

Tucson Amateur Astronomy Association

Observing our Desert Skies since 1954

Summer 2014

Volume LX, Issue 2

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Take Note!

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Milky Way from Dagoon, AZ



TAAA member Terri Lappin photographed the Milky Way from the picnic grounds of the Amerind Foundation located near Dagoon, AZ. The image was taken on 21 June 2014 using a Nikon D5200 DSLR camera with a Nikon 16-85mm (at 16mm) f/3.5, ISO 800, mounted on an IOPtron Sky Tracker. Exposure time was 3 minutes. Short review on the IOPtron Sky Tracker—don't bother, we're returning it. Image copyright 2014 Teresa Lappin, used by permission.

Messier Marathon and BASIS Charter Students Hosted at Chiricahua Astronomy Complex

Text and Photos by John Kalas

The last several months at CAC have been rather busy. The annual Messier Marathon event was held on Friday, 3/28 and Saturday, 3/29. As part of the event, Paul Trittenbach coordinated the first potluck dinner at CAC on Saturday. Twenty-two people in sixteen vehicles showed up, and most participated in the potluck dinner. Thanks to

(Continued on page 3)



Preparing for the 2014 Messier Marathon.



Our mission is to provide opportunities for members and the public to share the joy and excitement of astronomy through observing, education and fun. We fulfill this by providing Astronomy Services to schools, church groups, scout troops, and convention organizers. We support many organizations in the Tucson area that are involved in Science, Technology, Engineering and Mathematics (STEM) programs. Our members enjoy observing the night sky under the dark skies that our observing sites offer. We are an all-volunteer, tax-exempt, non-profit, 501(c)(3) organization.

Frequency

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From Our President

It looks like it will be a hot-dry summer. Let's hope that the monsoons bring us some much needed rain and not just the cloud cover that ruins our observing. Now remember, this needs to happen only during the week as weekends are reserved for observing (yeah, right).

On a serious note, as I mentioned last time, we are intensifying our efforts to reach out to the communities around us as well as the public. It was gratifying to witness the success of the Astronomy Festival – the first sponsored solely by the Tucson Amateur Astronomy Association. Also, as you'll read in this issue, last month we opened up the Chiricahua Astronomy Complex for a 3-day special event for students from BASIS Charter High School. We plan on doing more of these types of events as we move forward.

Now, I want to talk with you about a problem that we have been grappling with for quite some time – magazine subscriptions. Many of you order *Sky & Telescope* or *Astronomy* magazines (or both) when you renew your membership. This procedure was started many years ago as the sole method for offering our members the best rate on these subscriptions. However, that is no longer the case. You can get the same discounted rate by signing up as a TAAA member with the Night Sky Network. Also, there are times when the magazines have special offers that are even lower. In addition, there are delays when we process a subscription. It can take two or three weeks before it is mailed to the magazine and then it can take them another 3 or 4 weeks before a subscription is actually updated. These delays have led to subscription cancellations. What started out as a good thing has become obsolete. So, as of September 1, 2014, we will no longer accept magazine subscriptions. Members can sign up for magazine subscriptions through the Night Sky Network.

We are working hard to make our members feel welcome and appreciated. Part of this effort is evaluating what you, our members, really want from your membership. We have set up a suggestion box in the back of the meeting room for your suggestions and feedback. Also, to make board members easily identifiable at meetings, they will be wearing large name tags on lanyards. Please offer them your feedback. We also want feedback from members who are unable to attend the meetings on a regular basis. So, please feel free to contact me with any suggestions, questions, feedback or criticisms you may have.

Remember, through understanding, cooperation, enthusiasm and dedication we can accomplish great things.

Bob Gilroy, TAAA President



Make your observations!

July 16-25

August 15-24

September 15-24

www.globeatnight.org/webapp/



Concrete slab, measuring 20' x 30', will become a covered picnic ramada.

Messier Marathon and BASIS Charter Students... (Continued from page 1)

TAAA member Chris Brownwell, we had a nice grill and lots of hamburgers and hot dogs. Folks brought some really nice dishes to share and everyone had a great time. Early in the evening, the skies were quite good. Unfortunately, clouds moved in on Sunday morning making it impossible to complete the marathon on Saturday/Sunday. The folks who came down on Friday evening and worked their marathon through Saturday morning had much better results.

On May 8th, the 20'x30' concrete slab for the picnic ramada was poured. Approximately 85 engraved bricks have been transferred to the CAC Site in preparation for building the engraved brick patio. The 6' wide by 30' long engraved brick patio will be installed between the ramada slab and the existing concrete walkway. Filler bricks were purchased recently and were delivered to the site. The engraved brick patio should be installed within the next month. It would be really nice to install the ramada roof as soon as possible to provide desperately needed shade for daytime activities. The club would appreciate any donations toward erecting the ramada cover.

From Monday, 5/19 through Wednesday morning, 5/21, the CAC Site hosted a group of twelve BASIS Charter High School students, their teacher and two chaperones for their year-end project. TAAA member Mike Magras coordinated the event, and Bill Lofquist and I supported it. The visitors tent-camped for two nights. On Tuesday morning, the student group along with Mike toured the nearby Chiricahua National Monument. Both evenings were filled with dark sky observing. One of the highlights for the students was Bill allowing them to use two of his Dobsonian telescopes (a 6" and an 8"). The activity was very

successful and everyone enjoyed it immensely. Mike and Bill will be working with BASIS Charter High School to initiate an astronomy club at the school.

At the May 31st CAC monthly star party, Paul Trittenbach coordinated the second potluck dinner at CAC. Although the participating group of members was smaller, everyone had a great time. The weather was spectacular; clear nighttime skies with a very comfortable overnight temperature.

We're keeping our fingers crossed that the monsoons will be late this year, so we have a chance to get in the June 27 - 28 star parties. If you haven't taken the time to visit the CAC Site yet, you are missing out on a fabulous experience.



TAAA member Chris Brownwell (our unofficial Messier Marathon Cook) tends his grill. Hamburgers and hotdogs were enjoyed by all before a night of observing

Community Involvement & Outreach

TAAA Observing Programs Reach Out to Our Community

Text and photos by Bill Lofquist (wlofquist[at]comcast.net) and Jim Knoll (sjknoll[at]q.com)

Editor's note: Jim currently coordinates scheduling of observing events for schools and non-profits after taking this over from Bill Lofquist earlier this year.

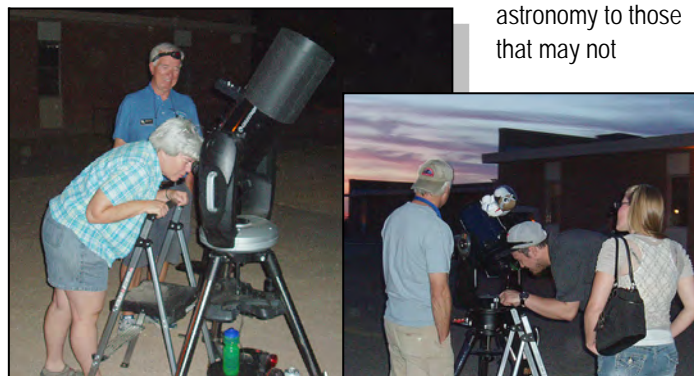
From its earliest days, a very strong part of the Tucson Amateur Astronomy Association's efforts has been making opportunities possible for the public to view the night sky. This continues to the present day, and these efforts are growing each year. While we take a breather during the summer monsoon months of July and August, we gear up each September to start another active period of frequent public events.

Our Basic Program – School and Nonprofit Star Parties

We thank all of our generous volunteers who supported the TAAA Star Party program this school year. We absolutely cannot have a successful program without our members generously volunteering their time, talents, and equipment. The feedback from our school and non-profit coordinators has been outstanding and very appreciative. We not only support our community schools, but also other non-profits and the public in general. The May 2014 Astronomy Day program at Brandi Fenton Park was extremely successful and hopefully can be expanded into a more routine event for our local community.

