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The Astronomical Society of Las Cruces (ASLC) is dedicated to expanding public awareness and understanding of the wonders of the universe. ASLC holds frequent observing sessions and star parties and provides opportunities to work on Society and public educational projects. Members receive the *High Desert Observer*, our monthly newsletter, plus membership to the Astronomical League, which includes their quarterly publication, *Reflector*, available in digital or paper format.

Individual Dues are \$30.00 per year

Family Dues are \$36.00 per year

Student (full-time) Dues are \$24.00

Dues include electronic delivery of the *HDO*. Prorated dues are available for new members. Dues are payable to ASLC with an application form or note to: Treasurer ASLC, PO Box 921, Las Cruces, NM 88004

*ASLC members are entitled to a \$5.00 (per year) Sky and Telescope magazine discount.*

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### May Meeting --

Our next meeting will be on **Friday, May 29**, at the DACC Main Campus, Room 141, Technical Studies Building, starting at 7:00 p.m. Please note this meeting is one week later than usual, due to the Memorial Day holiday

ASLC member, Fred Pilcher will offer a presentation on Dwarf Planets

### ASLC Board of Directors, 2015

[Board@aslc-nm.org](mailto:Board@aslc-nm.org)

President: Daniel Giron; [President@aslc-nm.org](mailto:President@aslc-nm.org)

Vice President: Steve Barkes; [VP@aslc-nm.org](mailto:VP@aslc-nm.org)

Treasurer: Patricia Conley; [Treasurer@aslc-nm.org](mailto:Treasurer@aslc-nm.org)

Secretary: John McCullough; [Secretary@aslc-nm.org](mailto:Secretary@aslc-nm.org)

Director-at-Large: Tracy Stuart; [Director1@aslc-nm.org](mailto:Director1@aslc-nm.org)

Director-at-Large: Ron J. Kramer; [Director2@aslc-nm.org](mailto:Director2@aslc-nm.org)

Immediate Past President: [rrichins73@comcast.net](mailto:rrichins73@comcast.net)

### Committee Chairs

ALCor: Patricia Conley; [tconley00@hotmail.com](mailto:tconley00@hotmail.com)

Apparel: Ron Kramer; [ronjkramer@aol.com](mailto:ronjkramer@aol.com)

Calendar: Chuck Sterling; [csterlin@zianet.com](mailto:csterlin@zianet.com)

Education: Rich Richins; [Education@aslc-nm.org](mailto:Education@aslc-nm.org)

Grants: Sidney Webb; [sidwebb@gmail.com](mailto:sidwebb@gmail.com)

Librarian: **\*\*\*OPEN\*\*\***

Loaner Telescope: Frank Fiore; [ffchilehead@gmail.com](mailto:ffchilehead@gmail.com)

Membership: Judy Kile; [judykile3916@gmail.com](mailto:judykile3916@gmail.com)

Night Sky Network: **\*\*\*OPEN\*\*\***

Observatory:

Leasburg Dam: Rich Richins; [rrichins73@comcast.net](mailto:rrichins73@comcast.net)

Tombaugh: Steve Shaffer; [sshaffer@zianet.com](mailto:sshaffer@zianet.com)

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Web-Site: Steve Barkes; [steve.barkes@gmail.com](mailto:steve.barkes@gmail.com)

*HDO* Editor: Ron Kramer; [ronjkramer@aol.com](mailto:ronjkramer@aol.com)

### New & Existing Member Package

Membership Chair, Judy Kile has sent member packages to all current members before the June meeting. These were sent via Yahoo!Groups email. If you did not receive your package, please let her know ([jkile@elp.rr.com](mailto:jkile@elp.rr.com)) and she will send you a regular email with the package.

### Outreach

Outreach is a very important part of ASLC. We are always looking for more volunteers to help us educate the public. Even if you do not have a portable telescope to bring to the events, please consider attending our public outreach programs to help answer questions, share knowledge and point out constellations in the sky.

### Events

ASLC hosts deep-sky viewing and imaging at our dark sky location in Upham. We also have public in-town observing sessions at both the International Delights Cafe (1245 El Paseo) and at Tombaugh Observatory (on the NMSU Campus). All sessions begin at dusk. At our Leasburg Dam State Park Observatory, we hold monthly star parties. Located just 20 miles north of Las Cruces, our 16" Meade telescope is used to observe under rather dark skies. Please see *Calendar of Events* for specific dates and times.

### Annual Dues

Please note that annual dues are due in January. Contact our Treasurer, Patricia Conley ([treasurer@aslc-nm.org](mailto:treasurer@aslc-nm.org)) for further information. Dues can be paid at the next meeting or via mail, sent to Treasurer ASLC, PO Box 921, Las Cruces, NM 88004.

