NOVA

Official Newsletter of the Salt Lake Astronomical Society
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SLAS's Newsletter's 50th year of publication.

Please Welcome The Newest SLAS Members!

Dadok, Christopher Dumas, Allan Livsey, James Mirizzi, Paige

Joan Carman got this shot on 25 January of the Library Loaner Scopes receiving some TLC.

MINUTES OF THE SALT LAKE ASTRONOMICAL SOCIETY TRANSITIONAL BOARD MEETING

08 January 2020

Location: Denny's Restaurant, 250 W 500 S, Salt Lake City

Board Members in Attendance: Luke Moses, Rodger Fry, John Drabik, Tom Sevcik, Daland Speirs

General Members in Attendance: Jim Keane, Joan Carman, Daland Speirs, Larry Holmes, Patrick Wiggins, John Johansen, Ken Warner

President Luke Moses called the meeting to order: 6:58 PM

(No formal agenda tonight. Budget sheets and updated star party suggested date sheets were handed out by Luke and by Rodger, respectively. Brief comment by Luke and Joan that the new loaner telescopes have been ordered, more to follow later in the meeting on this topic).

Motion by Rodger that the budget be accepted, for presentation at the General Meeting next week prior to final ratification. Second by Luke. Unanimous approval by Board.

Roger asked the Board to reconsider the Wheeler farm site for non-SPOC star parties, due to the dark skies and good support, and because Wheeler farm would still like to host them (the Wheeler site and other non-county-library sites were removed from the list at the December transitional meeting). The focus now is to work with select county libraries and host star parties there. Luke is concerned about operator turnout. Rodger and Tom noted that there has been good attendance at Wheeler, and good support - typically with 7 or more telescopes per party. Rodger noted that some of the libraries also have bright parking lot lights, and Wheeler is darker. Joan presented a list of 7 libraries that have agreed to participate in star parties.

Motion by Luke to pick 7 libraries, one per 1st quarter moon, and keep Wheeler as discussed too, for April to October non-SPOC parties, potentially resulting in 2 non-SPOC parties per month. Also, that the libraries and Wheeler are to be informed that parties are based on participation and weather, and may be changed. Second by Roger. Unanimously passed.

Tom received a request for a private star party to be held at SPOC, from the Junior League of SLC. Luke expressed concern about private parties at SPOC, including possible insurance issues, and because SLAS members with SPOC access can arrange to use the telescoped and this may interfere with private parties. A specific question was posed: “What is the purpose of star parties?”, with consensus on the answer “Public outreach.”

Motion by Rodger that we continue public star parties for free, including star parties at public schools. Amendment by Patrick that such groups must be 501-c(3) organizations. Amendment accepted. Discussion followed. Joan is concerned we are spreading ourselves too thin for operators and suggested we get some groups who request star parties to instead coordinate with county libraries. Several members noted that SLAS should not support commercial or paid parties (however, private members may do so if they wish. There was some discussion on whether SLAS should maintain a list of members interested in supporting commercial parties. Not resolved at this meeting.) Second on the motion by Luke. Unanimous approval.

Motion introduced by John D that we inform commercial entities that we are considering a paid program, in order to gauge their interest in paying for parties. Insurance issues were again raised, and the motion was withdrawn.
Rodger has a guest speaker for next week (on the topic of changes in the Hubble Constant ("variable?"). He needs help and ideas to find future speakers and asked those present to contact him if they have ideas.

Rodger briefly discussed the Jackman telescope (11" refractor) and suggested it be used for astrophotography. There is a question of suitability due to the f-ratio and other considerations. He also noted that the new "SPOC Committee" is still in a holding pattern and we can wait to proceed until the committee is formed.

Luke would like to get Board Members at Large (BMaL) positions off the workload of current Board members with other assigned tasks. The two key BMaL roles to address are School/Special and SPOC star party coordinators. Motion by Luke to appoint Tom as Special Star party coordinator due to his ongoing work in that role. Second by John D. Unanimous approval. It was noted that Tom does not have to bring schedule requests to the board for approval, however, requesting parties are to be informed that any star party is contingent on weather and available volunteer staff.

Daland would like to see us institute some form of incentive, such as tickets, to be given to those supporting various events. These could be used to offset their annual SPOC fee, membership renewal, or other purposes.