Outreach events like star parties, can be very exhilarating with the potential to touch an enormous number of people, in particular, the younger generation. Imagine sparking in a young person an interest which grows into a successful science or astronomy career. If you haven't yet considered getting involved in some outreach events, you really should.....they are very rewarding. Our outreach program is extremely important to our community. It can increase astronomy awareness and the importance of "dark skies", give back to the community by providing an opportunity to experience the wonders of

astronomy to those that may not



Observing at Dunham Elementary School. Left: Ralph Jensen and Susan Knoll. Right: Jim Knoll (in blue shirt) shows a couple an astronomical object before darkness falls. Jim is our current School Star Party Coordinator.

After maybe 4-5 minutes she stepped down, gave a big sigh, and even more quietly said, 'Thank you, mister'."

otherwise have the chance, and be an avenue to increase our membership by sparking an interest in astronomy and the sciences.

TAAA volunteer Don Beaman reported on an experience at his telescope at a recent event: "While I was pointed at Saturn, a little girl climbed up the step stool, looked into the eyepiece, and very quietly said, 'ohhh, wow'. Then continued to look and look, while the line grew and grew. Nobody disturbed her. After maybe 4-5 minutes she stepped down, gave a big sigh, and even more quietly said, 'Thank you, mister'."

There are many different ways you can become involved in the TAAA Outreach program. If you don't have a telescope or pair of binoculars, you can check out a telescope from the club. We have Night Sky Network Toolkits available to use in

demonstrating various astronomical concepts. Or, you can just attend and share your knowledge and enthusiasm of the night sky. You can volunteer as often or as little as your time permits. You do not need extensive knowledge of the night sky to share with the participants. Generally, good knowledge of 3-4 objects you feel comfortable observing with your equipment is all that is required. We can have an experienced volunteer work with you the first couple of times until you do feel comfortable, or you can attend as an observer and mingle among all the volunteers to get a well-rounded sense of the volunteer experience. You can join the Starry Messenger SIG (SMSIG) at our bimonthly meetings to help shape the future of TAAA Outreach. If you would like to volunteer your help as a backup coordinator or with other aspects of the program, please let us know.

**2013/2014 Academic
Year Activity**

67 star parties

242 telescopes

40 TAAA volunteers

(Continued on page 5)

TAAA Observing Programs ... (Continued from page 4)

Other Aspects of Our Observing Efforts

For years our members have assisted the folks at NOAO with their Project ASTRO school-related activities. This involves a volunteer from the community teaming with a teacher at a school and offering both in-class study of astronomy and observing opportunities.

In addition, various TAAA members have worked with schools in a variety of ways. For example, an astronomy club has been formed at Rattlesnake Ridge Elementary School in the Marana Unified School District. The teacher, Victoria Scott, has organized this group of fifth and sixth graders. Here is what she said about the first year of this project:

This year, we founded our first Astronomy Club at Rattlesnake Ridge Elementary School in conjunction with TAAA. Working together with Don Cain, Robert Wilson and Bill Lofquist, we have exposed a very enthusiastic group of 5th and 6th graders to the wonders of amateur astronomy. Some students came with very little experience or knowledge of astronomy, only a desire to learn, while others came toting theories about black holes and knowledge well beyond their years. Throughout the school year, students met bi-weekly to learn about astronomy and our solar system in an after-school club format, and then met with the TAAA astronomers monthly for observing nights. Students absorbed information quickly, were taught hands-on how to use telescopes of varying complexities, and how to find and identify objects in the night sky. Both students and parents had wonderful things to say about their experiences with the astronomers, and desire to continue in amateur astronomy. At least two families purchased telescopes, and most of the 5th graders plan to continue next year. We are even heading out to the TIMPA site to observe this summer! Thanks to thoughtful reflection and discussion, next year's club will be open to more students and more grade levels, and the astronomers and I have planned an exciting list of topics to cover each month throughout the year. We have included more guest TAAA members, special speakers from around the community, and more. This club has been a wonderful adventure to begin, and holds many treasures for the coming years!

And Victoria Scott has become a member of TAAA.

Another development has been an exploratory experience at the high school level with one of the BASIS Charter High Schools. This



The 2014 Rattlesnake Ridge Elementary School Astronomy Club with their teacher, Victoria Scott (at center-back).



Members of the Rattlesnake Ridge Elementary School Astronomy Club with guest speaker from the Planetary Science Institute.

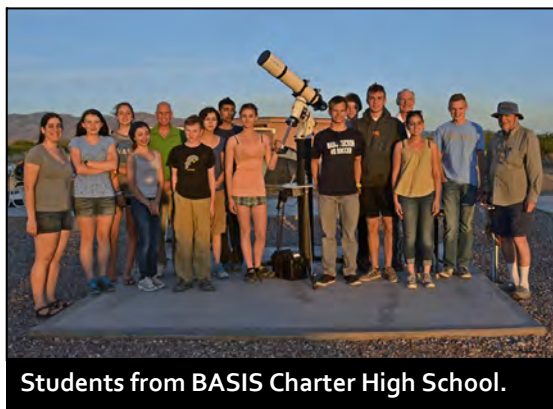
exploration, which began in January, culminated for the school year with a three-day adventure at the Chiricahua Astronomy Complex (CAC) from May 19 to 21. Following is an excerpt taken from an emailed message which Bill Lofquist sent to the TAAA Forum describing how this event came about:

On Monday, Tuesday and Wednesday of this week we had a special event at the Chiricahua Astronomy Complex. As a result of several things that developed, we had a group of 12 students from the BASIS Charter High School on River Road, their teacher/ advisor and a couple parents at CAC for two nights of observing and a lot of daytime emphasis on things astronomical. Mike Magras, John Kalas and Bill Lofquist were there for two very enjoyable nights of observing with our visitors.

The opportunity for this excellent experience began when one of the students at BASIS, Xochitl Longstaff, joined the TAAA last September. Carter Smith and Bill Lofquist met Xochitl at the September general meeting, and after that she opened the door for some conversations with the school. The teacher, Ms. Hannah Sugarman, who is an 8th grade physics teacher, took the lead for the school in these conversations.

In the meantime, Mike Magras had made a general proposal that we explore the possibilities for creating an intensive astronomy emphasis at the high school level. With Mike taking the lead, he and Bill met with Ms. Sugarman and some students back in January. BASIS places a great deal of emphasis on academics, and many of the students are involved in honors courses. Even

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Students from BASIS Charter High School.

TAAA Observing Programs ... (Continued from page 5)

though we started this in the middle of the school year, a strong effort was made at the school to make use of the opportunity.

It was decided that we would do a three day, two night observing session during the school's Project Week. This occurs at the end of each school year after exams have completed. These 12 students opted to focus on astronomy. They ranged from the eighth to rising twelfth graders. All of the students have had physics and a lot of math, and they were very assertive in their discussions of a wide range of topics related to astronomy. They also got very involved in the observing we did. We had four Dobs, a refractor and the C-14" SCT in the roll-off roof observatory. All of the scopes were kept quite busy both nights. We viewed a great number of deep sky objects as well as the four planets that were available. The students had some good hands-on experience with the Dobs.

Monday night was a bit cloudy, though we were able to do a lot of observing until the moon rose at about midnight. Tuesday night, however, was outstanding. It was perfectly clear and the wind died down almost completely.

Ms Sugarman is an excellent teacher who has a strong interest in astronomy. The students were quite enthusiastic about everything we did and expressed an interest in continuing the experience into next school year. There will be more discussions about a planned approach for next year, possibly with the inclusion of more time at CAC and the formation of a club.

We made the best of the facilities we now have at CAC, and with the additional features that are in the making, we will be better equipped in the near future for this kind of experience.

After the event, Xochitl wrote the following:

Thank you so much TAAA for giving us such a wonderful astronomy experience. I had an amazing time. I know that I, as

well as all my peers, were especially blown away by the enthusiasm, kindness and knowledge that Mike, John and Bill embodied on the trip. I feel like I learned so much and got to see so many wonderful things, all thanks to your group. I look forward to continuing this relationship between BASIS and TAAA for years to come.