**From the Prez**

All Good Things

Reaching Out to the Young One Step at a Time

Last month, we said goodbye to the last of the ASLCs founding members, Walter Haas, and we celebrated his life and achievements. We learned from those who knew him, that he had a strong desire to bring young people into the world of amateur astronomy. Many of us share that desire and participate at school outreach throughout the city.

Lately, a couple of us have been experimenting with having kids participate in an observing activity. After completing the activity the kids are rewarded with a prize, be it a poster, 3D postcard or something else related to the activity for them to take home. So far, the children who participated enjoyed the activity and some were very good observers who took the time to really look at the objects they were studying. Hopefully, the prizes they were rewarded with will serve as a reminder of the activity and help keep an interest in what is up in the sky.



On our outreach at Leasburg Dam State Park, May 9th, members conducted a solar observing activity with prizes for those who participated. Most of the participants were children and, with the help of the telescope operators, saw the Sun in a different light for the first time. Some were very good at drawing the sunspots and prominences they saw through the solar scopes. They may not have realized it but, they were solar astronomers for the day.

It was a pleasure talking to the older children who showed an interest in astronomy. They were curious and had a lot of good questions. Some of them even described to me times they had gone out to observe the night sky with family and friends and the questions they would ask each other about what they saw.

The highlight of our outreach at the park was the raffle drawing for two beginner astronomy prizes: a binocular stargazing kit and a 3-inch Newtonian on an alt/az mount with a lot of goodies to help the novice explore the night sky. The first prize winner (the binocular kit) was an adult gentleman but, the grand prize winner was a young girl from Chaparral. She was very happy winning the prize and, according to her father, she is very interested in astronomy and science, so this was the perfect prize for her. I wish both winners the best and wish them many enjoyable nights under the stars.

Astronomy is for everyone but, if we are to see participation continue, we need to reach out to the younger generations as much as we can and help them enjoy exploring the universe. With many other things that call out the children's attention, it will take some ingenuity and perseverance in involving the young in astronomy and showing them that it is a fun and rewarding activity. With continued effort on our we will reach out to the young one step at a time.

Daniel Giron

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**Recent Outreach Events**

by Jerry McMahan & Steve Shaffer

**Saturday, April 11; Leasburg Dam State Park Observatory**

Lots of telescopes, one target. Late afternoon was fairly clear, but by observing time, the only visible object was

Jupiter and it was barely visible through clouds. The North and South Equatorial Belts were somewhat visible in the 16-inch. The 8-inch did not even show any moons, just a small low power disk.

Chuck Sterling manned the observatory with Frank Fiore. Sid Webb has his 10-inch Dobsonian. A non-member (I didn't get his name) had a nice 12-inch Dobsonian. I had the 8-inch SC while Robert Westbrook set up his 114mm Newtonian. Daniel Giron, Judy Kile and Ron Kramer assisted spectators.

It was a very disappointing night, visually, but a number of people had questions and seemed to have a good time anyway, so the evening was not a total loss as a result.

#### ***Thursday, April 23; Onate High School***

Tracy Stuart, Rich Richins, Chuck Sterling. Rob Westbrook and Jerry McMahan attended. Bert Verstraete joined us later. I set up the 125 Maksutov and Tracy had his 90mm Maksutov. Tracy remarked on the student to astronomer ratio. It was zero. We had no observers, student, teachers, or otherwise. Clouds!

The Moon could be seen, with no detail apparent. Venus and Jupiter could barely be made out in the clouds.

A few rain drops were even felt. When lightning was observed over the mountains, it was suggested that I put my scope back in the car. I had set up, so I stated that I wanted to see the Moon first. Fearing that I might be on the verge of throwing a tantrum, each of the club members came over and looked through my scope. Satisfied, I put scope up, and we called it a night.

#### ***Friday, April 24; Open House at Tombaugh Observatory***

The day before I went to the observatory and replaced the shutter gear motor hand controller power cord. Friday night we viewed the Moon and Jupiter.

Jerry McMahan came shortly after the ASLC meeting was over. Stan and Carol Chiochio also stopped by after the meeting to have a look. We had 78 viewers.

#### ***Saturday, April 25; Moongaze, International Delights Café***

It was cloudy on Thursday and rained on Sunday, but it was clear on Saturday, so we had a good Moongaze. I had the 125 Maksutov on the Moon and Chuck Sterling pointed his 100mm refractor at Jupiter. Daniel Giron answered questions for spectators.

We may gain a new member that came to the open house at the Tombaugh Observatory and two teachers, at Moongaze, said they would like to join.

