PRESIDENT’S CORNER

By David Mathias, 2015-16 President

Fellow members,

I come to you this month refreshed from my family’s recent vacation in West Texas. We enjoyed Big Bend and Terlingua, Alpine, Marfa and Fort Davis. We had wonderful skies during the days, and clouds or rain almost every night. Unfortunately, our star party at McDonald Observatory was rained out; so we’ll just have to chalk that one up to experience and try again some other time.

By now most of you have renewed your annual membership in AAS. We are seeing an uptick in membership, which is very encouraging. We know a lot about our membership anecdotally from e-mails or in-person communications at AAS events. I think the membership map that I am sharing with you (Page 3) is helpful information. (Canyon of the Eagles, by the way, is towards the top left of this map near the text reading “Buchanan Dam.”)

This representation actually excludes a number of our members in Dallas, Houston, and other states; but it does give you an idea of the geographic breadth of our membership even within the Greater Austin metro area.

Dawn Davies’ scheduling of Astronomy Off the Field events in parts of town that may be closer to you than the UT Campus is one acknowledgement of our geographic dispersion. (Her challenges with Outreach events that cover this vast geographic area can’t be underestimated either.)

Jim Spigelmire, as Member Services Chair, surveyed our membership last month. The survey has just closed, and we are in the earliest stages of reviewing the information. Roughly 25% of members responded, which is actually a pretty good response rate. Thank you! We hope that your responses help us to understand your interests and preferences and guide our activities as a Society.

I’ll make one last pitch for volunteers for all of our committees. One of the early results of our membership survey is that roughly half of the respondents stated that they thought they had skills and experiences that would be valuable to the...
Society. If we have not yet found a way to involve you, please ask; but most of our Committees still have need of volunteers.

In a group this dispersed geographically, successful communications can be a challenge. And, though external communications are important in communicating our Society's mission and growing our membership, improving internal communications (from board to members, and from members to members) needs to be the greater priority. Successful communication is hard work, but we will keep trying to improve our efforts.

We will have a new Communications Chair, and, hopefully, a newly-appointed webmaster, within the next couple of weeks. Our sincere thanks go to David Lynch, former Secretary, and most recently our Communications Chair, for his service to the Society. We wish him well as he has chosen to leave the Executive Committee.

We hope you will be able to join us for our upcoming Practical Astronomy and General Assembly meetings on Friday, September 11th. We are trying out the facilities of the Thinkery this month. The Thinkery offers a Central Austin location (similar to UT), but also offers street parking and free garage parking to attendees. Although we will not be using it this month, Thinkery has access to green space for setting out scopes. Its family-friendly science and technology mission is also consistent with our efforts to reach a young demographic of new astro-enthusiasts.

Anshuman Garga, we hope, is representative of that new generation. He will be among the speakers at our meeting that night. Please come out and support this young man's interest in our hobby.

I want to emphasize that we are still trying out alternative locations. No decision can be made to permanently change our meeting location without a vote of the General Assembly. If you have a meeting location you'd like us to consider, please let us know.

Clear skies,
COME TO OUR SEPTEMBER MEETINGS

When: Friday, September 11, PA at 6:30 PM, GA at 7:30 PM

Where: The Thinkery, 1830 Simond Avenue in Mueller (the old airport)

Practical Astronomy: Terry Phillips will present “Learning the Night Sky, Continued: Software Tools to Get You Started.” His presentation will focus on Stellarium and Sky Tools and will mention other tools as well.

General Assembly: Robin Gose, PhD, Director of Education at the Thinkery, will introduce us to the Thinkery and its mission. She will speak to our Society’s desire to engage STEM-oriented organizations to enhance AAS outreach to our community’s young future STEM careerists.

Fittingly, Anshuman Garga, will present a talk entitled “Another Earth” about the advances in exoplanet search that are beginning to zero in on planets that are similar to our own and capable of sustaining life. Anshuman is a young AAS member who hopes to become an astrophysicist some day.

Lastly, we are allotting time on the agenda for questions from members about our current contract with Canyon of the Eagles for our Eagle Eye Observatory. Please submit your questions ahead of the meeting to contactaas@austinastro.org. Our former President, Dawn Davies, will lead that portion of the meeting.

Our meeting at the Thinkery is part of the Executive Committee’s continuing effort to be responsive to members who have shared concerns about the continuing suitability and convenience of meeting on the UT campus. We welcome your suggestions for other potential meeting locations.

The Thinkery is at the north end of the Mueller complex (site of the old Mueller airport). Take exit 236B off I-35 to Airport Blvd east. Turn left on Aldrich Street and right on Simond.