Other observing opportunities are provided by other TAAA members. The Astronomy Fundamentals Special Interest Group, the Starry Messenger Special Interest Group and the Astro-Imaging Special Interest Group also have much to offer to these efforts.

A Major Event – The Grand Canyon Star Party

Each June, during the week of the new moon, TAAA sponsors the Grand Canyon Star Party. Literally thousands of people come to the Canyon and take advantage of this event. There will be fifty and more telescopes there, brought by volunteers from all over the country, to show the tourists and local residents the very dark skies at the south rim of the Canyon. Jim and Susan O'Connor currently coordinate this event, and a number of TAAA members participate as volunteers for the Park Service. This eight-night saturation experience in astronomy is now in its 25th year. For years it was led by Dean Ketelsen, and it has become a very nice institution that gets national attention.

The Astronomy Services Program

Still another opportunity for observing the night sky that TAAA offers is the Astronomy Services Program. This effort works with the resorts and other groups in the community who wish to enrich the experiences of their customers and clients with some observing. This happens regularly throughout the year, and it provides an opportunity to earn some funds that help support the operation, maintenance and development of our facility at CAC.

Many hundreds of people are able to experience some astronomy through this program. It is coordinated by John Kalas and supported by a small group of TAAA volunteers.

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We are excited to see what new adventures next year's program will bring and we hope you will consider sharing your knowledge of the wonders of astronomy with our community residents.

Job Openings at Sky & Telescope

From Robert Naeye, Editor in Chief of Sky & Telescope:

We knew this was going to happen eventually, but I wanted to let you know that after 40 years of service, senior editor Dennis di Cicco will be leaving S&T at the end of June. We will miss him a great deal, and we wish him the best in the years to come! Also, associate editor Tony Flanders will be leaving S&T at the end of August, and we wish him the best too!

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BASIS Students observing with the C-14 at the Chiricahua Astronomy Complex.



Astronomers Without Borders

ONE PEOPLE + ONE SKY

Telescopes to Tanzania

Invest in the future of children's astronomy education in Tanzania!

Help build the Centre for Science Education and Observatory.

Visit the Astronomers Without Borders website at

<http://astronomerswithoutborders.org/projects/telescopes-to-tanzania.html>

In collaboration with UNAWE-Tanzania we are now looking for funds to establish a Centre for Science. This project is also a recommended project of the IAU-OAD and has thus been placed on its wish list. In June 2014, individuals will gather in Usa River (near Arusha, Tanzania) to prepare a Space Science model for advancing the development of inquiry based science education in Tanzania based on the current national curriculum. The gathering will include District Education officers from the Ministry of Education, science teachers from public and private schools, scientists, and Astronomy educators. A number of teaching resources, Nanotarium (a Do-It-Yourself inexpensive planetarium) and E-Science Cafe (bringing together youth astronomy groups via a website and social media), will also be fielded tested for classroom use in Tanzania at this time.

How you can help:

\$14,000 are needed to set this project in motion.

One individual has already pledged a start-up fund of \$500 (funds for one participant to attend), will you be the next? Consider funding one more participants, or one of our areas of need (any contribution will be much appreciated!): Your contribution helps the project with:

- Resource development materials (ie. Text books, science equipment)
- Cost for gathering 10 people for 5 days
- Travel expenses for participants
- Office and study supplies (postage, paper, copy expenses)
- Research development, follow up and evaluation costs

Job Openings at Sky & Telescope (Continued from page 6)

These will obviously be big holes to fill, and we have just started the process of hiring two new editors. We intend to replace Dennis and Tony with experienced amateur astronomers who have strong writing skills, and who can also help us expand our efforts in new types of media, such as video and digital. We are hoping to find one editor who is an equipment expert, and another who is an observing expert. We are looking for candidates who either live in the Boston metro area, or who are willing to relocate to the Boston area, and who are willing to serve on our staff for the long term. If you know of any amateur astronomers who

might be qualified and interested, please have them contact me, or they can apply directly by going to:

<http://www.fwmedia.com/careers>

They can scroll to the bottom of the page and click "Search our current openings." On the next screen, they can select Cambridge, MA in the Location box. That will show the two editorial positions, one that is equipment oriented and the other that is observing oriented.

Featured Article

Inspired and Inspiring - An Interview with Carter Smith

Conducted by Bill Lofquist, wlofquist[at]comcast.net Photos provided by Bill Lofquist

Editor's Note: Carter Smith joined the TAAA when he was 10 years old. Over the years, we've watched him grow up. He's inspired us as much as we've inspired him. Bill Lofquist interviewed Carter a few years ago when he was a freshman at the University of Arizona. He is now a senior and Bill has once again interviewed him. Both interviews are included in this article.

Part I—January 2011

I am talking with Carter Smith, who is now a freshman at the University of Arizona in Tucson.

Bill: *Carter, what first got you interested in astronomy?*

Carter: When I was three, my mom took me to the Steward Observatory on one of their public nights, and I got to see Saturn. She likes to remind me that when I was there I refused to leave. I loved looking at Saturn and wouldn't stop. So from then on, she decided that this kid was really interested in astronomy, and she decided to foster that. From there, she took me to some of the classes that the Science Center in town had for young people about astronomy and the solar system. I went there and went through several courses, and that was my first introduction to astronomy.

It took me about a year to exhaust the resources they had for six-year-olds, so I was somewhat left in the dark for a while, and did not have an outlet for my craving for astronomy.

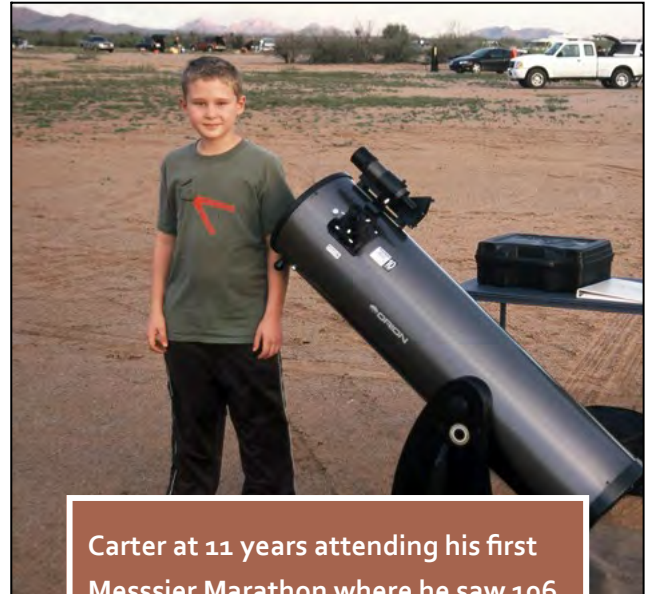
I had been working on a science project, and a friend was helping me with it. He was a member of the Tucson Amateur Astronomy Association, and he suggested that my mom take me to one of the meetings. My mom had heard that TAAA was an advanced group, and the information would not be accessible to a ten-year-old. But she tried it. At that first meeting I remember getting such a kick out of the lecture. I don't remember what it was about, but I was so excited that I had found a place where I could learn and be exposed to a mature level of astronomy.

It was at that meeting that a club member said he was starting up a group for young members to introduce them to astronomy and to the basics of observing.

Bill: *Did you have a telescope at that time?*

Carter: I did. I had a small four and a half inch Newtonian on a go-to mount. The mount drove me crazy. I had wanted to find things on my own, so I had actually stopped using the telescope for a while because it was frustrating and it was hard to see anything much with it.

At the first meeting of this new group for young people, I got to look through an 8" Dobsonian and I was absolutely hooked on observing. I was only ten years old at the time, but I realized that I was developing a passion for astronomy. I could actually see the things I was learning about.