Motion by Luke to move the SPOC BMaL position a SPOC Committee position. Don (Colton; not present at meeting) will continue to do some of this work, such as the Bryce Canyon star parties. Second by Rodger. Unanimous approval.

Daland also noted he has seen a sharp increase in the amount of spam email he receives since he joined the board. Other members also report seeing a rapid spike. Ken noted that there is personal contact information on the website that is causing the problem. Patrick noted that it is also in the Nova and other PDF documents that are sent to SLAS members.

Motion by Luke that we remove all personal contact info from the public side of the website. Ken noted that he could setup a contact page and form for people to contact board members, using a drop-down list of names or roles a person wishes to contact, and a "Captcha!" box so the person submitting a contact request has to confirm they are not a bot. Ken recommends that all references be by role (e.g., President) and not by name. Motion seconded by Daland, unanimous approval.

Tom also received a request for an Astronomy Day onsite help at Clarke Planetarium, and to setup the solar scope. It was noted that Clarke is a governmental organization, not commercial, and there was discussion about what that means to the Society, since they also support SLAS. However, SLAS would like to have some kind of banner or sign, perhaps with a QR code, for visitors to Clarke to get more information about the Society, and this is not currently in place. We may be able to hand out flyers and sign-up forms at Astronomy Day events at Clarke, but this is not certain. No motion, but consensus from the Board is that Tom can proceed to find added details. Also, Luke will put out an announcement tomorrow about the Astronomy Day event. Luke asked whether there are tickets available for the event, and Tom will try to determine if SLAS can obtain some tickets for attending.

Tom also noted a request in establishing an observatory at Clarke (on the roof). Board members expressed concern over insurance as well as the amount of work involved, but generally are not in favor of supporting the work (SLAS members may support as private citizens not representing SLAS).

Officers' Reports
Luke Moses – nothing further to report
Rodger Fry – had to leave meeting early
John Drabik – Informed the Board that he received files and information from the prior Secretary, including the expenses / bank spreadsheet. Jim Keane noted that there is a new spreadsheet format, more like a checkbook (i.e., without the "account columns" used today). He will send it to John. John asked about SLAS federal tax return. Patrick thought it had been handled by the Secretary in the past, and John offered to do it this year. Patrick clarified that there is both a federal and a state return, and that via the state return we can obtain reimbursements for sales tax paid. After discussion, it was determined that we may need to get IRS 990 form filed for 2019 or be at risk of losing 501-c(3) status. Patrick will look into this and inform John and other Board members of what he finds.

Luke asked John to begin sending monthly income report and an estimate of the expenses for the upcoming month. John agreed to send the spreadsheet to him and to Patrick, and will add an estimate of upcoming expenses.

Other Board Member Input
Jim Keane – nothing to report
John Johansen – he has two receipts waiting for reimbursement; solstice party tip, and Save-a-Star guest speaker (Christine Kenyon) donation. He provided the receipts to John D. Discussion about getting John (D) onto the bank signature cards in order to write checks (with second board member co-sign) in 2020. John D will send out an email to the former Secretary, and to other board members with a possible bank connection, about getting activated soon.
Joan Carman – she also has a receipt for $3800, for the loaner telescopes she purchased. This is on her private credit card and will be due soon. John D will work with Luke and/or Rodger to get her a check in the next day or two, once the bank signature card is resolved. She provided the receipt to John D.

Joan also reported on the telescope preparation sessions (two of them, one for the current 35 loaner telescopes on January 18th, and one for the new loaner telescopes on March 7th at Whitmore library, in coordination with the Boy Scouts seeking service hours.
Patrick Wiggins – Discussion of getting the signature card in place for John D. John J offered to sign checks until then, but it was noted he is no longer a Board member and so that was rejected. Patrick introduced a motion that we not print 2020 Star Party information sheets. He noted that we routinely dispose of thousands of them at the end of each year [the blue handouts]. It was suggested that we use generic cards with a QR label to point people to the SLAS site and to star party info; this has the added benefit that the cards would be reusable year-to-year, since the website can be updated but the QR code would remain the same. Motion seconded by Daland. Unanimous approval except for Rodger, who had left early.

Budget
Budget was approved for presentation to the general membership next week, earlier in the meeting.

