also available:

Digital Imaging Photometry (2013)

Lightning Safety and Hazard Management (2013)

Small-Telescope Spectroscopy (2012)

Robotic and Remote Observatories (2011)

Eclipsing Binary Stars (2011)

If you'd like DVDs of these prior-year workshops, send a note to Bob Buchheim (Bob@RKBuchheim.org). If you were registered for the workshop when it was held, the DVD cost is $5. Otherwise, the cost is $55.

Spectroscopy Workshop at AAVSO's Fall meeting

As part of this gathering, SAS sponsored a workshop on "Slitless Spectroscopy", presented by Dr. John Martin.

The topic flowed out of two subjects that were discussed at the SAS-2014 Symposium. Tim Puckett noted during his Supernova workshop that quite a few probable-supernova discoveries are never confirmed by spectroscopy, and hence they never get a "supernova" designation. Dr. Martin described several types of supernova imposters that can show up on the lists of transient discoveries.

A great many of these uncharacterized discoveries appear to be within range of backyard-scale telescopes using low-cost slitless spectrographs. This provides an interesting way to apply amateur spectroscopy to a scientifically-useful project, without making a large investment in equipment or training.

Dr. Martin's workshop described the concept of slitless spectroscopy, using the inexpensive SA-100 or SA-200 gratings. He covered the setup and calibrating of a slitless spectrograph, and interpretation of the resulting spectrum images.

He has generously made the slides from his workshop presentation freely available at the following web page:

https://edocs.uis.edu/jmart5/www/SpectroscopyWorkshop/index.html

Results of SAS-2014 Participant Survey

We appreciate all of the input that participants provided to the SAS Committee after the 2014 Symposium. We received about 65 Survey forms, and quite a few valuable suggestions

Your input will be factored into the 2015 Symposium planning as best we can.

Landolt Standards Conference Planned for 2015

Reported by Dr. Ashley Pagnotta

In honor of Dr. Arlo Landolt's contributions to modern photometry, a conference in his honor will be held this upcoming May at Arlo's home institution, Louisiana State University in Baton Rouge, Louisiana. The conference, entitled **Landolt Standards and 21st Century Photometry**, will feature a variety of invited talks from professional astronomers on the history and future of astronomical photometry and calibration. Additionally, if the weather cooperates, we'll be able to do some classical observing with the 11" Alvan Clark refractor on top of the LSU Physics & Astronomy building, in the Landolt Astronomical Observatory. For more information, and to pre-register, please visit our website at http://www.phys.lsu.edu/landoltstandards

Reminders ...

Membership Renewal: Even if you can't attend the annual Symposium, we value your support of the Society for Astronomical Sciences, and your interest in small-telescope science. You can renew your membership on the SAS website (SocAstroSci.org), by going to the MEMBERSHIP/REGISTRATION tab.

Symposium Proceedings: Published proceedings from the 2014 Symposium are available in PDF format at the PUBLICATIONS tab of the SAS website (www.SocAstroSci.org).

Symposium Videos: If you missed a recent Symposium, you can still watch the presentations. Videos of most of the technical presentations have been posted on the SAS website at the PUBLICATIONS tab.

Contact Information: If you haven't been receiving e-mail messages about the Newsletter or the SAS Symposium, perhaps it's because you've changed your e-mail address. You can update your contact information on the MEMBERSHIP/REGISTRATION tab of the SAS website. SAS never sells or shares your name or contact information without your explicit permission.

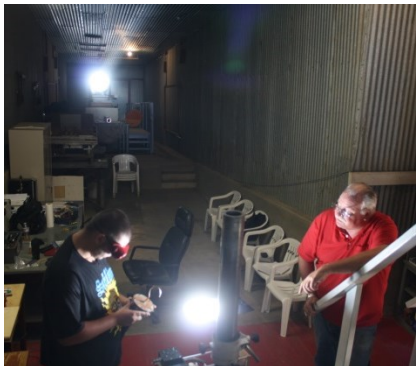
Publication of Student Projects and Research Papers

Recent SAS Symposia have included student groups who described their projects on asteroid lightcurves; stellar spectroscopy; double-star astrometry; and sky-glow evaluations. In keeping with the SAS mission of encouraging small-telescope astronomical research, we applaud these efforts.

SAS will now offer a forum ensuring that similar work will be part of the astronomical literature, and that students can include a publication citation in their resumes, even if they are not able to attend the Symposium.