Carter at 11 years attending his first Messier Marathon where he saw 106 of a possible 110 objects in one night.

At that first meeting I learned about the Messier Marathon that was to be held later that month. So my mom and I went with the leader of the group and I got to use the 8" Dob to look for the Messiers.

When we started, I was not sure that I had actually found the objects, but a member of TAAA who was set up next to me checked each object as I found it. The experience was like nothing I had ever experienced before. I searched all night long for the objects, and I got 106 of the 110 objects. My goal was to get 50 of them, and I remember getting such a feeling of excitement and satisfaction from the experience.

Then about three months later, there was the Grand Canyon Star Party sponsored by the TAAA. This is an annual event that lasts a week on the south rim of the Canyon. There are about 60 or 70 people with telescopes who show the skies to the tourists. They are set up on a parking lot, and I was in the middle of many wonderful people who were eager to help this little ten-year-old. They knew a lot about astronomy and I had a chance to share my passion with them. I could show distant objects to the tourists. It was great fun.

The Messier Marathon was really fun, but the Grand Canyon Star Party was really something special. It was at the Canyon that I started doing

(Continued on page 9)

Interview with Carter Smith (Continued from page 8)

the Astronomical League observing of the Messiers, and by the end of the next year I got my certificate for the Messiers.

Those experiences were the first for me, and I have continued to go the Messier Marathon and the Grand Canyon almost every year since then. So even as a very young boy, I found a special place for myself in the TAAA. Going places with dark skies and being with so many amateur astronomers has been great.

I also participated in many of the TAAA School Star Parties. Frequently I was younger than the other students I was showing deep sky objects to.

Bill: *So those opportunities gave you a chance to share your enthusiasm with others and to teach them about astronomy.*

Carter: Through school I did a variety of science projects and participated in science fairs. One of my interests was in light pollution. I learned about this through some of the club meetings, so I decided to do a project focused on measuring light pollution. I met members of the International Dark Sky Association who helped me work hands-on with light pollution issues. I got to present my project at the IDA national conference. I met a man who was with the National Park Service, and I got to work on a project with the Park Service when I was about 14 years old. The TAAA opened these opportunities for me.

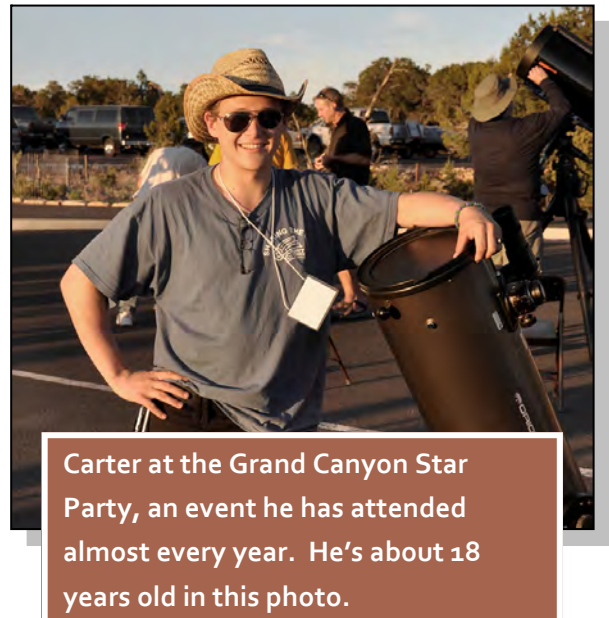
Another project I did was while working on my Eagle Scout Project. I decided to design an experience for students at the Arizona School for the Deaf and Blind. This was my first time trying to organize a star party. The project called for astronomers to help introduce astronomy to the students, and TAAA provided ten volunteers to help me. Introducing deaf and blind students to astronomy is a challenging thing, and it is different from most star parties. I trained the TAAA members to work with tactile approaches to experiencing objects and ways you can help people to see objects by looking through different angles. The TAAA members did an excellent job in working with these disabled students. That was a really fantastic event.

Bill: *So you pursued your interest in astronomy through Junior and Senior High School. Where do you think this interest is taking you?*

Carter: Right now I am a freshman at the University of Arizona, and I am majoring in physics and astronomy. Right now my plan is to become a theoretical astrophysicist working with some of the same concepts that I was introduced to at TAAA. My passion now seems to go toward dark energy and dark matter, which are two concepts that scientists know very little about. I plan to get a Ph.D. and moving on to a place where I can study.

Bill: *I know that you had a very strong experience in high school and took advanced placement courses along the way. Do you think that gave you good preparation for where you are going?*

Carter: The courses I took gave me a good background, but they gave me very little in the specific subjects I am interested in. There was almost no focus on astronomy. What I have learned about astronomy



Carter at the Grand Canyon Star Party, an event he has attended almost every year. He's about 18 years old in this photo.

has come mostly through TAAA. At times I found myself helping the teachers understand some things about astronomy.

Just today I went to the first class in my first introductory astronomy course. I am wondering if I will be able to learn much beyond what I have learned from TAAA over the past several years. I can't wait to get beyond that as I pursue my degree.

TAAA has been a family and a community for me for the past eight years. It has helped me grow, not only as an amateur astronomer, and as a person, and it has been the best community that I have ever encountered.

Bill: *And we can also say that you have made a major contribution to TAAA. You have impressed and inspired TAAA members with your observing abilities and your dedication to learning so much about astronomy. It has been very much a mutually enjoyable and beneficial relationship.*

Thank you, Carter, for sharing your story with us. We wish you the best.

Part II: February, 2014

Bill: *Carter, we started this interview in January, 2011 when you were beginning your second semester as a freshman in your Astronomy major. Now it is February of 2014. Where are you now in your studies?*

Carter: Right now I am in the second semester of my senior year of a five year program, as it has turned out to be, at the University of Arizona, still studying physics and astronomy.

Bill: *I think you have had some interesting experiences along the way, including a time in Scotland. Tell us about the kinds of things you have been studying.*

(Continued on page 10)

Interview with Carter Smith (Continued from page 9)

Carter: I have had the opportunity to study many different aspects of astronomy, both through academics and through research. Everything from baby stars and supernovae, through core-collapse supernovae and the end-of-life stages of very massive stars. I have spent time in the U of A astronomy club for the past three years. I have served as treasurer and am now the president of the club. I have watched the club develop research projects, outreach efforts, grow and continue to be a significant resource for astronomy majors and for astronomy outreach in Tucson. I have spent time in Scotland at the University of St. Andrews where I had a cosmology class and an astronomy computing class. I had a wonderful opportunity to meet students from actually all over the world, studying at St. Andrews.



“I have found ... that astronomy is beautiful and complex, and full of amazing and interesting people who study amazing and interesting things”

Throughout my years here I have delved more deeply into the professional world of astronomy than I expected to, really, and I have found, as a field, that astronomy is beautiful and complex, and full of amazing and interesting people who study amazing and interesting things. I am hopeful that I will get to continue on, get a Ph.D, and stay in the field and really experience more how astronomy can benefit humanity beyond research and academics.

Bill: One of the things you mentioned is that you work with younger astronomy majors as a preceptor. Is that sort of a toe in the water for teaching?

Carter: Yes it is. This is the first time I have been able to be in a classroom and interact directly with students in a formal academic setting. I have office hours once a week, and have students come to me and ask me questions about concepts in class. Just yesterday I had several students come in who have an exam today. They did some review with me about different concepts, and they had questions about how to think about certain things. It has been nice to be able to do that outside of public outreach or informal tutoring. It is nice to get a feel for what it might be like to be a teacher in a formal setting, to give assignments and grade assignments, to actually figure out how people learn and how they understand things that we are trying to teach them. It has given me a sense of hope and a desire to help people learn and appreciate astronomy, and to go beyond just a cursory level or an academic understanding of astronomy, to help them figure out the mechanics of astronomy and the physics of it -- to opening their eyes to see more how the world works and seeing the connections beyond astronomy.

Bill: What have been some of the courses you have taken and found fascinating? What does an undergraduate in astronomy study?