Prior to adjournment, Daland asked if we could get an agenda at the next meeting, including defined public input speaking time. Luke indicated he will have formal agendas going forward.

Motion to adjourn by Luke, second by Daland. Unanimous approval.

Meeting Adjourned: 8:31 pm

MINUTES OF THE SALT LAKE ASTRONOMICAL SOCIETY GENERAL MEETING

15 January 2020

Location: Room 103 Calvin Rampton Technology Building at Salt Lake Community College

Attendance:

Board Members in Attendance: Luke Moses, Rodger Fry, John Drabik, Tom Sevcik, Daland Speirs

President Luke Moses called the meeting to order: 7:30 PM

Guest speaker: Joseph Jensen, UVU, on "Tension in the Cosmological Distance Scale". Rodger introduced the guest speaker.

Joseph gave background on himself. He grew up with telescopes from an early age, "pre-Dobsonian". His first telescope was a Newtonian reflector without automated drive or controller mechanisms. He went on to study in Hawaii, and participated in early infrared (IR) work. He became a Science Fellow at Gemini Observatory (HI). After 12 years there, he moved to Utah and UVU, where he has been the past 10 years.

He introduced the topic as "tension" first (not "crisis") in the Hubble constant, and the impact on estimating the age of the universe. He briefly described two basic types of astronomical distance measurement and noted that they do not agree. The Hubble Constant (H_0) and the estimated size of the universe result in an under-estimate of the age of the universe. Expansion in particular affects age estimates. But because the distance to remote galaxies indicates the universe expansion is accelerating (due to dark energy; in his terms, "dark" is anything we don't currently understand).

The Cosmic Microwave Background (CMB) and thermal acoustic fluctuations in the early universe together show that the universe is very flat. That is, space time curvature is flat. This is a good thing because it means that rules and constants are applicable across the universe.

When they put compare results of age / distance / flatness / CMB different methods, the results disagree by a significant amount, in the range of 4-5 sigma (σ). General consensus on sigma variation from expected is that:

1σ: agreement
2σ: curious
3σ: tension
4σ: disagreement
5σ: crisis

His humorous quip on this is that "You know physicists are in a state of crisis when the start talking like philosophers" - Thomas Kuhn

Joseph then began discussing "distance ladders". There are both outward and inward ladders, and they should agree. Also, there are various methods, which he will describe next. The first method uses Geometry, the second is based on Luminosity, etc.

The outbound distance ladder starts with geometry, in particular, parallax. Parallax is the apparent movement of stars caused by our own movement. For example, take an image of a "nearby" star in January and in June, and compare the apparent position with respect to the distant background stars (which do not appear to move much if at all). This change is measured as "parallax arc seconds", or parsecs (pc). He noted it is a measure of angle, not distance. 1 parsec refers to the relative change in position of a star roughly 3.2 light years (LY) from Earth. But no stars are within 3.2 LY, so they have to measure fractions of an arc-second. In any event, basic trigonometry (sines, cosines) can then be used to estimate distance.

Another geometric approach is based on "detached eclipsing binary stars". Their radial velocity and red-shift it causes indicate their mass and thus their composition. They then use the spectra to estimate brightness, and thus the luminosity and distance.

A third method uses natural masers (MASER=microwave amplification by stimulated emission of radiation, and creation of an "inversion state" similar to that for light (the common term LASER). The effect is caused by water vapor, so these are H_2O masers. This occurs around the accretion disk of a black hole, and these natural masers "flash" from the edges of the disk and along the line of sight. These can then be used, with Kepler's equations, to estimate the mass of the black hole. NGC4258 is the prime example of such a system, since it tilted slightly toward us. He referred to it as the standard others are compared to.

Yet another method is usable beyond about 2 million LY (2 MLY), where the prior methods are only really usable for targets closer to us. This fourth method uses gravitational lenses. Examples are HE0435, WEI-2033-4273, and RXJ1131-1231. They search for supernovas in a galaxy beyond the lens mass, and measure the time-of-arrival for the four images around the center in order to gauge distance. [He later described why there are four images.]

The next distance ladder technique is based on Luminosity. This is often done with Type 1a supernova. The reason is that a Type 1a, resulting from white dwarf collapse, are very predictable because the mass is well known: it can be no more than about 1.4 solar masses, so the brightness is also very similar.