We will be pleased to receive student-research paper submissions for the SAS Newsletter. The papers will be considered as "pre-prints", so that they are made available promptly. They will be formally published as "papers without presentation" in the next SAS Proceedings volume.

Please encourage your students to submit appropriate papers by e-mail to a Newsletter Editor.



John Hoot instructs a student at CUREA (the Mount Wilson Summer School) on the use of the spectrograph of the "Snow" horizontal solar telescope. Photo by Bob Buchheim

Keeping in Touch ...

SAS Yahoo Group "SocAstroSci"

The SAS Symposium is a premier forum for small-telescope researchers to discuss ideas, observing procedures, and equipment insights; to share project results; and to form collaborations. Since our membership is scattered across the United States and around the world, we're trying an experiment to help people keep in touch between Symposia: a Yahoo Group called SocAstroSci has been set up as a forum for discussion of any topic related to SAS and small-telescope astronomical research. Kevin Hearst volunteered to be the moderator of the group. (Thanks, Kevin!).

You can reach the group at https://groups.yahoo.com/neo/groups/SocAstroSci/, or by searching the Yahoo Groups page for SocAstroSci. Check it out and see what's happening.

A Classroom Spectrograph You Can Borrow

Jeff Hopkins donated to SAS a "REX Spectrograph", which is a neat piece of classroom equipment to demonstrate spectroscopy. Several participants at the SAS-2014 wanted to borrow it, so it's currently out on loan. We'll get a case for it that will (hopefully) let it survive shipping to and from borrowers. If you'd like to be added to the interest list, send a note to Bob Buchheim (Bob@RKBuchheim.org). We'll probably create a sign-up list on the Yahoo Group SocAstroSci in the near future.

Observing Project Opportunities:

b Per eclipse: b Per is a hierarchical triple system, consisting of a close pair (P≈1.53 d) and a distant component (P≈700 d). The close pair is not eclipsing, but it displays ellipsoidal photometric variability (ΔV≈0.06 mag). The third star does eclipse one or both of the close stars. The NPOI has followed the orbital motion of the third star.

The Feb, 2014 eclipse of the AB pair by the C component was detected by AAVSO observers, including Donald Collins who used a tripod-mounted DSLR to follow the ΔV≈0.12 mag eclipse.

If you're up for a bright-star photometric challenge, here's a good one: multi-color photometry of this rare event may help to narrow down the properties of all three components of this system. The next primary eclipse is expected to occur in early January, 2015 (Jan 10, assuming P= 702 d). Based on previous observations, the eclipse lasts about 2-3 days. Timing uncertainty suggests that all-night time-series photometry should be attempted every night from Jan 1 through Jan 20, 2015.

The following guidance was given for the 2013 eclipse: The eclipse may last for up to four days, so you should strive to capture at least 5 days on either side of the predicted eclipse, to provide both a baseline out-of-eclipse light curve and a multi-color eclipse light curve for analysis. Photometry is needed at the level of 0.02-0.03 magnitude or better; the eclipse may be as deep as 0.1 mag. PEP observers should strive for V coverage, and B if possible. DSLR observers should use whatever band(s) are available (probably "G"). Finder charts may be created using the AAVSO Variable Star Plotter at http://www.aavso.org/vsp. Observations should be submitted to the AAVSO International Database.

AAVSO hasn't issued an alert for this event, but it would be a shame to let the eclipse pass by unobserved.

ε Aur pulsation phase: Several of you adopted epsilon Aurigae during the last eclipse. Don't overlook the suspicion of coherent photometric pulsations at about 1/3 of an orbit after eclipse, i.e. right about now (Dec, 2014). See AAVSO Alert Notice 504 for details.

"Orion Project" Spectroscopy and Photometry: This is a great way to exercise your medium- or high-resolution spectrograph (e.g. ALPY-600, Lisa, SGS, LHires or equivalent) on bright targets. A continuous record of the spectra and photometry of these stars will provide a "bridge" between the sporadic intense campaigns that occasionally pop up for these surprisingly dynamic bright stars in Orion – Betelgeuse, Rigel, Mintaka, Alnilam and Alnitak – all of which display both spectral and brightness changes on various time scales. Refer to Jeff Hopkins' presentation at the 2014 SAS Symposium and his website at

http://www.hposoft.com/Orion/Orion.html for the details.