Carter: I have taken my fifth and sixth classes in astronomy now. They have given me a very broad but detailed understanding of astronomy as a field, helping me familiarize myself with a range of topics and what they entail in terms of formal study. So I have gone through the first level introductory classes that don't use a huge amount of math, and then the higher level of upper division of class that use a lot more math and cover pretty much the full range of astronomical topics. Everything from solar physics to cosmology. And I have found that I really, really like stars. That is not what I expected to want to study. I thought I wanted to study dark matter and dark energy and cosmology, the really big stuff that we understand so little of. The further I have gone with research of stars, how they form, how they die, they fascinate and delight me. I have come to understand that there is a wealth of complex physics that goes into their study. There is so much depth to a single star's life. One of the neat things about stars is that they have a life cycle -- they are born, they live, they die, and they give life to other stars. That is a nice parallel to my life, to humanity, to that which is beyond astronomy.

Bill: One of the things that is going on currently is the excitement about the supernova in M82. That is very much related to what you are talking about.

Carter: Yes it is. It is a delight to have that discovered at a time when we can observe it. We have gone for a long time without having a bright supernova, and this has been a great opportunity to observe it directly. We have used the 21-inch telescope on campus, and one of the cool things now is that I am the chief operator for it. We got to see it, to look at this Type 1A supernova, this system of most likely one white dwarf and one very massive star, to watch the beautiful story of its death and see this system scatter their essence across their galaxy to give life to fertilize other stars. It is something to see, to observe, but to think about it, to understand it, to know that in[sic] more than just an abstract sense, know that we can understand how this supernova happens, exactly what this one is doing. It helps me feel a part of something that is so unfathomably large and so unimaginably important. That is what I love about astronomy.

Bill: You mentioned that you are the chief observer on the 21" scope at Steward Observatory. Say a little more about that.

Carter: The 21-inch telescope is the first telescope that I ever looked through. When I was three years old, my mom took me to the U of A campus, which was very near by to where we lived. And they were showing Saturn, as the story goes. When I got to the eyepiece and looked through, I saw Saturn. I was struck and I wouldn't leave. I just stood there and stared and stared. There was a line behind me, and my mother was getting a little anxious, but I fell in love with what I saw. I don't remember anything about this because I was three, but apparently it was enough for her to keep that happening, to keep astronomy open to me, and I am glad she did. Now here I am, the chief operator of that telescope. I am responsible for coordinating its four nights of observing. I have keys to the dome. I teach people how to use her. I have the

(Continued on page 11)

Astronomy Fundamentals Special Interest Group Observing Clubs

- ★ Open to all TAAA members
- ★ Guided or work on your own
- ★ Stepping stone into the Astronomical League Observing Clubs
- ★ Join at any time
- ★ Certificate at completion

Lunar Observing Club meets sporadically depending on schedule compatibility and the lunar cycle. The purpose of this club is to identify and log 30 specified lunar features – some of which are easy, while others are more difficult. This is a great club in which to participate, as the moon is ideal for observing from your back yard or patio. Dark skies are not really necessary and some features are even visible through light clouds. If you are interested in participating in the Lunar Observing Club, or if you just want to be added to our email list to keep posted about our activities, email Bob Eby at [r.eby\[at\]comcast.net](mailto:r.eby[at]comcast.net)

Constellation Observing Club meets monthly on our regularly scheduled TIMPA night. The purpose of this club is to identify and log 20 constellations, their brightest stars and deep sky objects. This is a great way to learn your way around the night sky. If you are interested in participating in the Constellation Observing Club, or if you just want to be added to our email list to keep posted about our activities, email Paul and Cathy Anderson at [paulanderson\[at\]tucsonastronomy.org](mailto:paulanderson[at]tucsonastronomy.org).

Solar System Observing Club meets monthly on our regularly scheduled TIMPA night. The purpose of this club is to observe and log the different features and actions of the planets and their moons and other interesting solar system objects. If you are interested in participating in the Solar System Observing Club, or if you just want to be added to our email list to keep posted about our activities, email Brian O'Connell at [boc7\[at\]inbox.com](mailto:boc7[at]inbox.com).

Double Star Observing Club meets monthly on our regularly scheduled TIMPA night. The dark night sky is filled with millions and millions of stars. Some are close by (relatively speaking) but most are far away. Some are single stars (like our sun) but others are multiple star systems. Of these multiple star systems, we can detect and split many double stars with the aid of our observing equipment. The purpose of this club is to observe and log the different types and colors of double stars. If you are interested in participating in the Double Star Observing Club, or if you just want to be added to our email list to keep posted about our activities, email Tom Watson at [watson1987\[at\]cox.net](mailto:watson1987[at]cox.net).

Interview with Carter Smith (Continued from page 10)

same honor to look at Saturn through her, and even more than that I get to share that experience with the public, with other people who have never met astronomy before.

Bill: *Carter, you have more study to do and more to learn before you get your undergraduate degree. And it sounds like there is a future beyond that as well. Any predictions?*

Carter: I wouldn't dare make too many predictions about this. Wherever I go and whatever I do, I do know that I want to teach. I want to do research. I want to broaden my understanding and ask questions and find the answers. But I want to teach. I have no idea where that will take me and I have no idea what I will do with it. The plan as it stands is to go on to a Ph.D. program and to do post-doctoral research. After that, who knows?

Bill: *Well, we wish you the very best. You have many supporters within the ranks of TAAA members who have been proud to know you and to see you develop as you have over the years. Thanks very much.*

Classifieds

For Sale: Celestron Ultima 2000 & Accessories Purchased New from Starizona. Excellent condition. HyperStar & FastStar compatible. Limited use. Includes Celestron GoTo mount and standard factory accessories \$795. Celestron HD, Hard, custom-fitting case \$145; Celestron HD Wedge adapter for Astrophotography \$125. Celestron Ultima 35mm eyepiece \$75. Solar Filter \$75. Telrad finder \$35. Purchased all for \$3500+ Sell all for: \$975 Also for sale: **Tele Vue Radian 10mm eyepiece** \$150. **Meade SWA 24.5mm eyepiece** \$125. Contact Jim at 520-744-3858 or 520-401-6769.

For Sale: Orion EQ-1 Mount w/EQ-1M Motor Drive & Hand Controller Suitable for small scopes and DSLR astrophotography. Partially assembled. Manuals included \$145. Contact Jim at 520-744-3858 or 520-401-6769

For Sale: Celestron NexStar 8 telescope in good condition. Not used in last four years. Features GoTo mount. Can look up planets and deep sky objects using the key pad and it tells you what you are looking at. Runs on both 12 volts or 110 VAC house current. Two eyepieces: 40mm Celestron Plossl (model 93346) and Vixen 31.7mm (model 3865). Tripod has aluminum legs. Purchased new in 2001 for \$1500; asking price \$400 or best offer. Contact John at 520-722-4199 or [jesdgs\[at\]gmail.com](mailto:jesdgs[at]gmail.com).



Grand Canyon Star Party 2015

t-shirt Design Contest

Purpose: To obtain original designs to be considered for use on the 2015 GCSP t-shirts. (Only one design will be selected for the 2015 t-shirt, but any submitted design may be used for a different year or for a different TAAA purpose.)

Theme: John Dobson. (The design will celebrate the life of John Dobson.)

Who may participate: Anyone. A person submitting a design is not required to be a TAAA member or a GCSP participant. THE WINNER RECEIVES TWO FREE T-SHIRTS.

Due date: All design entries must be submitted by 11:59p.m. (Tucson time) September 30, 2014.