I am feeling a little guilty about not being as patient with a customer as a usually am. He insisted that the stars are not powered by fusion, but by electricity producing plasma and heavier elements were not being produced in the stars. He said that this idea has been gaining strong support, even majority support, with scientists, and was so adamant that I finally had to tell him that there was not much use of us continuing to discuss the topic since no common ground was being reached. I was not rude, but I usually listen more patiently with many strange things that people say. So tell me, have I been missing a new "Theory" that I have never heard of, but is becoming very popular. It turns out that even hydrogen bombs are not produced through fusion.

#### ***Friday, May 8, 2015; Open House at Tombaugh Observatory***

NMSU graduation, end of classes and an Astronomy Department Open House two weeks sooner caught more than a few of us off guard. While writing up the report for April I noticed that today was Open House, guess I have something else to do this evening. I emailed Jerry McMahan but not knowing that he would not be able to come I did not do any homework. I pointed our telescope at Jupiter and had a very nice view with the new 2" 37mm 70 degree eyepiece that Jerry had brought a couple of months ago. We had 43 viewers who all were asking hard

questions and I had no answers. I work the telescope, Jerry has the answers, we make a good team.

**Saturday, May 9; Leasburg Dam State Park Observatory**

First, I will apologize for forgetting anyone that attended. It was dark. I was there. I think. I know that Nils Allen was there because he helped me get the eyepiece (holder stuck) in a usable position on my 8-inch. This was a Music & the Stars evening, with Solar observing preceding night viewing.

Nils had a mount that held two solar scopes, a Hydrogen alpha and white light refractors. The white light filter showed a large sunspot group while the H-alpha filter displayed a number of prominences, included one pretty large one. Sid Webb also set up the clubs' 60mm H-alpha scope. I think that Daniel Giron and Christina Lugo had a white light scope set up as well. The two of them also handled a raffle for a telescope and binoculars. A young girl won the telescope.

Sid also set up the parks' 12-inch Dobsonian for dark sky views. He was joined by Ed Montes with his refractor. A man from El Paso (Paul?) set his scope near mine. He is pretty knowledgeable about astronomy and, I think, was one of the raffle winners.

Dave Doctor and wife Kathy ran the observatory, assisted by Bob Armstrong (I think). Give me a break, I am still trying to recover from grading final exams. Don't ask how they went. Ron Kramer and Judy Kile were also present. Chuck Sterling stopped by for a few minutes and then left to finish loading his car for the trip to the Texas Star Party.

The afternoon was windy, but the wind died down in time for the evening session. It was a good night for viewing Jupiter, M3, M81, M82, M44 and even Saturn, later on, but it was colder than any of us expected. I did manage to get the giant globular cluster, Omega Centauri. It was not a great view since it was very low and in the glow of Las Cruces lights, but it was the first time I have seen it in two or three years.

I was a very good night until the end. As I was starting to take the scope down, I heard Daniel complain about something. Seconds later, I found out what he was complaining about when the blast of water from the sprinklers hit me. By the time we finished getting my equipment out of the way, Daniel, Christina and I were pretty wet. Did I mention it was cold that night.

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**Calendar of Events (Mountain Time - 24 hr. clock)**

MAY 22	18:53	Saturn at Opposition
23	dusk	OUTREACH; MoonGaze, International Delights Café
25	16:12	First Quarter Moon
29	11:30	Venus-Pollux Conjunction
29	19:00	ASLC Monthly Meeting, DACC Main Campus, Room 141 (Technical Svcs. Bldg.)

**NOTE: Meeting is one week later than usual due to Memorial Day Weekend**

JUN 01		Venus 46.3° east of Sun
01	14:02	Moon-Saturn Conjunction
02	10:19	Full Moon
06	18:30	OUTREACH; Music & the Stars, Leasburg Dam State Park; entertainment by Paul Walter Kimble
09	09:42	Last Quarter Moon
13	02:59	Venus-M44 Conjunction
16	08:05	New Moon
20	05:28	Moon-Venus Conjunction
21	10:38	Summer Solstice

23	03:39	Mercury-Aldeberan Conjunction
24	05:03	First Quarter Moon
26	19:00	ASLC Monthly Meeting; DACC Main Campus, Room 141 (Technical Svcs. Bldg.)
27	dusk	OUTREACH; MoonGaze, International Delights Café
28	19:27	Moon-Saturn Conjunction
30	20:14	Venus-Jupiter Conjunction

Be sure to visit our web site for the latest updates: [www.aslc-nm.org](http://www.aslc-nm.org)

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**Meeting Minutes**  
by John McCullough

Note: The March meeting minutes were not included in the April issue of the *HDO*; they are included here, followed by the April minutes.