Dwarf Nova Flares: CBA and AAVSO have announced a campaign to catch the flaring of a handful of dwarf novae. The main PI (principal investigator) is Ms. Deanne Coppejans [PhD candidate, Radboud University Nijmegen (Netherlands) and University of Cape Town]. If a flare is captured, contact

matthewt@aavso.org,
eowaagen@aavso.org, or
d.coppejans@astro.ru.nl.

VLA observing time has been allocated to look for radio jets and other phenomena. They need prompt detection of any outbursts, so that they can trigger VLA observations. The target stars are: RX And, U Gem, YZ Cnc, SU UMa, Z Cam, SY Cnc, EX Dra, EM Cyg, and AB Dra. Nightly checks by either CCD or visual observation are requested.

For details, see
http://www.aavso.org/aavso-alert-notice-505.

Mt Wilson Workshop on Speckle Interferometry of Double Stars

Reported by Dr. Russ Genet

Small-telescope CCD astrometry is a potent and popular method for monitoring visual double stars, but it is limited to pairs with fairly wide separation (ρ≥ 3 arc-seconds, or so). Speckle interferometry can be used to measure much closer pairs (ρ≈0.5 to 1 arc-second or so with backyard-scale telescopes), but some small-telescope researchers may be intimidated by the mathematic background of speckle interferometry. However, new tools (e.g. Florent Losse's *Reduc* freeware completely remove this hurdle and open up a great number of double-star targets that need attention of small-telescope researchers. In addition, some enthusiastic researchers are investigating modest-cost ways to further extend the abilities of amateurs or college observatories to pursue research on visual double stars.

Nils Turner, an astronomer at the Center for High Angular Resolution (CHARA) array on Mt. Wilson, kindly hosted an informal workshop on speckle interferometry of double stars organized by Russ Genet (California Polytechnic State University, San Luis Obispo). The workshop was held in the CHARA conference room, right across from the 100-inch telescope, on September 6-7 2014. Besides Nils and Russ, attendees were Dave Rowe (PlaneWave Instruments), John Kenney (Concordia University Irvine), Brian Mason (US Naval Observatory), Alex Teiche (California Polytechnic State

University), Reed Estrada (Northrop Aviation), and Chris Estrada (California State University, Los Angeles).

The following topics were discussed:

On-line Research Seminar: Double-star observations provide an accessible way for students to experience "real" astronomical research, and to see the fruits of their work published promptly. Russ and John are collaborating to develop an online astronomical research seminar that features double star observations. The course will be taught by Russ and offered by Cuesta College beginning in January, and by Concordia University this coming summer. Students will plan their research program, implement it with the help of expert advisors, write a paper for publication, and present their results in public. The "beta testers" of the course will include a math student team from Crean Lutheran High School in Irvine, California, to work on orbit analysis, a physics team to make CCD observations of double stars at Bob Buchheim's Altimira observatory, and a chemistry team to determine the spectral types of both components in several binary pairs (also at Bob's observatory using his new ALPY spectrograph). A surprising number of the entries in the Washington Double Star Catalog do not have spectral classifications. We hope that some these student's results will be presented at the SAS-2015 Symposium.

Automated Speckle Interferometry: Speckle interferometry has a fast pace that tends to keep one or more people fully busy at the telescope. Alex Teiche has been developing a concept for relaxing this requirement by offering full automation of speckle interferometry. The first automated speckle run occurred in September at Russ' Orion Observatory. This prompted a discussion of ways to handle the large avalanche of data that is about to descend on us.

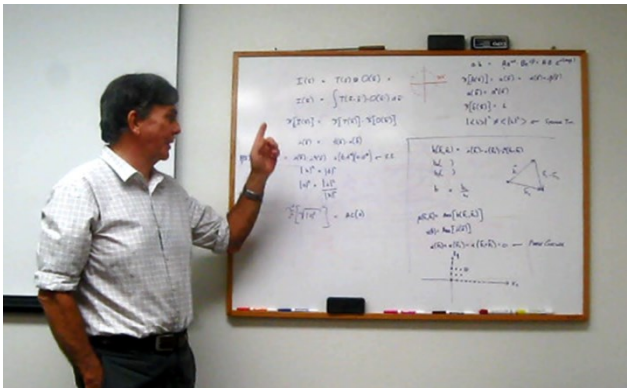
Large delta-mag pairs: Observing double stars with large differential magnitudes has long been a challenge. One attractive approach is to use shaped pupil masks that diffract the light of the primary star away from "discovery zones", thus allowing faint secondary stars to be observed. The theory behind these masks has been developed by a group at Princeton University for imaging exoplanets on future space telescopes. A Master's mechanical engineering student at Cal Poly, Ed Foley, is applying this idea to design full-aperture masks for smaller telescopes. These could be used to make speckle interferometry observations of close double stars. In keeping the goal of increased automation, the masks will rotate under computer control. Testing of a number of masks will be done this fall at the Orion Observatory.