The Thinkery offers visitors free parking in the Mueller Town Center garage located north of the museum on McBee Street. Free street parking is also available next to the museum.

(FYI. The Thinkery’s exhibits and activities will NOT be open during our meeting, but we hope you and your family will visit them during their posted hours.)
Executive Committee Minutes
By Domingo Rochin, Secretary

August 3, 2015

The meeting was called to order at 7:05 PM. Present were President David Mathias, Vice-President Terry Phillips, Secretary Domingo Rochin, Treasurer Tara Krzywowski, Equipment Chair Jim Spigelmire, Communications Chair David Lynch, Outreach Chair Dawn Davies, Members-at-Large Katie Raney, Brian Lippincott, and Alan Carruth, IDA Rep Tim Brown, newsletter editor Joyce Lynch, and former Treasurer Mark Lyon.

Officer and Chair Reports

Vice-President For August, we are set with UT College of Natural Sciences for a brief presentation on the night sky and basic observation and then a star party after the meeting. For September Robin Gose from the Thinkery will present. Terry sent out inquiries for speakers for October and November, but nothing has been set yet. However, he is scheduled to do a presentation in October to the Mason County Astronomical Society about observing satellites, and if needed he could do the same for us.

Treasurer We received the IRS certification in the mail today. It indicates that it was issued in August of 2000. The ID# is the same as before. The issue of copyright infringement was settled for $1000.

Outreach AUTS report: 250+ visitors – it’s hard to keep track after dark. We could create a better signage and directions to funnel people in. There were more than 30 telescopes and binoculars. There were 4 winners of the astronomy bingo. COE public star party this weekend (8/8/15). For September, tentatively we have Starry Night Girls at the 3rd, Dam Star Party on the 4th, possibly Belterra. And two possible new events: Bring your own telescope workshop, and Lady Bird Lake Boardwalk - urban night sky astronomy.

Communications IT training needed. Jim and David will look into setting up a training date. Discussion continued on the future of the Yahoo group.

Equipment EEO field keys – only one set available (should be five). Combination lock on members only night. Scope training will be conducted on Saturday the 8th prior to the Public Star Party. Two campsites are available for AAS members wishing to stay overnight.

Member Services Survey questions are being re-structured. Will send final revision by this weekend. During July’s Members Only Star Party there were some issues that need to be dealt with. We need to make clear the purpose and use of the Eagle Eye Observatory during members only night.

Texas IDA Texas Night Sky Festival will be in March of 2016 in Dripping Springs. Tim wants to put together a dark skies presentation for Practical Astronomy.

Business Collaboration with the Thinkery: David indicated that Dr. Phil Schmidt has strong interest in a partnership and outreach activities at the Thinkery, and this could lead to potentially using the Thinkery as our home base for our GA meetings. Tim indicated that to permanently change the location of the GA meetings requires approval of the General Assembly. The agreed course of action is to inform the GA that it is under consideration and set up a committee to address and provide an e-mail point of contact to send opinions, suggestions, and questions. Tara and Dawn indicated that we should provide a list of possible places and some guidelines as to what kind of a place are we looking for.

This month is membership renewal time. Problems noted are that some are getting the wrong (membership) dates. Additionally, we need to look into why some family members are not on the list after renewal.

The budget will be presented at the August GA meeting. EC members should submit their requests for funding for the new fiscal year.

The meeting was adjourned at 8:57 PM.
GENERAL ASSEMBLY MINUTES
By Domingo Rochin, Secretary

August 14, 2015

The meeting was called to order at 7:31 PM. A quorum was present. The minutes for July were approved.

OFFICER AND CHAIR REPORTS
President  David welcomed those in attendance and explained the star party after the meeting in cooperation with the College of Natural Sciences.
Vice-President  September meeting will be at the Thinkery with speaker Robin Gose from there. The 25” scope needs mirror recoated -$1.5 - 2K.
Treasurer  A budget for the fiscal year beginning September 1 was presented and approved.
Communications  Committee members are welcome.
Outreach  Girlstart outreach events resume on September 4th and will be once a month thereafter. Belterra star party on the 18th. COE public star party on the 19th. Solar scope training will be provided. AUTS was a great success – more than 200 guests and over 30 scopes available. July Star Party was also a great success with 175 guests and 18 telescopes. Astronomy Off the Field on the 27th at the Galaxy Cafe. And still planning to host an event at the Lady Bird Lake boardwalk.