Where Submitted: email the design, written information about the design, and information about the contributor to Mae Smith at [ssmith\[at\]email.arizona.edu](mailto:ssmith@email.arizona.edu)

Important Rules:

- The design and all of its parts must be original and copyright free.
- No material that may be considered advertising may appear anywhere in the design (This includes the TAAA name or logo.). This is a National Park requirement and exceptions cannot be made.
- Submission of a design gives rights of use of that design to TAAA for the 2015 t-shirts and/or for use at a later time on t-shirts, paper or electronically.
- One person may not submit more than three designs.
- A design may contain up to three colors.
- A design must be appropriate for t-shirt use.
- The 2015 GCSP t-shirt Committee and/or its designees will have sole responsibility for selection of the winning design; the determination of future use of all submitted designs; and the selection of 2015 t-shirts, including color.
- Any design submitted by a minor must be so indicated and accompanied by written parental permission.
- Submitted designs must meet the following silkscreening graphic requirement: vector format. (Preferred is vector format, spot color, fonts converted to outlines.) Two commonly used programs to produce vector format are Adobe Illustrator and CorelDraw. (Bitmap images are not acceptable.) Anyone who has a completed design and needs help with vector format may email Mae Smith no later than August 1st and Mae *will advertise for a TAAA volunteer to help*. Obtaining such volunteer assistance or the success of such assistance cannot be guaranteed and will not substitute for the vector format requirement.

Observing and Imaging

Planetary nebulae of the quarter – Summer 2014

By Christian Weis, [weis\[at\]astroweis.de](mailto:weis[at]astroweis.de)

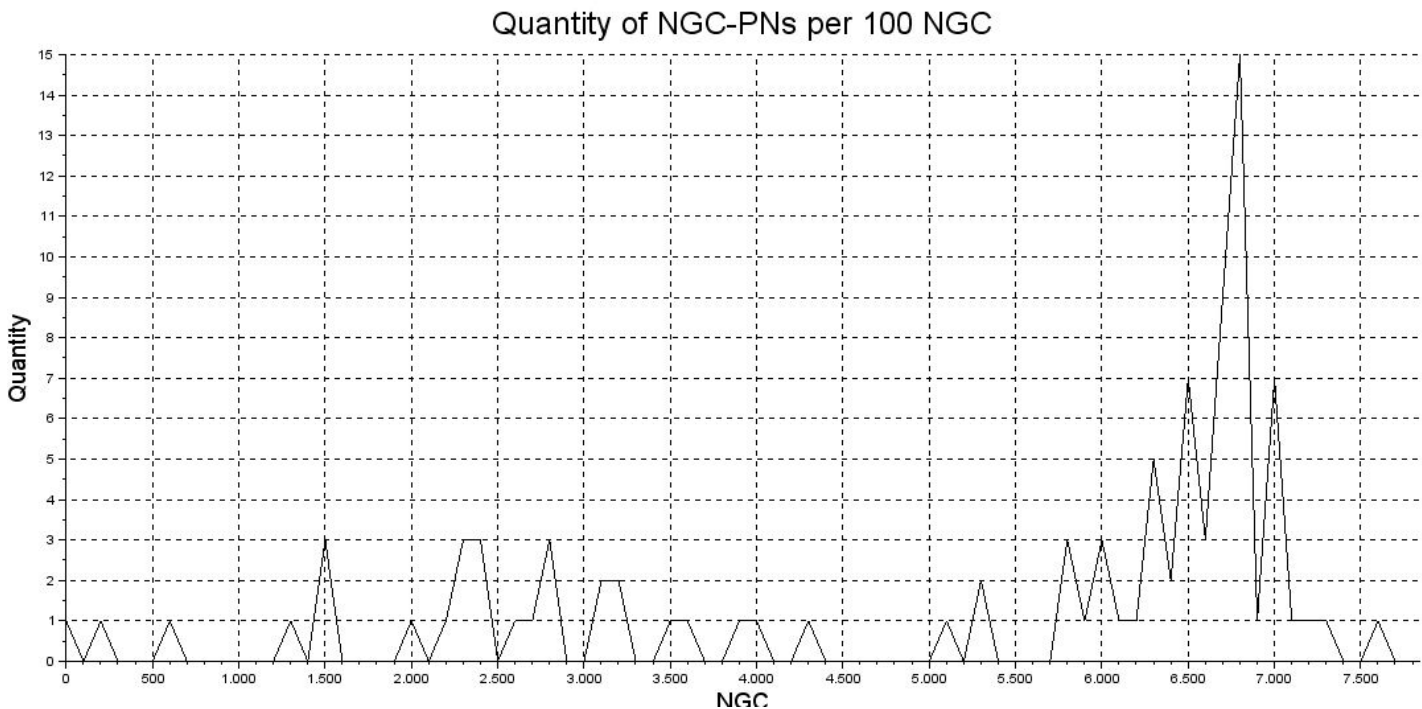
Planetary nebulae (PN) are fascinating objects which come in numerous forms or appearances. Besides the well-known grand four Messiers (M27, M57, M76 and M97), there are hundreds more to explore. This article suggests two PNs, a pretty bright and easy-to-observe one, and a harder one for the more ambitious observer who is equipped with a bigger scope.

If we count both NGC 650/651 (the Little Dumbbell M 76) and NGC 2371/2372 as one object each, then there are 94 planetary nebulae listed in the NGC catalog. Comparing that to 7840 entries, planetary nebulae are rather underrepresented objects. Plotting the quantity of PNs in packages of 100 over their appropriate NGC numbers (e.g. there are 15 PNs with NGC numbers between 6800 and 6900) shows some interesting peculiarities. First, there is an obvious maximum between NGC 6000 and NGC 7000. As the NGC catalog basically is ordered by right ascension, one can translate this to a corresponding area in the

sky. Thus, half of all NGC PNs have right ascension values between 16 hours and 21 hours, which corresponds to the summer Milky Way.

Having one more look at the graph may also lead to another conclusion. There is kind of a very broad second maximum around the NGC numbers 2400. This is located in the winter Milky Way. With our current knowledge of star origin and death (for example PNs) the simplest conclusion is that the star density in the winter Milky Way is less than the one in the summer Milky Way. Of course, this agrees with observation.

(Continued on page 15)



This plot of the number of planetary nebulae found in the NGC catalog per every 100 objects shows a spike which corresponds to the summer Milky Way. Approximately half the planetary nebulae in the catalog are found within the summer Milky Way.

Planetary Nebulae of the Quarter – Summer 2014 - (Continued from page 14)

This season I would like to introduce two quite peculiar planetary nebulae. The first one is NGC 6309. This object is located in Ophiuchus and was discovered by Ernst Tempel in 1878 and identified as a planetary nebula in 1882 by Edward Pickering. It also goes by the name Box Nebula. NGC 6309 is quite beautiful – even in small telescopes you should be able to see some detail. With an apparent magnitude of 11m6 a 6" telescope should suffice. However, this PN is rather small, so one will need some magnification to see structure. I observed the Box Nebula in 2012 from the Grand Canyon South Rim with a 16" Dobsonian and noted: Clearly non-stellar even at low magnifications, longish, elongated in north-south, brighter in the northern and southern part, there is a recess in the west which is weaker than the rest of the nebula, no central star seen, the shape of the nebula appears more "boxy" when using an [OIII]-filter; 780x, fst 6m5 (Sag)

NGC 6309

RA: 17h 14.1min

Dec: -12° 55'