John Kenney, Russ Genet, Brian Mason, and Nils Turner discussing various topics in the CHARA conference room during the two-day informal workshop. (Photo by Russ Genet).

Mirror-array telescope for speckle interferometry: Much of the workshop was devoted to discussing and sketching out the concept for a dedicated double-star telescope (sort of a "poor man's CHARA"). With apertures of ≈ 4 meters, it is possible to measure double stars with separation as small as 50 milli-arc-seconds. Normally this would be the province of general-purpose four-meter telescopes, but we felt there is insufficient time available on these telescopes to appropriately follow and discover new short-period binary stars.

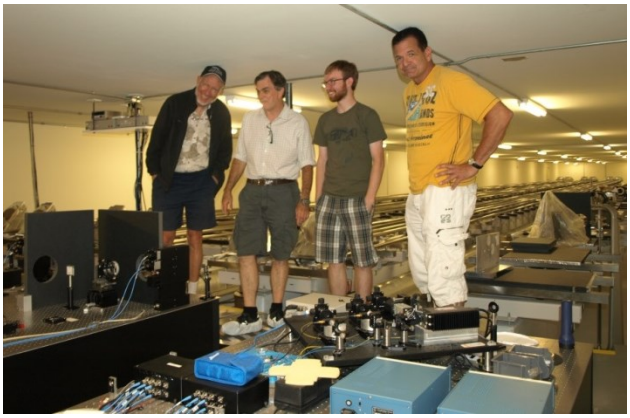
We selected a sparse-aperture telescope as the most feasible approach to developing a very low cost instrument that would provide a four meter baseline. This telescope, as we envision it, would feature between 7 and 30 low-cost spherical mirrors, each somewhere between 12 and 24 inches in diameter. The mirrors would be arranged in (most likely) a non-redundant pattern with a set of unique baseline lengths and angles. Each mirror would be controlled in tip-tilt and piston by three precision positioners. The entire assembly would be mounted on a rigid space-frame and pointed by an Alt-Az mount.

Bi-spectrum analysis: Conventional speckle interferometry presents two weaknesses: (a) a 180-degree ambiguity in the position angle solution, and (b) loss of photometric data. Dave Rowe explained the basic mathematics behind bispectrum analysis. Unlike speckle autocorrelation, bispectrum analysis recovers the phase information (via phase closure). The cost of this is mathematical complexity: analysis of complex numbers in four dimensional space. While autocorrelation provides the separations and positions angles of close double stars, bispectrum analysis recovers differential photometric magnitudes. These data are of considerable value in developing astrophysical models of stellar evolution.



Dave Rowe describes the overall concept behind bispectrum analysis using complex numbers in four dimensions. (Photo by Russ Genet).

Not all work, the attendees took time off to examine the CHARA optics, the 100-inch telescope, including the mirror coating facility (explained in some detail by Nils), and the Coude spectrograph, especially appreciated by John Kenney, a physical chemist keen on spectroscopy. The attendees also looked over the 60-inch telescope which Dave Rowe had not seen since he was a graduate student (physics) at Cal Tech many decades ago.



Russ Genet, Dave Rowe, Alex Teiche, and Reed Estrada examine CHARA optics (note booties on their feet to help maintain a cleanroom environment. The optical "trombones" stretch off into the distance. They compensate for the changes in the optical paths to the six 1-meter telescope due to the Earth's rotation. (Photo by Chris Estrada).

Dave Rowe, Reed Estrada, Russ Genet, and John Kenney (barely visible—you can see his arm) admire the Coude feed spectrograph (below the 100-inch telescope) which was used by Edwin Hubble and Milton Humason to record the red shifts of distant galaxies, thus discovering the expansion of the universe. The sloping spectrograph room was surprisingly narrow. The collimating mirror (about 1-meter in diameter) appeared to be in good shape. John would love to bring this spectrograph back into operation. (Photo by Chris Estrada.)