Another luminosity method uses Cepheid variable stars and the accurate measurement of their blink rate.

The results of these methods is the Distance Ladder – he showed a 3-box drawing, and where (each box) the methods described above are applicable. A line goes through the three boxes (laid upper-right corner of one to the lower-left corner of the next). The line should be straight, and the results are actually fairly consistent – few "outliers".

Joseph uses a different luminosity technique, based on statistical measurement of surface brightness fluctuation. He went into detail about what this means and why it's important. For a given sensor device (charge coupled device, or CCD), more distant galaxies have more stars impinging on each pixel, so the variation (statistical variance between pixels) is less. The result is that distant galaxies tend to look "smoother", and he showed several examples, based on images from the Fornax and the Coma constellations. The Coma galaxy he showed is

about 5 times further than the one in Fornax, and the smoothness was obvious (adjacent pixels had more white/dark separation, and the other had subtler shades of gray). From these measurements, they have been able to estimate that H_0 should be about 76 km/sec/Mpc (mega parsec). The measured value of H_0 is about 67 km/sec/Mpc, substantially different. As a result, the estimated age of the universe based on these methods is also very different.

Now, gravitational waves are being considered instead of light. These waves are measurable when they involve the merger of two neutron stars, and calibrated against the light from them. He refers to these as "Standard Sirens", due to the simulated "whooping" sound that they made using output from the gravitational wave detectors. These are proposed for use instead of today's "standard candle" approaches which must be calibrated to brightness of the object(s) involved, which can be difficult.
So far, he has described outbound ladders. He noted how they can use the "upper right corner" results from one box in the 3-box set, to start to estimate into the lower-left corner of the next box. Now it is time to consider inbound ladders, i.e., measured from the edge of the universe inwards; the results should be the same.

He began with the CMB, which captures details from the early universe. Galaxies are found in the cooler, blue areas of the image he showed – they are cooler because the material in them has aggregated. Using the CMB "photograph", it has been determined that universe curvature is flat, in four dimensional space-time, so constants are the same in all directions, and that can be used to determine the size of the "lumps" in the CMB. That in turn enables them to determine the speed of sound in the early plasma. The speed of sound limits the rate of expansion in the early universe, and so they can also estimate the age of the early universe: 13.787 BLY. This is known as the baryonic acoustic modulation of the CMB.

The disparity in the "flat ACDM" is substantial (more correctly, ΛCDM, where Λ (lambda) is a cosmological constant introduced to provide compatibility between cold dark matter (CDM) models versus other models of inflation). In this case the models being compared are the CMB approach and the supernova (SN) method. In order for errors of this size to occur, things like the values of sines and cosines would have to be off by 10% or more.

The SN ladder going outward, versus early universe values, indicates that there may be some new physics involved, for example, is there a fourth type of neutrino (there are only three in the current standard model), or perhaps there is a form of dark energy that disappeared after the early universe period. They simply don't know.

A new ladder approach is being built now, based on the Gaia and James Webb telescopes and sensors on them (Gaia has sensors rigidly fixed at a particular angle; it rotates to capture 10 years worth of information on the location of stars, to create a very accurate model).

Joseph noted that in order to eliminate potential systematic errors, it is necessary to use new methods and equipment – that is why they constantly seek new telescopes, satellites, sensors, etc.

His talk concluded. A Question & Answer session followed. During the Q&A, he expanded on the gravitational lens issues. The four images are due to a quadrupole component of the general

relativity theory. The result is that we see either a circle, or four dots, or some mixture of those. He showed a number of diagrams of objects exhibiting the effect. In order to determine things like direction and speed, it is necessary to solve General Relativity (GR) equations, including the quadrupole component. This requires large computers. He concluded by saying that the results of today will either “lead to the discovery of new physics, or the discovery of a really embarassing systematic error.”

His talk ended at 8:37 PM.

Luke then discussed several business topics:

1) he told attendees that at the most recent Board meeting, it was decided to keep meetings on the same days (2nd and 3rd Wednesdays of the month). He also indicated that there will be no General meeting in June (due to the Bryce Canyon field outing), and December (due to the traditional Solstice party).

Next, he showed the budget that was recently approved by the Board but that needs member ratification. Motion by Patrick to accept both the schedule and the budget as presented. Second by Don Colton. Passed by near-unanimous show-of-hands.