***Minutes, March 2015 ASLC Meeting***

**Show & Tell**

Tonight's pre-meeting Show & Tell session began with Joe Alvarez displaying a portion of his meteorite collection, including a large specimen that fell in Argentina. Joe said most of the items in his collection had been purchased from dealers and were of differing compositions, though most were nickel/iron. He had a piece of coal to demonstrate the difference in weight and density. Joe also talked about the Barringer Meteor Crater in Arizona and some of what has been learned there.

**Call to Order**

Daniel Giron, President, Astronomical Society of Las Cruces (ASLC, the Society), called the March business meeting to order at 7:30 pm, 20 March 2015, Room 141, Doña Ana Community College (DACC), Las Cruces, New Mexico. The March meeting was being held one week earlier than normal because of access issues associated with DAAC's spring break.

**President's Comments**

The President, Daniel Giron, welcomed the group to tonight's meeting and thanked Joe Alvarez for his Show & Tell presentation. Daniel asked that all members register their presence on the sign-in sheets. There were no new members or guests present at tonight's meeting.

***Officer's Reports***

**Secretary's Report**

Daniel Giron reported the minutes for the February 2015 meeting had been submitted by the Secretary, John McCullough, for publication in the March 2015 issue of the Society newsletter, the High Desert Observer (HDO). If there were no corrections, revisions, or discussion, Daniel asked that the minutes be accepted as published. Tracy Stuart moved that the minutes be accepted as published and Bert Stevens seconded. The motion passed by acclamation. There was not an additional Secretary's report.

**Treasurer's Report**

The Treasurer, Trish Conley, provided an update of income and expenditures including income from books, calendars, and dues renewals. She also reported current balances in the Society's accounts. There was not an additional Treasurer's report.

***Committee Reports***

**Outreach**

Chuck Sterling, program coordinator, had to leave the meeting early. Daniel Giron reported on coming events in his place. The 2015 Messier Marathon is planned for 21 March at Leasburg Dam State Park (LDSP), weather

permitting. The star party at Highland Elementary on 19 March went well. There will be an Open House at the Tombaugh Observatory on 27 March and a Moon Gaze at International Delights Café (IDC) on 28 March. The event at Spaceport America tentatively planned for the end of this month had been canceled but something similar may take place later this year. Daniel reminded members of the total lunar eclipse that will occur early in the morning on 04 April. There will be a monthly event at LDSP on 11 April. A Math and Science event will occur at Hermosa Heights Elementary during the school day on 15 April. The Enchanted Skies Star Party will take place in Magdalena, NM, 1718 April. There will a Moon Gaze and Tombaugh Open House in April.

### **The Observatory at LDSP**

Daniel reported that a new Observatory chairman was needed and the issue was being addressed by the Board of Directors.

### **Tombaugh Observatory**

Steve Shaffer, coordinator, reported that recent activities had been reported in the *HDO*.

Daniel reported all other committee reports had been published in the *HDO*.

### **Old Business**

1. Apparel - Ron Kramer reported that he had received a shipment of new ASLC apparel, including special orders but had exceeded his working budget by approximately \$155. Bert Stevens and Frank Fiore moved that the Society reimburse Ron for the extra cost. The motion was accepted.

2. 2015 Messier Marathon - Steve Barkes is organizing this event but was not present at the meeting. Members should contact him for details regarding the event.

3. Spaceport America - The Society was asked to provide telescopes and astronomers the weekend of 27-30 March for a star party. As noted above, this event has been postponed until further notice.

4. ALCon 2015 - Ron Kramer reported that planning for the event is in good shape. Ron is currently working with session speakers; 7 of 21 have committed. Twenty-nine people have registered to date. The committee is also booking tours, some of which, particularly White Sands Missile Range, the Very Large Array, and various observatories, are filling quickly. Registration for the evening events is also taking place. An extensive status report by co-chairman Bert Stevens was published in the *HDO*.

5. Friends of Leasburg - Sid Webb, president of FoL, noted that the park had purchased a Meade 12" Light Bridge (Truss Dob). Sid was still working on the set-up. The system could be upgraded with Go-To or "push-to" capability if the Society wanted to support that effort. This telescope is available for use at park events.

### **New Business**

1. City of Las Cruces/Earth Day - This event will be 22 April (Wednesday). The Society needs to let the city know as soon as possible if it intends to participate in this event. Solar observing is a potential public activity. Members should contact Daniel Giron if they are interested in participating.