Report from the Fall 2014 Meeting of the AAVSO

reported by Marlin Costello

This was the 103rd meeting for the AAVSO and the first for me. I have been contributing data for a couple of years now and attending SAS meetings in Big Bear so I felt qualified to join the party.

A fine party it was.

The mainstay of the meeting was the lecture agenda. Lectures were generally of 2 types; scientific and personal.

A good range of observational subjects was covered; exoplanets, sunspots and a couple of specific variable stars. All these interested me because I have recently acquired a full set of filters which could give me specific projects for the Sirius observations. Sunspot observation fits my curiosity and recent physics courses I have taken learning heat flow and stellar interior heat generation. Exoplanets were discussed. This had originally brought me back into astronomy from the eyeball crowd. Transforms and APASS were useful for the gear head and data reduction side of my curiosity.

The first speaker, Dr. John Martin, went to the heart of the spectroscopy. I had recently completed a project working on calibrations so I was familiar with the subject. The shining value of his talk was revealed to me by others who had not yet made the attempt. Many beginners and experienced observers were highly motivated to begin spectroscopy.

Personal stories: "Dark side" was an excellent exposition of the growth of a hobbyist. It certainly paralleled my own experience. Dr. Singh from India demonstrated his great effort to build working observatories on a shoestring, then travel great distances to share his experience.

Histories: I love a good yarn. These were also cleverly told.

The man of the hour was Arne Henden. A number of speakers celebrated the immense contribution of his leadership at the event of his retirement.

The facility was great, easy to get around, I ate more than I should, the pool was great for a private exercise session and the gym was in constant use by the hardier sorts.

Outside of the lecture presentation this meeting was the perfect venue for my personal growth.

There seem to be 3 levels of attendees. Most important are leaders and lecturers who state the subject and set the tone suggesting projects for the rank and file. A second tier are many who are experienced observers. These members contribute data and know how to find the telescope without breaking a leg in the dark. For about 5 years I felt akin to the bottom level operating at the level of being lost in the dark but dearly loving the subject of astronomy at the science level without knowing what to do.

With some experience now to date I started by networking. Knowing what to ask I was soon directed to an experienced spectroscoper. I had spent enough time after the Ontario

meeting to learn the L Hires III and RSpec enough to take some serious steps. Eventually I obtained particular advice on the spectroscope and on appropriate more challenging target stars. I could spend months of delay online to get the same information. In person, I can ask follow-up questions to clarify my situation. I can get specific answers to mind-numbering mechanical roadblocks and make some real progress where FAQs and emails never seen to be at exactly the step I am trying to clarify. The group is invaluable as one person will refer me to another until I find someone to answer my questions and solve my problem.

My 2 cents

Now, what about the person who has useful equipment and does not know what to ask, as I was for the last 5 years of these meetings. I think personal guidance can cut years out of an observers' development. I suggest the learner make it known to the leadership what equipment he or she has. An experienced mentor will ask what do you like to do. But at the start, of course, is "I don't know what I like to do". It is then important for a mentor to make an involved inquiry in order to help with both a next step, then advising an area to work on. A couple of people have reached out to me to push me along, making me willing to send in stupid pictures and bad observations so I can get improvement advice. A patient and proactive mentor can make all the difference in the world. I suggest greater emphasis on the mentor program and even a strong system of follow-up to encourage the learner to continue through the inevitable sequence of failures we endure to gain experience.

Now and then I get an email from a mentor and it makes all the difference in the world to my motivation.

All in all, great meeting. I met a lot of people and learned a lot.

Small-Telescope Astronomical Science in the News: July-September 2014

T*hanks to Wayne Green and Dale Mais for noticing these items!*

Ideas for Citizen Science in Astronomy
by Philip J. Marshall, et al

preprint at: arXiv:1409.4291 v1

Here is an interesting overview and compilation of research areas where citizen-scientists can contribute to advancing our understanding of the universe. Many of the topics will be familiar to SAS members, but you'll probably find some new ideas in here, too.

The authors believe that "citizen science" implies that the citizen is making an intellectual contribution to the project. This distinguishes it from distributed computing projects such as SETI, in which the participant provides an asset, but doesn't make an intellectual contribution.