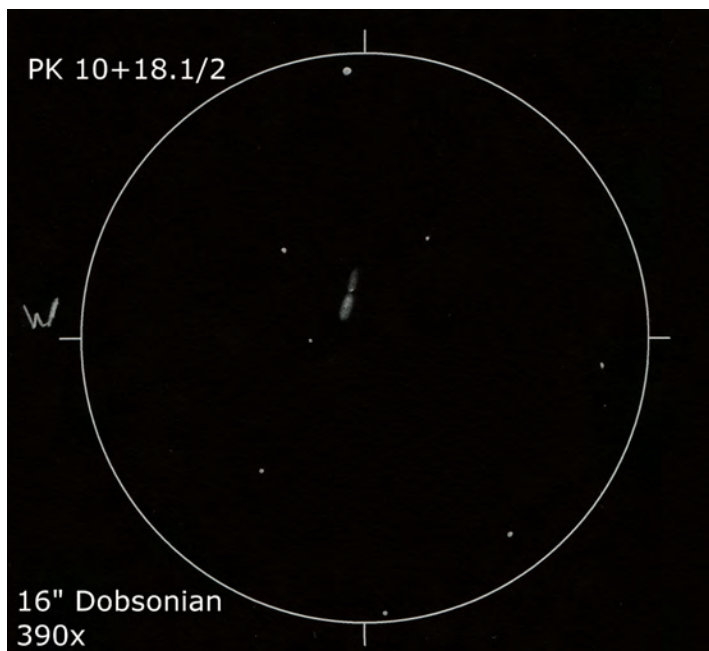
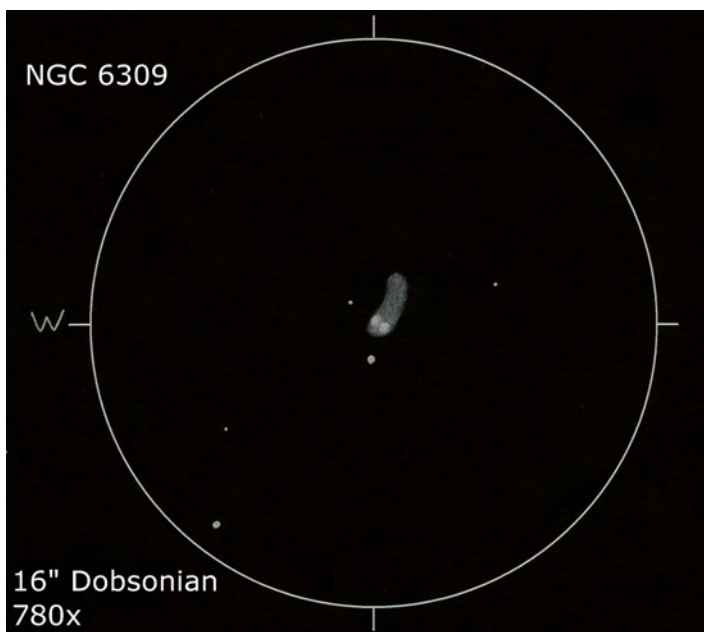
Constellation: Ophiuchus

Brightness: 11m6

Central star: 16m3

Size: 20x10 arcsec

Distance: 8,500 ly



The second peculiar PN is PK 10+18.1/2 and it also is located in Ophiuchus. An interesting feature is that it has two numbers in the PK catalog. The reason becomes clear when you observe it – it clearly has two parts. Remember NGC 650/651 and NGC 2371/2372? Well, here is another example of one PN having two designations in one and the same catalog. I have not checked, but I am confident in saying that there are more examples. If you know such PNs, please let me know – thanks! PK 10+18.1/2 was discovered by Rudolph Minkowski in 1947 and is also known as M2-9. To put it straight: This object is hard! I observed it half an hour after NGC 6309 with a 16" Dobsonian and noted: Suspected at 76x, longish when using averted vision, quite faint, two-part, northern part appears a bit brighter, challenging object; 390x, fst 6m5 (Sag)

PK 10+18.1/2

RA: 17h 5.6min

Dec: -10° 8'

Constellation: Ophiuchus

Brightness: 14m6

Central star: 15m6

Size: 20 arcsec

Distance: 2,100 ly

Constellation of the Season (Continued from page 13)

down, this collection of stars measures 1.5 degrees across and, indeed, looks like a simple coat hanger, complete with a conspicuous hook formed from four stars and six other stars forming the "shoulders" of the hanger.

If you follow the straight edge of the coat hanger toward the east and you have at least a medium sized scope, you will see a star cluster which is truly different than the other clusters described so far. It is difficult to see and would truly be a challenge to find if it weren't for the line of stars pointing directly at it. It lies 17' due east of the eastern most

star of the coat hanger. This cluster, NGC6802, is formed from stars shining at magnitudes 13 through 18, and, therefore, very few, if any, stars can be resolved. The brightness of the entire cluster is magnitude 8.8, is bar-shaped, and measures 3' along its length. If you didn't know that you were looking at a galactic star cluster, you may mistake NGC6802 for a nearby irregular galaxy as it will appear in most scopes only as a diffuse glow.

★ Featured Article - The Space Place

A Glorious Gravitational Lens

By Dr. Ethan Siegel



As we look at the universe on larger and larger scales, from stars to galaxies to groups to the largest galaxy clusters, we become able to perceive objects that are significantly farther away. But as we consider these larger classes of objects, they don't merely emit increased amounts of light, but they *also* contain increased amounts of **mass**. Under the best of circumstances, these gravitational clumps can open up a window to the distant universe well beyond what any astronomer could hope to see otherwise.

The oldest style of telescope is the refractor, where light from an arbitrarily distant source is passed through a converging lens. The incoming light rays—initially spread over a large area—are brought together at a point on the opposite side of the lens, with light rays from significantly closer sources bent in characteristic ways as well. While the universe doesn't consist of large optical lenses, **mass itself** is capable of bending light in accord with Einstein's theory of General Relativity, and acts as a *gravitational lens*!

The first prediction that real-life galaxy clusters would behave as such lenses came from Fritz Zwicky in 1937. These foreground masses would lead to multiple images and distorted arcs of the same lensed background object, all of which would be magnified as well. It wasn't until 1979, however, that this process was confirmed with the observation of the Twin Quasar: QSO 0957+561. Gravitational lensing requires a serendipitous alignment of a massive foreground galaxy cluster with a background galaxy (or cluster) in the right location to be seen by an observer at our location, but the universe is kind enough to provide us with many such examples of this good fortune, including one accessible to astrophotographers with 11" scopes and larger: Abell 2218.

Located in the Constellation of Draco at position (J2000): R.A. 16h 35m 54s, Dec. +66°



**Abel 2218. Image credit: NASA, ESA, and Johan Richard (Caltech).
Acknowledgement: Davide de Martin & James Long (ESA/Hubble).**

13' 00" (about 2° North of the star 18 Draconis), Abell 2218 is an extremely massive cluster of about 10,000 galaxies located 2 billion light years away, but it's *also* located quite close to the zenith for northern hemisphere observers, making it a great target for deep-sky astrophotography. Multiple images and sweeping arcs abound between

magnitudes 17 and 20, and include galaxies at a variety of redshifts ranging from $z=0.7$ all the way up to $z=2.5$, with farther ones at even fainter magnitudes unveiled by Hubble. For those looking for an astronomical challenge this summer, take a shot at Abell 2218, a cluster responsible for perhaps the most glorious gravitational lens visible from Earth!

Learn about current efforts to study gravitational lensing using NASA facilities:
<http://www.nasa.gov/press/2014/january/nasas-fermi-makes-first-gamma-ray-study-of-a-gravitational-lens/>

Kids can learn about gravity at NASA's Space Place:
<http://spaceplace.nasa.gov/what-is-gravity/>

Permission to use this article granted by the NASA's Space Place.

A History Lesson

The following three pages are a report on the first three years of our existence. Although we had a different name and the mode of communication was quite different in those days, we were able to establish community connections that continue to this day.

The First Three Years of the T. A. A.

In March 1954 a small group met at the home of the Earl Burches to talk about organizing an amateur astronomer's group. In the April meeting the following officers were elected: Earl C. Burch, President; John Vega, vice-president; and Kathryn Burch, sec'y-treasurer. A constitution was drawn up, and approved at the May meeting. The relationship with Harvard Publishing Company, Sky and Telescope magazine, was established. Mr. Burch contacted Dr. Edwin F. Carpenter, head of the Astronomy department of the University of Arizona, and as a result of Dr. Carpenter's interest, we were able to get his support and University sponsorship of our organization. This includes the use of the Steward Observatory building, for our meetings, and the use of the 36 inch and other telescopes as well as demonstration equipment of the University.