Member Services  The survey is available on the web. We would like to have at least half of our members participate. Tomorrow is members only star party. Members should review light protocols.
ALCor  Briefly covered AL programs available to AAS members with awards that can be earned.

ANNOUNCEMENTS FROM THE PRESIDENT
Grant proposal to SXSW was not approved. Canyon of the Eagles contract is posted on the website for review, discussion, and proposals. Different sites for GA meetings are being considered. Volunteers are needed for the Long-Term Planning Committee, specifically people skilled with money, people with connections with parks (city, county, and state), and persons with know-how to interact with other nonprofit organizations including STEM groups.

Meeting was adjourned at 8:26 PM.

WELCOME NEW MEMBERS
Aline Albert
Eunjung Choi
Deborah Elufson
Haley Freytag
Jeannie Goldwire
Gary Grafel
Jerod Kendrick
Taegon Kim
Joseph Mathias
Sharon Meloy
Jerimy O’Mary
Michael Owens
Cathy Parker
Aurora Rochin
Evelyn Rochin
Isadora Rochin
Laura Rochin
Sara Slate
Angela Smith
Andrew Swain
Bryan Verhoeff
David Watts

ASTRONOMY OFF THE FIELD
Thursday September 24
7:00 p.m. - 9:00p.m.
Cafe Express, 3418 North Lamar

Put down the telescope and come Off the Field. Are you looking for a bit of mid week astronomical socializing? Are you tired of trying to discern one astronomer’s voice from another on the observing field in the pitch dark? Want to better get to know your fellow AAS members and other Austin astronomers?

Join us for Astronomy Off the Field on the last Thursday of the month. Meet up with fellow astronomers to talk shop and then some. Get to know their other interests, alternative hobbies, relax with a drink and food and have a little fun, if not a lot. All ages welcome.
# July 2015 Treasury Report

*By Tara Krzywonski, Treasurer*

## Deposits

*Dues payments*

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**Dues payments totals** $189.52

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**Total interest earned** $0.65

**Total other income** $0

**Deposit Totals July 1 - 31, 2015** $190.17

## Expenses

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**Expense Totals July 1 - 31, 2015** $1,533.95

## Bank Balances

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<tr>
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**Total Cash** $27,232.32

*Total of 425 AAS members as of August 26, 2015*
Having begun a relation with Girl-start earlier in the year, I am pleased to announce we will be making a regular appearance at their monthly Starry Night Events. We hope to continue making new friends and working with some of the non-profit and educational organizations. You will still see the familiar outreach requests for schools and libraries we've worked with for years; however, be prepared to take your scope to new locations in and around Austin and join us in making new friends.

In August we once again had a great turnout of astronomers and scopes at our public star party. We will continue to offer solar observing prior to dark skies and look forward to training more members on both the observatory scopes as well as the solar scope.

Thank you to all those that joined us after the General Assembly meeting to provide urban stargazing to the College of Natural Sciences on the UT Campus. Despite the light pollution and sky limitations, our guests had a delightful time, and it was a pleasure to connect with CNS and their alumni.

A special thanks to Rob Pettengill for his outreach work and representation at the Manor Art Council Star Party.

Please see the listing below of upcoming outreach events as well as opportunities to work with the Texas Museum of Science & Technology. If you are available to attend any of these events, please let me know and in what capacity.

Do you have questions about outreach? Want to know more about how you can play a bigger role in the mission of the Austin Astronomical Society? Call or email me and let's talk! (dawnmunroedavies@gmail.com or 512.663.2249)

**SEPTEMBER**

19 Public Star Party at EEO at COE 6:00 PM – 7:00 PM Solar Scope Training 7:00 PM – 8:00 PM Solar Observing 8:00 PM – 11:00 PM Star Party 16942 RR 2341, Burnet, TX 78611 Astronomers with telescopes and binoculars needed as well as observatory operators, welcome table greeters and sky tour guides

20 Austin Museum Day at the Texas Museum of Science & Technology Time TBD, daytime hours 1220 Toro Grande Drive Cedar Park, TX 78613 Astronomers with solar scopes needed as well as individuals to provide astronomy type activities

3 Ranch Star Party Time TBD 1000 John Deere Road Burnet, TX 78611 More details forthcoming

3 & 4 Planetarium Opening Weekend at the Texas Museum of Science & Technology Time TBD 1220 Toro Grande Drive Cedar Park, TX 78613 Astronomers with solar scopes needed as well as individuals to provide astronomy type activities

**OCTOBER**

2 Planetarium Opening Gala at the Texas Museum of Science & Technology Time TBD 1220 Toro Grande Drive Cedar Park, TX 78613 Astronomers with telescopes needed