2. Astronomy Day 2015 - International Astronomy Day is 25 April. The Astronomical League (AL) sponsors Astronomy Day(s) on 25 April and 19 September in 2015. Because of the short lead time for planning, Daniel suggested the Society combine Astronomy Day with another event in early May, probably the monthly event at LDSP on 09 May (also the first 2015 Music and the Stars event). This could include both day and evening viewing, public outreach events, etc. Contact Daniel with suggestions and/or to volunteer.

### **Announcements**

Judy Kile noted that the Las Cruces Convention and Visitors Bureau promotes LDSP as a destination but doesn't mention the observatory or the events associated with it. She would like to encourage more information be added to the promotional materials. Several members mentioned the observatory and LDSP get considerable publicity in the Chamber of Commerce publication.

### Items for Sale

No items were offered for sale.

### Recognitions/Awards

John Kutney has not received any observing awards recently.

Daniel noted that two (2) members had recently completed building telescopes. Emma Fuchs built a 6" Dob she intends to use for the Messier Marathon. Cristina Lugo built a 4" Dob with Nils Allen. She already uses it for outreach and some astrophotography. She likes to work with kids at public events.

Although traditionally a responsibility of the serving Society Vice-President, Daniel could use assistance arranging meeting presentations, including for April. Sid Webb acknowledged the difficulty and suggested forming a committee to arrange speakers. Ron Kramer reiterated that the Vice-President has handled this in the past and suggested continuing to work with Steve Barks on the issue.

Joe Alvarez has offered his facility (EMI Technologies) for viewing events during ALCon. It has pavement, power, and shelter and could be available all week (starting Sunday, 06 July). Ron Kramer noted there are evening events planned for Thursday, Friday and Saturday during the convention.

The business portion of the meeting concluded at 8:04 pm on motion by Ron Kramer, seconded by Fred Pilcher.

### Presentation

This month's presentation was by Society President Daniel Giron on recent public outreach efforts by the ASLC. Daniel reported that Bert Stevens now provides a monthly observing column in the Sunday Sun-News, the next one reporting on the 04 April lunar eclipse. Bert supplied a lot of material but it was extensively edited for space. Other members are welcome to submit articles as guest Night Sky columnists on topics that are of interest to the public.

Daniel has also been working with Robert Westbrook to get more radio exposure. Bert Stevens was again interviewed by Kelly O'Connell for an hour on 06 February. The interview was mostly about Bert's observing activities but the Society's activities were also emphasized. Daniel is also working on possible Public Service Announcements (PSAs) to inform the public of observing opportunities. He is also looking at promoting ALCon 2015 on radio and is working with Ron Kramer and Bert Stevens on this.

Daniel is also experimenting with outreach in Spanish including bilingual handouts for public events that has met with very positive response. Cristina Lugo has been of great assistance with this effort. Daniel encouraged the membership to help reaching that part of the community.

Daniel noted that the Society website is up-to-date and current. The Face Book Page is also being maintained. He noted that short videos could possibly be produced and uploaded to You Tube. Several Society members have video production experience and Daniel encouraged them to contact him if they are interested in working either in front of or behind a camera to reach a larger audience.

Daniel would also like to see the Society renew its involvement in the Night Sky Network and Project Astro. Rich Richins (Education Committee chairman) has been contacted by Booker T. Washington school to plan an event/demonstration. If members have ideas or school contacts, please pass them on to Rich. As several schools contact the Society each year for event planning, several simple straight forward activities need to be available. Daniel has been using the monthly Moon Gazes to utilize trivia quizzes to pass on information the general public may not be aware of. He has also initiated a "Moonwalker Challenge" to find Apollo landing sites on the lunar surface. He is also presenting prizes that may attract more public interest. Daniel and Cristina are collecting prize items and welcome donations.

Daniel suggested the Society could host more presentations at the LDSP Visitors' Center. He has had good luck with response from the public on just about any astronomy topic.

Daniel then opened the presentation to the audience for discussion.

Ron Kramer asked about the possibility of partnering with Oñate High School to utilize its planetarium. Daniel noted there are several issues associated with the planetarium right now. The facility is not currently ADA accessible. The school is attempting to remodel/upgrade the facility, perhaps to a digital format. Financing this is also an issue. The location within the school plant is also a consideration. However, a partnering arrangement may be possible in the future.

Charles Turner mentioned the New Horizon Pluto fly-by event in July. Previous encounters have generated exceptional interest from the public. Daniel agreed that this could be utilized as a public event. Kim Hansen at the Museum of Science and Natural History is planning events throughout June and July and Daniel will re-contact her to investigate Society participation. Bert Stevens noted that the Museum's planning is well advanced but the Society still need to see where it can fit in. Judy Kile noted that an option during ALCon will include a side trip to the Museum/Branigan Cultural Center for the Pluto events.