They note that the amateur astronomer brings some special advantages to observing projects:

- Time availability: Amateurs can provide both fast response and long-duration for observing programs.
- Flexibility: The amateur can observe whatever he or she finds interesting, including newly-identified needs or highly speculative projects.
- Context: The professional observatories usually apply specialized, narrow-field, specific-wavelength instruments to a target. Amateurs can provide context in three dimensions. Observations made before and after the pro's observations provide context in time. Observations with wider fields of view provide context in space. Amateur observations in conventional visual-range passbands provide context in wavelength, to augment professional data in (for example) X-ray, UV, and IR ranges.

The authors highlight examples of context including the Outer Planet Watch archive of Jupiter data. They note that the amateur Saturn Storm Watch collaboration with the Cassini spacecraft made possible the discovery of the correlation between certain cloud patterns and Saturnian-lightning-induced radio bursts.

There are probably new pathways for "Passive observing" projects that haven't been thought of yet. You all know about the classification project as Galaxy Zoo. There's another such research idea that struck me as both innovative and slightly weird: discovering meteor showers by searching Twitter records. Yep, it turns out that there quite a few more tweets about shooting stars during meteor showers than on average. Who knew?

There are potentially fruitful opportunities for "Citizen-led inquiry", in which the non-scientists themselves pose the question to be investigated. The authors provide some examples of this poorly-exploited corner of opportunity space.

Instrumental Methods for Professional and Amateur Collaborations in Planetary Astronomy
by O. Mousis, et al

preprint at: arXiv :1305.3647v2

Here is an overview of planetary-astronomy topics that have generated fruitful professional-amateur research collaboration. The emphasis is on the instrumentation needed for the topics of interest to planetary astronomy. This is particularly useful, since one of the issues that most amateur astronomers must deal with is, "can I do useful science with the equipment that I have, or that I can afford to acquire?"

If you have any interest in planetary astronomy, check out this article. It will help you to understand what research projects are feasible for a backyard-scale setup, and will point you toward sources of specific detailed information.

AL Pictoris and FR Piscis: two regular Blazhko RR Lyrae stars
by Pierre de Ponthiere, Franz-Josef (Josch) Hambsch, Kenneth Menzies, Richard Sabo
Accepted for publication in **Journal of AAVSO**
preprint available at arXiv:1310.4190

The results presented are a continuation of observing campaigns conducted by a small group of amateur astronomers interested in the Blazhko effect of RR Lyrae stars. The goal of these observations is to confirm the RR Lyrae Blazhko effect and to detect any additional Blazhko modulation which cannot be identified from all sky survey data-mining. The Blazhko effect of the two observed stars is confirmed, but no additional Blazhko modulations have been detected.

The observation of the RR Lyrae star AL Pic during 169 nights was conducted from San Pedro de Atacama (Chile). From the observed light curve, 49 pulsation maxima have been measured. Fourier analyses of (O-C), magnitude at maximum light (M_{max}) and the complete light curve have provided a confirmation of published pulsation and Blazhko periods, 0.548622 and 34.07 days, respectively. The second multi-longitude observation campaign aimed at the RR Lyrae star FR Psc was performed from Europe, United States and Chile. Fourier analyses of the light curve and of 59 measured brightness maxima have improved the accuracy of pulsation and Blazhko periods, which are 0.45568 and 51.31 days, respectively. For both stars, no additional Blazhko modulations have been detected.

SAS Leadership

Membership Information

The Society for Astronomical Sciences welcomes everyone interested in small telescope astronomical research. Our mission is to provide education, foster amateurs' participation in research projects as an aspect of their astronomical hobby, facilitate professional-amateur collaborations, and disseminate new results and methods. The Membership fee is $25.00 per year.

As a member, you receive:
• Discounted registration fee for the annual Symposium.
• A copy of the published proceedings each year, even if you do not attend the Symposium.

Membership application is available at the REGISTRATION page of the SAS web site: http://www.SocAstroSci.org.

The SAS is a 501(c)(3) non-profit educational organization. Your Membership dues and donations may be tax deductible.

SAS Contact Information

9302 Pittsburgh Avenue, Suite 200, Rancho Cucamonga, CA 91730

Robert Stephens:
rstephens@socastrosci.com

Newsletter Editors:
Dale Mais:
dmais@socastrosci.com
Bob Buchheim:
Bob@RKBuchheim.org

On the web:
www.SocAstroSci.org