10 Public Star Party at EEO at COE 6:30 PM – 7:30 PM Solar Observing 7:30 PM – 10:30 PM Star Party 16942 RR 2341, Burnet, TX 78611 Astronomers with telescopes and binoculars needed as well as observatory operators, welcome table greeters and sky tour guides

16 Belterra Star Party 7:00 PM– 9:00 PM 801 Belterra Drive Austin, TX 78737 Astronomers with telescopes and binoculars needed as well as sky tour guides

30 Green Screen Film Series 7:00 PM – 1:00 AM (astronomers need not be onsite the entire event duration) Laguna Gloria @ 3809 West 35th Street Austin, Texas 78703 Astronomers with telescopes and binoculars needed
Cooler September evenings invite a more balanced view of the sky. If you favor star clusters, the northern Milky Way - Cygnus, Cepheus, and Cassiopeia - is your stomping ground. Galaxy lovers will opt for more southerly regions like Andromeda, Pegasus and Pisces, although even there the occasional globular cluster can be found. Either way, the fall sky presents plenty of celestial real estate, so pull your scope out into these fall evenings and stake your claim - enjoy!

**NGC 7235 rating EASY**

open cluster in Cepheus  
RA 22h 12.6m Dec +57d 16.8’  
(2000)  
Magnitude 7.7

Here’s a pretty little cluster for smaller scopes that’s easy to find. Start at 3rd magnitude Zeta Cephei, the southernmost star in the Cepheus pentagon, and from there jump about a degree SE to 4th magnitude Epsilon Cephei. The cluster is easily visible just NE of Epsilon, a pretty view in a 6-inch scope at about 50x.

A 10-inch will show you about 15 stars, scattered in a roughly 5’ long formation trending ENE-WSW. A brighter 9th magnitude star sits slightly separated on the SE side; the other members range from magnitude 10-12. The second brightest star in the cluster is notable due to its color, described as ruby by some, and fire-red by others. The brightest cluster star has a yellowish tinge.

**M15 rating MEDIUM**

Globular cluster in Pegasus  
RA 21h 30.0m Dec +12d 10.1’  
(2000)  
Magnitude 6.4

M15 was discovered by Maraldi in September of 1746 during a comet search and found again by Messier in 1764. However, Messier considered the cluster a starless nebula, as did other early astronomers like Bode. William Herschel, in 1783, was probably the first to realize it was a cluster of stars.

You can find M15 yourself in western Pegasus, about 4 degrees NW of 2nd-magnitude Enif (Epsilon Pegasi). It hangs like an apple in front of Enif, which represents the horse’s nose.

The cluster is generally ranked among the dozen finest globulars in the northern sky. With a total magnitude of about 6.5, it can be glimpsed as a fuzzy star-like object in binoculars. In a 2.4-inch it’s very bright, slightly brighter and more concentrated than globular M2 in Aquarius. In a 6-inch you’ll see a halo out to about 5’ surrounding an intense core. But it still appears granular. An 8-inch at about 250x is needed to begin to resolve it. With a 12-inch you can resolve M15 to the bright 1’ center. This is surrounded by a 5’ core, with 12th magnitude stars sprinkled out as far as 13’. M15 is one of the richer and more compact globulars, notable for the brilliance of its central core. This core has undergone a contraction known as “core collapse” and contains an enormous number of stars surrounding what may be a central black hole. M15 is also notable for its large number of variable stars. Most are short-period RR Lyrae class variables, all about 16th magnitude. But at least one type II Cepheid is also known.

Another unusual feature is a small planetary nebula (Pease 1) on the NE side of the cluster. The planetary, found with the 100-inch Mt. Wilson telescope in 1927, is photographic magnitude 13.8 and 1” in diameter. It has been observed in scopes as small as a 10-inch, but is considered a tough visual target even for large amateur instruments. M15 is one of just four globular clusters known to contain a planetary nebula. The other globulars in this select group are M22, NGC 6441 and Palomar 5.

Also like several other globulars, M15 is an X-ray source. These sources are thought to be neutron star binaries, in which a city-sized neutron star is in a close orbit with a normal star.

By Brian Cuthbertson
NGC 7026 rating HARD
planetary nebula in Cygnus
RA 21h 06.3m Dec +47d 51.1’
(2000)
Magnitude 10.9

Dubbed the “Cheeseburger nebula” for its odd form, NGC 7026 is located in northern Cygnus NE of Deneb, about 1/4 degree from 4th magnitude 63 Cygni. In a 6-inch scope, look for an 8” diameter planetary about 25” WSW of a 10th magnitude star. A 10-inch shows a round 15” diameter object with a starlike center and diffuse edges. But in 12-inch scopes and larger, the nebula starts to get interesting: it begins to look elongated by about 40 percent, and appears to be divided into two bright lobes separated by a dark line.