As the close of the presentation, Daniel conducted the drawing for the door prize. Member Jackie Beacham received an Apollo 8 print.

The March meeting of the Astronomical Society of Las Cruces concluded at 8:33 pm.

-Respectfully submitted by John McCullough, ASLC Secretary

### ***Summary, April 2015 ASLC Meeting***

NOTE: Our Secretary was not present at the April meeting. What follows is a summary of what took place during the April meeting.

There was no Show and Tell and the meeting was called to order at 7:30 pm. New member Raymundo Gomez introduced himself and we had three guests including Walter Haas's daughter, Mary Alba, and her husband, David. Since there was difficulty with the minutes submission from John, there was not a motion to approve the minutes from the previous meeting and there was the notification that it will be included in the next HDO. Only committee report was about ALCON. Chairpersons for Outreach, LDSP Observatory and Tombaugh Observatory were absent and therefore no reports were submitted. Also the Treasurer and Secretary report were not submitted since both were absent from the meeting.

Preparations for Astronomy Day/Music & the Stars on May 9th (at Leasburg Dam State Park) were discussed. There was a call for volunteers to conduct solar observations and activities, as well as, a volunteer for conducting a green laser tour of the night sky. Hand out materials were also to be produced for the event.

A raffle for Astronomy Day was announced. Prizes included a binocular stargazing kit as a first prize and a 3-inch Newtonian on an alt/az mount as a grand prize. Raffle tickets to be sold at \$1 each and winners needed to be present to claim the prize.

A call was made for someone to take over Apparel and *HDO* Editor positions. Candidate for the *HDO* Editor position needed to have working experience with *InDesign*, *Publisher* or *MS Word* and have a computer capable of handling any of those programs.

No further old or new business were brought up by members present at the meeting.

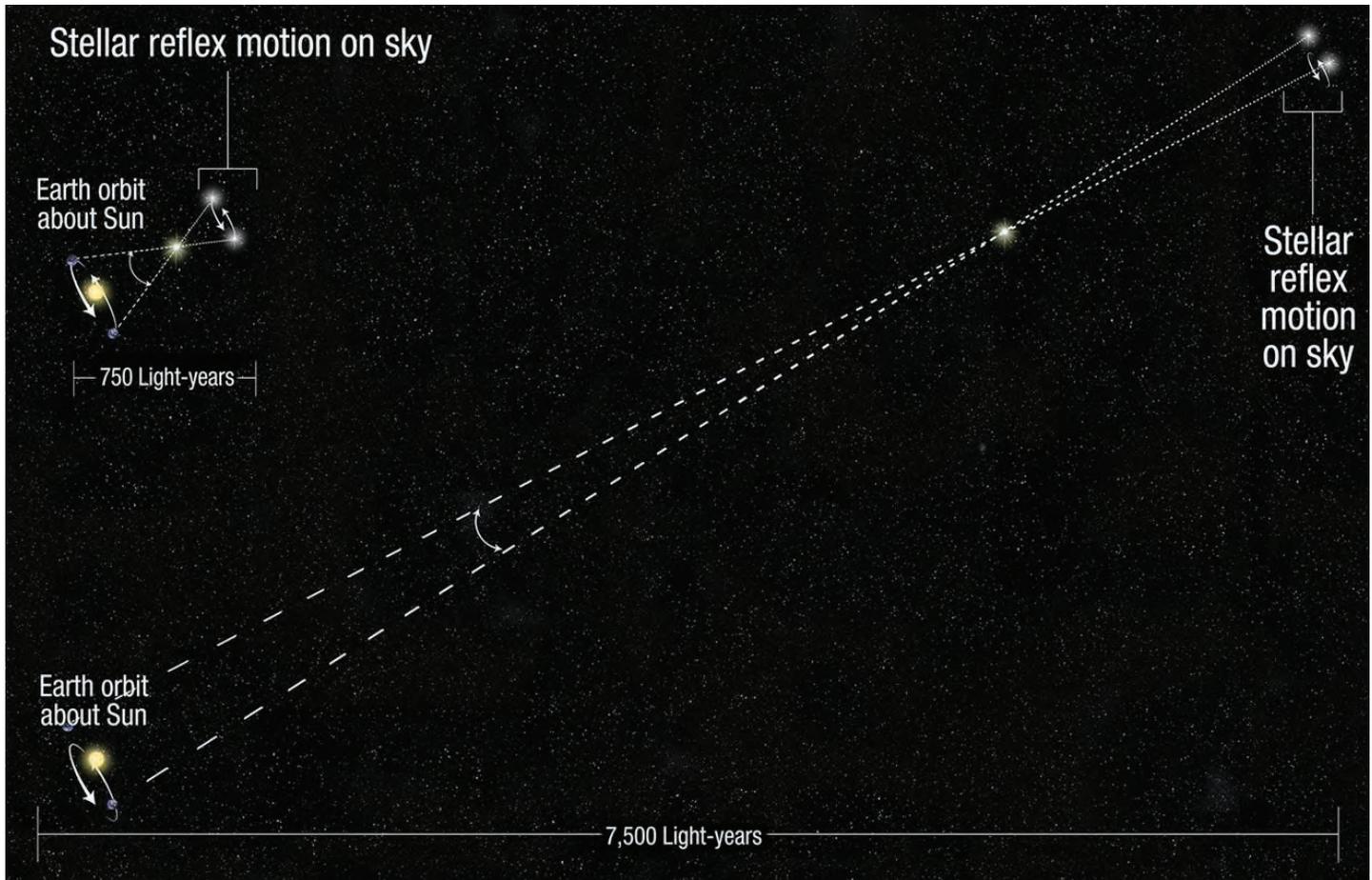
There were no announcements, items for sale, recognition and achievements from the floor.