Next, the star party schedule was shown. Rodger explained the rationale for scheduled dates (moon phase and site(s) availability, at SPOC and elsewhere. The non-SPOC parties will be held at various Salt Lake County libraries and at Wheeler Farm. Luke went deeper on the topic of library sites. He noted that the library loaner program has been very successful and we can have more sites available to reach the public. Bill made a motion to accept, Tony seconded. Passed by show of hands.

The Dark Sky star party was shown next. There is no need for a vote on whether to accept it due to potential variability. Don discussed field trips, including hotels and other logistics for the June trip to Bryce Canyon. The Society uses the Ruby Inn property, and we can get reduced hotel rates. He described it as a good site, and noted that last year they even took steps to block headlights from buses, the use of magnesium chloride filters, etc.

Tony mentioned the upcoming remote imaging session (at the University of Utah). He also provided some additional details on solar parties at the Natural History Museum near Red Butte Gardens. Upcoming sessions, and refurbished loaner scopes were also briefly mentioned. Tom Sevcik talked about the phase-out of Evolution telescopes at Clarke Planetarium’s store, and how interested SLAS member could get a reduced price on one the 8” or 9 1/2”EVO scopes.

John made a motion to dismiss, second by Tony. Passed by show of hands.

The meeting was adjourned to Village Inn for "Advanced Training" at 8:52 pm.

SLAS Member Information

The SLAS Member Information file is available at http://slas.us/slasbooks/NEWMEM.PDF.

Loaner Telescopes For SLAS Members

SLAS has several scopes available for loan to current SLAS members. Check the SLAS website under "Membership Benefits" for details.

Contact Us slasinfo@slas.us

2020 SLAS Board of Directors

President	Luke Moses
Meetings	
Vice President	Rodger Fry
Publicity, PR and Web Content	
Secretary-Treasurer	John Drabik
Membership Dues & Renewals	
Board Member at Large	Tom Sevcik
SPOC Star Party Coordinator	
Board Member at Large	Daland Speirs
School & Special Star Parties	

Appointed Positions

Astronomical League Contact	Aleta Cox
Equipment Manager	Luke Moses
Historian	Patrick Wiggins
NASA Night Sky Ambassador	Ann House
Newsletter Editor	Patrick Wiggins
Observatory Director	Rodger Fry
Private Star Party Coordinator	Don Colton
Webmaster	Ken Warner
ZAP Grant Writer	Jim Keane

SPOC Advisory Committee

Chair through JAN 2021	Rodger Fry
Member through JAN 2021	Rodger Fry
Member through JAN 2021	Stan Eriksen
Member through DEC 2020	Larry Holmes
Member through FEB 2022	Leslie Fowler
Member through DEC 2020	Patrick Wiggins
Member through JAN 2021	Jim Keane
Member while SLAS President	Luke Moses
Member through FEB 2022	Tony Lau
Member as Obser. Dir. Emeritus	Bruce Grim
Member while Harmons Rep.	Vacant

SPOC Telescope Instruction Coordinators

Refractor	Marlene Egger
Ealing	Jim Keane
Grim	Rodger Fry
Clements	Leslie Fowler

Events Calendar

February 2020
12 Board Meeting at Denny's Restaurant, 250 W 500 S, 7:00 pm
19 General Meeting at SLCC's Rampton Technology Building, Taylorsville Campus, 7:30 pm

March 2020
11 Board Meeting at Denny's Restaurant, 250 W 500 S, 7:00 pm
18 General Meeting at SLCC's Rampton Technology Building, Taylorsville Campus, 7:30 pm

April 2020
08 Board Meeting at Denny's Restaurant, 250 W 500 S, 7:00 pm
11 Sun party 6400 S 1100 W, 9:00 am to noon
15 General Meeting at SLCC's Rampton Technology Building, Taylorsville Campus, 7:30 pm
18 Star party at SPOC, dusk to 9:00 pm

View a list of all SLAS events online on the Events Calendar

NOVA is a publication of the Salt Lake Astronomical Society, a non-profit organization. Nova contains minutes of meetings, Board member names & contact info, activities, reports and special club events. The editor of NOVA is appointed by the SLAS Vice-President. Members are encouraged to contribute content. Current editor is Patrick Wiggins, 4099wiggins@gmail.com.