NGC 7026 is an odd variation of a bi-polar planetary nebula. Most bi-polar planetaries have two lobes that extend away from each other, but in this case they lie side-by-side, separated by a narrow strip of darkness. It is these two lobes which give the nebula its name, appearing like the buns of a cheeseburger.

NGC 7026 is located 6000 light years away, directly in the plane of the Milky Way. This means there’s more gas and dust than usual, and NGC 7026 is in the thick of it. As a result, the gas lobes we see are slamming into all this material, creating weird patterns and “fingers” which are visible in images from large telescopes like the Hubble. Such fingers are very common when hot, fast gas flows past denser, cooler gas. For those of you with a physics bent, that condition is called a Rayleigh-Taylor instability. Find a Hubble image on the web and you can see this bizarre detail yourself.

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**Image of the Month**

**Congratulations!**
ROB PETTENGILL

“The Nearly Blue Moon Revisited”

Moon 2015-07-30 04:08 UT Questar 3.5” with Sony NEX-5N at prime focus (1280mm). Exp 1/80 sec at ISO 200. 12 of 24 images stacked and deconvolved in Nebulosity with with affine 8 parameter alignment taking nearly 6 hours. Post processed for exposure, saturation and additional masked sharpening in Photoshop. Made with a Mak on a Mac :-) For additional comments from Rob, go to https://www.flickr.com/photos/robpettengill/20168048436/
M17
August 15, 2015
OTA: C11Edge F/2 Hyperstar
Mount: CGEM
Camera: Canon T2i, modified by Hap Griffin, IDAS V4 filter
Guided by: Orion 80mm and Starshoot Autoguider, PHD2
67 light frames, darks, bias and flat 120 secs at ISO800
Captured and processed with Images Plus 6.0

Images by Laurie Allai

M20
OTA: EDGE-11 F/2 Hyperstar
Mount: CGEM
Camera: Canon T2i, modified by Hap Griffin, IDAS V4 filter
Guided by: Orion 120mm and Starshoot Autoguider, PHD2.4.1
48 frames, 120 secs at ISO800
Captured with Images Plus Camera Control 5.75
Processed with Images Plus 6.05
As Earth spins on its axis, our planet’s interior spins as well. Deep inside our world, Earth’s metal-rich core produces a magnetic field that spans the entire globe, with the magnetic poles offset only slightly from our rotational axis. If you fly up to great distances, well above Earth’s surface, you’ll find that this magnetic web, called the magnetosphere, is no longer spherical. It not only bends away from the direction of the sun at high altitudes, but it exhibits some very strange features, all thanks to the effects of our parent star.

The sun isn’t just the primary source of light and heat for our world; it also emits an intense stream of charged particles, the solar wind, and has its own intense magnetic field that extends much farther into space than our own planet’s does. The solar wind travels fast, making the 150 million km (93 million mile) journey to our world in around three days, and is greatly affected by Earth. Under normal circumstances, our world’s magnetic field acts like a shield for these particles, bending them out of the way of our planet and protecting plant and animal life from this harmful radiation.

But for every action, there’s an equal and opposite reaction: as our magnetosphere bends the solar wind’s ions, these particles also distort our magnetosphere, creating a long magnetotail that not only flattens and narrows, but whips back-and-forth in the onrushing solar wind. The particles are so diffuse that collisions between them practically never occur, but the electromagnetic interactions create waves in Earth’s magnetosphere, which grow in magnitude and then transfer energy to other particles. The charged particles travel within the magnetic field toward both poles, and when they hit the ionosphere region of Earth’s upper atmosphere, they collide with ions of oxygen and nitrogen causing aurora. Missions such as the European Space Agency and NASA Cluster mission have just led to the first accurate model and understanding of equatorial magnetosonic waves, one such example of the interactions that cause Earth’s magnetotail to whip around in the wind like so.

The shape of Earth’s magnetic field not only affects aurorae, but can also impact satellite electronics. Understanding its shape and how the magnetosphere interacts with the solar wind can also lead to more accurate predictions of energetic electrons in near-Earth space that can disrupt our technological infrastructure. As our knowledge increases, we may someday be able to reach one of the holy grails of connecting heliophysics to Earth: forecasting and accurately predicting space weather and its effects. Thanks to the Cluster Inner Magnetosphere Campaign, Van Allen Probes, Mars Odyssey Thermal Emission Imaging System, Magnetospheric Multiscale, and Heliophysics System Observatory missions, we’re closer to this than ever before.