Announcement for May's presenter was made: ASLC's Fred Pilcher will talk about Dwarf Planets.

Business meeting was closed early, second by Bert Stevens and approved by the floor.



we can find a Cepheid, measure its brightness and the length of its period, we can compute its distance from the expected brightness based on the period and the measured brightness.



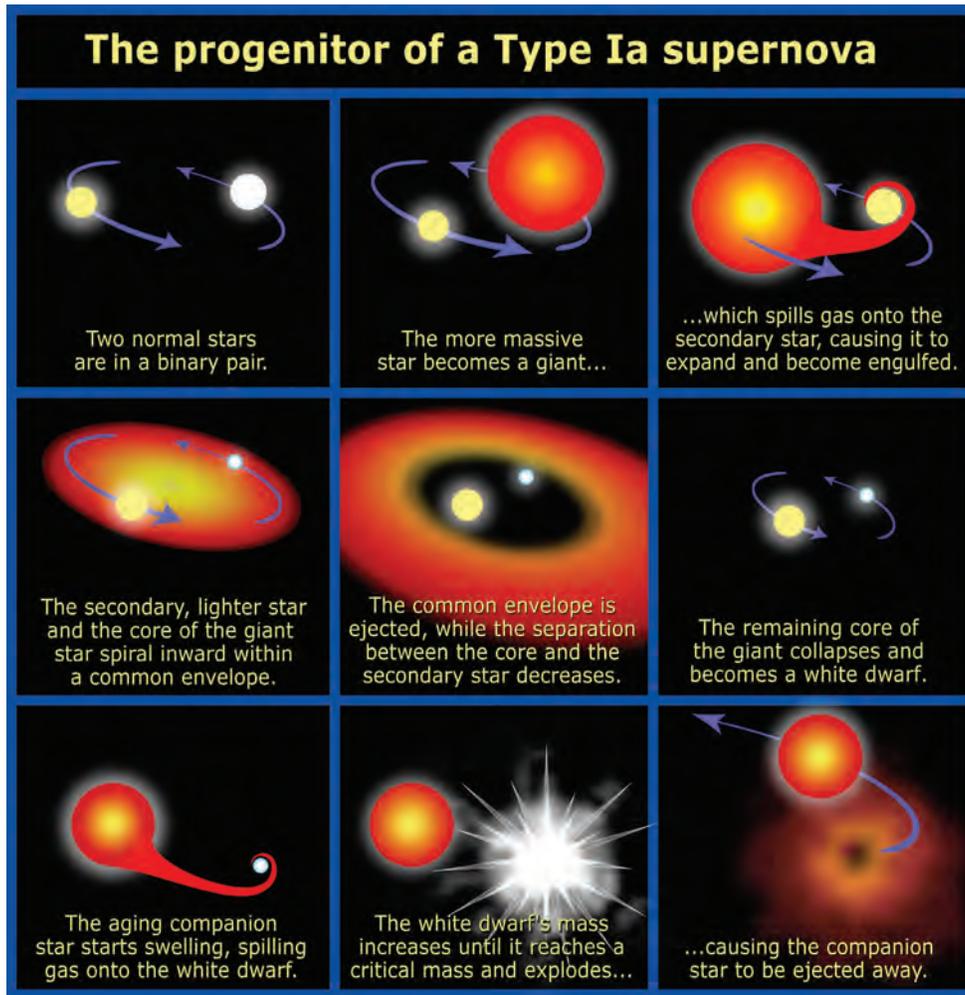
To create as long a baseline as possible, astronomers will use the Earth's orbit around the Sun as a baseline. To reduce atmospheric distortion, observations are taken by the Hubble Space Telescope (HST). Using a technique called spatial scanning, astronomers can make precision distance measurements up to 10,000 light-years away, ten times farther than previously possible. (Credit NASA/ESA, A.Feild/STScI)

So now we are able to use the Cepheids to compute the distance to anywhere in our galaxy and those nearby. Cepheids are not bright enough to allow astronomers to pick them out at great distances. They are too faint to see. Enter the Type Ia supernova.