From the original five charter members (Earl and Kathryn Burch, John and Hilda Vega, and Earl Soth) the club grew to 46 paid members by the end of the first year. We have a list of members and visitors whom the secretary phones each month, advising them of meetings.

In November, 1954, the group held its first star party at the home of the Burches, and in June of 1955 we held our first pot luck supper and star-gazing party. Since this time it is the custom of the group to hold these field trips as regular programs for the November and June meetings. Members bring their telescopes to these field trips; the first star party had one telescope; the last one had nine, ranging in size from 3 to 8 inches.

As called for in the constitution, an election of officers was held at the April 1955 meeting; the group voted to retain its officers for a second term. Dr. and Mrs. Gerd Schloss, who had been on the executive board since November, 1954, were asked to serve for the following year; Hilda Vega was also asked to serve. The executive board suggested that Dr. Carpenter be made an honorary life member of the T.A.A., and this was voted upon by the group and carried unanimously. As a result of this, Dr. Carpenter will receive Sky and Telescope at the expense of the club.

A club library was founded by the gift of 13 books on Astronomy by an anonymous donor, in February of 1956. The club has purchased four new volumes, and Dr. Carpenter and club members have donated additional books and material, including three years issues of Sky and Telescope. The librarian, Carl Clemente, appointed by the executive committee, is in charge of our library. Mr. Clemente has presented short book reviews on books in our library and other volumes of interest to the Tucson Amateur Astronomers, at our regular meetings. All library material is available to members of the T. A. A.

A telescope maker's group was started by Mr. Burch in September 1955. Approximately 15 persons attended ten meetings of this group. The purpose of this group was discussion of design, and building of, amateur telescopes. Information was exchanged on availability of materials and problems of individual constructors. A second group was started in January of 1957 and was attended by approximately twelve persons; this group ran for ten meetings.

Mrs. Hazel MacCready headed up a committee for the selection of the design, and the procurement of, club pins. A series of designs were drawn up by Carl Clements, and the final design was selected by the membership. Pins were ordered for the members who wanted them; the first pins were

distributed at the September 1956 meeting. These pins are priced to the membership at the price of \$2.20 each.

Election of officers was held in April 1956; the following officers were elected: Earl Burch, president; Dr. Gerd Schloss, vice-president; Kathryn Burch, secretary-treasurer. The executive officers asked the following members to be on the executive board: Mrs. Gerd Schloss, James Christy, and Loren Haury.

The Tucson Amateur Astronomers set up a group for the artificial satellite program at the September 1956 meeting. Mr. Burch appointed Earl Sydow to serve as chairman of this group. Funds for this activity were obtained from Hughes Aircraft, to finance the 13 wide field telescopes, and other equipment necessary for this work. Lester Hearn is in charge of the construction of the ground facilities, such as telescope mounts, observing chairs, marked cable and its support, etc. An observing group of approximately fifty persons has signed up for this work.

Program highlights of the first three years:

Speaker:

Dr. E. F. Carpenter

Program:

Super Novae
30 Years of Galaxies
Solar Energy Symposium
Photographic Atlases
Astronomy in Arizona
Solar Eclipses
Steward Observatory Work & Program
Satellite Program
Palomar Observatory

Dr. J. McDonald

Clouds

Dr. John Duncan

Photographing Stars
Mars

Dr. Walter Fitch

Photometric Measurements & Magnitudes

Mr. Robert Koch

History of Eclipsing Stars

Dr. Dinsmore Alter

The Moon (Special meeting; 119 present)

Mr. William Jewett

Lowell Observatory

Kathryn Burch

Constellation "Scorpio"

Capt. John Vega

Planet Venus
Planet Mercury
Changing Face of Mars
Constellation "Ursa Major"

Earl Burch

Comets
Planets
Atmosphere & Its Effect on Seeing
Amateur Telescopes
Handbook of the Heavens (a series)
Graphic Time Table of the Heavens
An Amateur Visits Lowell Observatory
(with Dr. Schloss)

Dr. Gerd Schloss

Article in Life on "Astronomy"
Einstein; Man and Scientist
History of Astronomy (a series; 4 to
date)

Films presented include:

Planetary Motion

Clouds

Eclipse of the Sun

Steward Observatory

Solar Prominences

Our Mr. Sun (special meeting; approx. 175 present)

Publicity:

Meeting notices on Hughes Aircraft and Davis Monthan AFB bulletin boards.

Notices of meetings in Hughes News.

Notices of meetings in local papers.

Notices of meeting in University publications.

Notice of meetings and description of club in Steward Observatory brochure.

Television broadcast and lectures on astronomy at: Boy's Ranch; Patagonia P.T.A.; Air Force Reserve, Tucson; Boy Scout Meetings; etc., presented by Mr. and Mrs. Earl Burch.

Announcements at University "Public Night" presentations (Steward Observatory)

Listings in Sky and Telescope.

Future plans for the Tucson Amateur Astronomers include the promotion and/or construction of a planetarium located in Tucson; the formation of Junior and subsidiary groups; the organization of a group interested in constellations; the organization of an observing program for the telescope owners, the continuation of the Moonwatch program, and expansion of the T.A.A. library.

A great deal of the success of the Tucson Amateur Astronomers is due to the interest and assistance of Dr. Carpenter; your retiring officers would like to thank Dr. Carpenter and the membership of T.A.A. for the whole-hearted cooperation we have received.

Earl C. Burch, President, Tucson Amateur Astronomers.

Gerd Schloss, Vice-president, Tucson Amateur
Astronomers

Kathryn R. Burch, Secretary-Treasurer, Tucson Amateur
Astronomers.

Board of Directors

Office/Position	Name	Phone	E-mail Address
President	Bob Gilroy	520-743-0021	president[at]tucsonastronomy.org
Vice President	Ben Bailey	520-903-7925	gcsp[at]tucsonastronomy.org
Secretary	Chuck Hendricks	520-247-3815	secretary[at]tucsonastronomy.org
Treasurer	Dr Ed Foley	520-777-9218	treasurer[at]tucsonastronomy.org
Member-at-Large	Paul Anderson	520-625-5035	mal1[at]tucsonastronomy.org
Member-at-Large	Bill Lofquist	520-297-6653	mal2[at]tucsonastronomy.org
Member-at-Large	Mae Smith	520-850-7137	mal3[at]tucsonastronomy.org

Appointed Leaders

Office/Position	Name	Phone	E-mail Address
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Community Event Coordinator	Jim Knoll	520-241-3113	school-star-party[at]tucsonastronomy.org
Volunteer Coordinator	Sara Liberty-Laylin	206-601-4825	
Welcome Coordinator	Cathy Anderson	520-625-5035	
Chiricahua Astronomy Complex Director	John Kalas	520-620-6502	cac-director[at]tucsonastronomy.org
TIMPA Manager & Key Card Controller	Dennis McMacken	520-638-8178	timpa[at]tucsonastronomy.org
Strategic Planning Chairman	Bill Lofquist	520-297-6653	
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Web Director	Tim Van Devender	520-495-0694	webmaster[at]tucsonastronomy.org
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Door Prize Coordinator	CKelli		
Refreshments Coordinator	OPEN		
Astronomy Services Coordinator	John Kalas	520-620-6502	
Family Astronomy Program	Jim Miller		family[at]tucsonastronomy.org
Apparel Sales Coordinator	Mae Smith	520-850-7137	taaa-sales[at]tucsonastronomy.org
Boy Scout Liaison	OPEN		
Equipment Loan Coordinator	OPEN		elc[at]tucsonastronomy.org
Librarian	Hunter Bailey		librarian[at]tucsonastronomy.org
Grand Canyon Star Party Coordinator	Jim O'Connor	520-546-2961	gcsp[at]tucsonastronomy.org
Astronomy Essentials Lecture Scheduler	Al Anzaldúa	520-409-5797	
Invited Speaker Scheduler	Terri Lappin	520-977-1290	terrilappin@tucsonastronomy.org
Calendar Designer	Susan O'Connor	520-780-0136	
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