Kids can learn about how solar wind defines the edges of our solar system at NASA Space Place. http://spaceplace.nasa.gov/interstellar
Astronomical League Report
By Lauren Gonzalez, ALCor

We have several awards to be presented at the GA meeting this month. Domingo Rochin, club secretary, has earned his first level Outreach award. This certificate and pin requires only 5 events of 2 hours duration each. He’s also well on his way to the Stellar level award. Rob Pettengill was awarded his Stellar level award several months back and will hopefully be able to be presented with his award this month. The Stellar level certificate requires 50 hours on top of the Outreach level. The final outreach level is the Master award, and it requires 100 additional hours after the Stellar level. I finally completed my Master level in August.

Mark Johnston has received his Master Observer plaque. Plaques were presented to Master Observers at ALCON in July. Mark was unable to attend, but Jack Estes was there to receive his and brought Mark’s back to him. Congratulations, Mark!

We’re still waiting on a couple of completed awards to come in from the award coordinators, so we may have even more awards to present! It’s so great to be involved with the AL and a club that is so involved. Keep up the good work, everybody, and let me know what you're working on!

Silent Sky, a play by Lauren Gunderson

A new play about Henrietta Swan Leavitt and the real women “computers” working at Harvard Observatory at the dawn of modern astronomy. In this exquisite blend of science, history, family ties, and fragile love, a passionate young woman must map her own passage through a society unaccustomed to strong women in a man’s world. A celestial romance and true story of discovery. Finalist for the Jane Chambers Award 2013. http://silentskyplay.tumblr.com/

“Lauren Gunderson’s luminously beautiful play… A lovingly crafted period piece that imagines Leavitt’s inner world against the backdrop of World War I, Einstein’s discoveries and the suffragette movement, Silent Sky is an intellectual epic told on an intimate scale. Bottom line: Heavenly.” —Atlanta Journal-Constitution

The play will open the newly renovated Rice Village theater in Houston and will run from Nov. 1 – 29:

http://www.mainstreettheater.com/mainstage/silentsky.html
Austin Astronomical Society is Going Back to School!!! Last year we partnered with Nepris, a cloud-based networking platform to connect with Kindergarten through High School students about various astronomical topics. What a great way to show students all over the country what we think is really cool about astronomy and space exploration! You can share your knowledge and inspire these students to check out their local clubs.

How it Works:
Teachers create requests for professionals to connect with their classes – including descriptions of what the students are learning and questions they have about the topic. Topics can cover any of the STEAM areas (Science Technology Engineering, Arts and Math). Nepris searches their database for any industry person who is a “match” and sends an email with details about the session. It’s not necessary that you work as an astronomer. We need people who are passionate about a topic (like all of you reading this!) to answer the call! Professionals review the request and if they choose to accept, select the time that works for them and then connect to the classroom right from a home or office – no need to travel. The only requirements are a device with a camera and access to high speed internet – could be a computer, tablet or Smart Phone. You can show anything that is on your computer whether it be pictures, slides, videos or software. We know that you have access to lots of great pictures, data and information through your club membership so let us know what you need.

What Kinds of Astronomical Topics are Teachers Requesting?
Here are few sessions completed last school year…
Space Planning (1st grade)
Brightness of the Sun Relative to the Distance of the Earth (4th/5th grade)
Classification of Stars (8th grade)
Manned Space Missions to Mars (12th grade)

Most sessions are 30-45 minutes in length, and about half of that time is spent in Q&A about the topic and your life experiences.

How Do You Sign Up?
It’s so easy!! You can sign up and create a simple profile on Nepris.com. They match based on skills and industry so be sure to put “Astronomy” under the Skills and Austin Astronomical Society under Affiliations. You are welcome to add anything from your work life or hobbies if you’d like to connect on those topics as well.

Questions or Want More Information?
Feel free to talk with anyone on the AAS Executive Committee or contact our Nepris partner, Stasi Gaveras, at stasi@nepris.com or 512-657-2211.

We want to excite and engage students about astronomy and this is a great way to get involved! Sign up today!!!!
Astronomy in the Middle Ages

By Michael Marotta

The unique conflict of personalities between Galileo Galilei and Pope Paul V has given rise to a popular assumption that the medieval church was opposed to science in general and to astronomy in particular. It is not true. In fact, during the Middle Ages, the church was a strong promoter of astronomy.