These supernovae are in binary star systems where one of the stars has already evolved into a giant star and then sloughed-off its atmosphere leaving the core to collapse into a white dwarf star. The white dwarf's gravity pulls material off the other star in the binary. It piles up on the white dwarf's surface. When enough material has accumulated, the weight compresses the material until it is hot enough to start hydrogen fusion.

The release of energy blows the white dwarf apart in a supernova explosion. Astronomers determined all the Type Ia supernovae are the same brightness, so once again, if we measure the brightness we can compute the distance.

Astronomers observed a great many of these supernovae and computed their distances by measuring their brightness. When they looked at the data, they found an unexpected result. One result of the Big Bang is that the universe is expanding. Even while it is expanding, the gravity from all the mass in the universe should be slowing down the expansion. Since we do not know the total mass of the universe, we cannot determine if the universe will continue to expand forever, stop expanding when we reach the infinite future, or stop expanding and start contracting before the end of time.



The formation of a Type Ia supernova. After the supernova explosion, the remaining star of the binary system escapes when it is no longer held by the gravity of the white dwarf. (Credit: NASA, ESA and A. Feild (STScI))

The analysis of the Type Ia supernovae implied that the expansion of the universe was not slowing down at all, but it was accelerating. This was quite a surprise. To accelerate the expansion of the universe there must be some energy that we had not observed that was overcoming gravity and actually push galaxies out faster. Astronomers called this dark energy.



Type Ia supernovae like SN 1994D can be seen across vast distances. Since astronomers believed that they all had the same intrinsic brightness, they could be used as standard candles to measure distances across the universe. (Credit: High-Z Supernova Search Team, HST, NASA)

No one knows the source of dark energy or anything about it. We just see its effect on the expansion of the universe. Astronomers have been trying to investigate dark energy, but have not had much success.

Recently, Peter A. Milne, Ryan J. Foley, Peter J. Brown and Gautham Narayan published a paper in the April 10, 2015 issue of the Astrophysical Journal that reported that there were actually two different ways that Type Ia supernovae can form. One was created by the mechanism described above, while the other is caused by two white dwarf stars colliding. These two forms of Ia supernovae have different intrinsic brightnesses, making them not as standard a candle as astronomers had thought.

It is difficult to tell one form of Type Ia supernova from the other. This calls the analysis of the expansion of the universe based on Type Ia supernovae into question. In a new analysis, the expansion of the universe is not accelerating quite as quickly, so the need for a dark energy to explain the acceleration is diminished.

While this does not eliminate dark energy, it reduces the need for it. If Type Ia supernovae have more surprises in store for us, we may reach the point where dark energy is not required for our model of the universe. On the other hand, we may actually find out what dark energy is and be able to use it as an energy source. Only time will tell.

\* \* \*

**Photo of the Month**



Phecda is the bottom left bowl star of the Big Dipper. This magnitude 2.4 star is approximately 83 light-years away. The barred spiral galaxy at the bottom left is M109 (NGC 3992) – part of the Herschel 400.

Imaged by Dan Crowson, from Dardenne Prairie, Missouri on March 23 and 26, 2015 with an SBIG ST-8300M on an Astro-Tech AT90DT at f/6.7, 603 mm.

Luminance – 12x600s – 120 minutes – binned 1x1

RGB – 8x300s – 40 minutes each – binned 2x2

240 minutes total exposure – 4 hours

The original image can be found at <https://www.flickr.com/photos/dcrowson/17797039595/sizes/l>

Dan can be reached at [dcrowson@crowson.com](mailto:dcrowson@crowson.com) and his website is <http://www.crowson.com>

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After three years of publishing the ASLC's newsletter, the *High Desert Observer (HDO)*, it is time to move on. Starting with the June 2015 issue, the *HDO* editor reins will be handed to ASLC member Charles Turner. I will remain in the background while Charles gets his "feet wet" (without drowning). Please forward your monthly reports to Charles at [turnerc@stellanova.com](mailto:turnerc@stellanova.com).

Thank you for your support these past several years.

Ron