Gerbert d’Aurillac, who served four years (999-1003) as Pope Sylvester II, studied among the Muslim scholars of Spain. He brought decimal arithmetic, Arabic numerals, the abacus and the armillary sphere to Europe. But he was not alone.

It is true that knowledge held by the Romans was lost during the Dark Ages, but that did not include much astronomy because the Romans did not know much. How extensively Ptolemy’s Almagest was accepted in the waning days of the Western Roman empire is questionable. Hypatia of Alexandria was likely the last editor of that work, following her father Theon. The distances to the Sun and Moon had been calculated by Hipparchus in the 2nd century BCE. No approximation for the size of the universe was attempted until the Middle Ages. That was a consequence of a more exacting problem: computing Easter.

“Historians have long recognized that the rebirth of science in twelfth-century Europe flowed from a search for ancient scientific texts. But this search presupposes knowledge and interest; we only seek what we know to be valuable. The emergence of scholarly interest after centuries of apparent stagnation seems paradoxical. This book resolves that seeming contradiction by describing four active traditions of early medieval astronomy: one divided the year by observing the Sun; another computed the date of Easter Full Moon; the third determined the time for monastic prayers by watching the course of the stars; and the classical tradition of geometrical astronomy provided a framework for the cosmos. Most of these astronomies were practical; they sustained the communities in which they flourished and reflected and reinforced the values of those communities. These astronomical traditions motivated the search for ancient learning that led to the Scientific Renaissance of the twelfth century” (Astronomies and Cultures in Early Medieval Europe by Stephen C. McCluskey. Cambridge University Press, 1997.)

Easter is the most important date in the Christian calendar. It is set as the first Sunday after the first full moon after the first day of spring. That challenge was a singular problem with a specific name: computas. In the Dark Ages, the common solution was simply to ask your Jewish neighbors when Passover will be. Eventually, the new arithmetic and new calculating tools allowed reckoners to bring the solar and lunar calendars into alignment.
Also, after the year 1000, the promise of the Second Coming had to put off for the far future. So, too, was the calculation of Easter extended forward for decades and centuries. Over time, it became obvious that the calculations were off. More precise instruments - hour glasses, water clocks, verge-and-folio (spring-driven escapements) - allowed more careful measurements. To correct the errors, assuming circular motion to be perfect, more deferents epicycles were added to the Ptolemaic model which had been imported through the Arabs, perhaps as early as the 11th century (but no earlier).

The astrolabe entered Europe about the same time, no later than the mid-12th century. Based on instruments created by Theon and Hypatia and their student Synesius of Cyrene, the earliest true astrolabes date to improvements by Muslim scholars of the eighth century. For them, the device was a time-keeper to set the daily prayer cycle. It also allowed other astronomical calculations, important to travelers across a culture that spanned three continents. The most likely candidate for the earliest European treatise on the instrument dates to about 1141 by one Raymond of Marseille. (See “New Manuscripts of On the Astrolabe by Raymond of Marseille,” by Irene Caiazzo and Charles Burnett, *Scriptorium* 65, 2011, pp. 338-349; and “The Astrolabe: An instrument with a past and a future,” [http://www.astrolabes.org/index.htm](http://www.astrolabes.org/index.htm).

“Measurements by clepsydras [water clocks] prove … that although the earth is at the center of the universe, it is eccentric to the sun’s orbit. At times the sun is borne at a greater distance from the earth than at other times. When the sun is climbing upwards in Cancer and Gemini, in the steeper tracts of its course, it takes longer, lingering 32 days in Gemini; but it requires less time in the lower tracts, 28 days in Sagittarius, the elapsed time for the other signs varying between those extremes. “Dominant Traditions in Early Medieval Latin Science” by William H. Stahl, *Isis*, Vol. 50, No. 2 (Jun., 1959), pp. 95-124.

By the middle of the 13th century, Saturn was estimated to be 72 million miles from Earth. The fixed stars were set at one billion miles from Earth. Those empirical assertions validated the relative unimportance of Earth and our mundane affairs, and magnified heaven.

Image credits:
Above, Iraq one-half dinar, series 1979. Author’s collection
Right, American Philosophical Society

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**Planesetary Diagrams for Roman Astronomy in Medieval Europe, C.A. 800-1500**

Bruce Eastwood
Gerd Graßhoff
The Eldorado Star Party has a congenial atmosphere where amateur astronomers renew old friendships and make new friends!

ONLINE REGISTRATION BY CREDIT CARD CLOSES: September 21, 2015

ONLINE REGISTRATION BY CHECK OR MONEY ORDER CLOSES: September 14, 2015
Checks or money orders must be mailed promptly after registration.

CANCELLATIONS FOR REFUND: September 21, 2015. Refunds will be processed for cancellation requests received by the Registrar through this date; there are non-refundable fees of $15.00 in addition to the initial registration service fee. Refunds will be processed after the star party is over.

REGISTRATION AT THE GATE: October 5 through October 10, 2015. Registration fees on-site are $100 for a full registration and $30 per additional family member living in the same household who is fifteen years or older.

As of September 7, X Bar Ranch does have lodging available. Anyone interested in the Round House, a cabin, or the safari-style tents, may call Stan Meador directly to discuss details: 325-853-2688

Meals may be ordered for the next day and later at an additional cost of $4 per meal. Tees can only be ordered with online registration.

ABOUT THIS YEAR

SAFARI TENTS: Stan has discovered and negotiated a great and affordable addition to star party housing at the X Bar—the safari-style tent. These tents accommodate two people with a queen bed or two twin beds; in addition to the bedding, there will be a table and two chairs. Your tent will be set up with the beds made, waiting for you. Only one of the two people occupying a safari-style tent will pay the cost.

RESTROOMS: There has been a small increase in the camping fee to cover the cost of improving the availability and servicing of the portable toilets. The toilets will be available for use at both ends of the observing field. In addition, they will be serviced on Wednesday, mid-week. Hot-water showers continue to be available.

TEE DESIGN: Congratulations to Clayton Jeter and Chuck Cypert whose ideas were merged into the tee design. This year a ladies’ tee is offered in addition to men’s short and long sleeve tees.

WINERY TOUR: The visit includes a pizza lunch, wine tasting and a tour of the beautiful grounds. www.christovalvineyards.com

MEADORS HOSPITALITY: The Meadors will continue to feed us well! When you wake up Tuesday morning, there is a breakfast taco brunch in the Lodge. The Saturday evening BBQ from the outdoor grill is cooked and served by the whole Meador family! This dinner is a celebration and wrap-up party as we look forward to our last night at ESP! Sutton County Steak House caters the other meals.

OBSERVING LISTS: Bill Flanagan and his team of Blackie Bolduc and Brad Walter have produced this year’s Observing Lists.

Register online NOW at:
http://www.eldoradostarparty.org
Joining AAS or Renewing Membership

To join or renew your membership to AAS, please visit: http://www.austinastro.org/JoinAAS

AAS memberships run from 9/1 to 8/31 and there are five membership levels to choose from:

- **Household $40.00 (USD)**
  - Subscription period: 1 year on September 1st
  - No recurring payments. For members of a household living at the same address.

- **Junior $15.00 (USD)**
  - Subscription period: 1 year on September 1st
  - No recurring payments. For members up to age 18.

- **Students $15.00 (USD)**
  - Subscription period: 1 year on September 1st
  - No recurring payments. For members age 18 and older.

- **Regular $25.00 (USD)**
  - Subscription period: 1 year on September 1st
  - No recurring payments. For individual members.

- **Seniors $15.00 (USD)**
  - Subscription period: 1 year on September 1st
  - No recurring payments. For members 65 years of age or older.

The Society’s elected officers for June 2015 through May 2016

- **President**: David Mathias (dmathias@mygrande.net)
- **Vice-President**: Terry Phillips (terjo@TaoSETI.com)
- **Secretary**: Domingo Rochin (sonicwaverochin@outlook.com)
- **Treasurer**: Tara Krzywonski (fafb1@yahoo.com)
- **Communications Chair**: Dawn Davies (dawnmunroedavies@gmail.com)
- **Outreach Chair**: Steve Means (texasmedic@mac.com)
- **Equipment Chair**: Jim Spigelmire (jspigelmire@ymail.com)
- **Member Services Chair**: Alan Carruth (alan-quasar@snkmail.com)
- **Member-at-Large**: Katie Raney (katie.raney@gmail.com)
- **Member-at-Large**: Brian Lippincott (brlippincott@yahoo.com)

Appointed positions

- **Historians**: Brian Cuthbertson (b_cuthbertson@yahoo.com)
- **Kelley Knight**: kelleyknights@yahoo.com
- **Jim Chandler**: jimchandler@isp.com
- **Lauren Gonzalez**: lsrogers16@gmail.com
- **Tim Brown**: tbrown@timobrown.com
- **Joyce Lynch**: joycedelynch@gmail.com

Monthly deadline for Sidereal Times submissions is the 25th. Please send submissions to joycedelynch@gmail.com