

image by Jeff Johnson

Black Eye Nebula (M64)

## Table of Contents

- 2 *Outreach Events*, by Jerry McMahan
- 2 *Calendar of Events*, by Ron Kramer
- 3 *July Meeting Minutes*, by John McCullough
- 5 *Back at the Telescope*, by Berton Stevens
- 7 *Automation Fascination!*, by Dave Doctor
- 10 Image of the Month

### August Meeting

Our next meeting will be on Friday, August 22, 2014, at the DACC Main Campus, Room 141, Technical Studies Building, starting at 7:00 p.m.

Our speaker will be Joni Clark of the NMSU Physics Department; the title of her talk is *Life in the Universe*

### New & Existing Member Package

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

### Outreach

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

### Events

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

### Annual Dues

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

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

Individual Dues are \$30.00 per year

Family Dues are \$36.00 per year

Student (full-time) Dues are \$24.00

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

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

### ASLC Board of Directors, 2014

Board@aslc-nm.org

President: Rich Richins; President@aslc-nm.org

Vice President: Steve Shaffer; VP@aslc-nm.org

Treasurer: Patricia Conley; Treasurer@aslc-nm.org

Secretary: John McCullough; Secretary@aslc-nm.org

Director-at-Large: Tracy Stuart; Director1@aslc-nm.org

Director-at-Large: Jerry Gaber; Director2@aslc-nm.org

Immediate Past President: csterlin@zianet.com

Director Emeritus: Walter Haas

### Committee Chairs

ALCor: Patricia Conley; tconley00@hotmail.com

Apparel: Ron Kramer; ronjkramer@aol.com

Calendar: Chuck Sterling; csterlin@zianet.com

Education: Rich Richins; Education@aslc-nm.org

Grants: Sidney Webb; sidwebb@gmail.com

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

Loaner Telescope: Frank Fiore; ffchilehead@gmail.com

Membership: Judy Kile; jkile@elp.rr.com

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

Observatory:

Leasburg Dam: Rich Richins; President@aslc-nm.org

Jerry Gaber; jerrygaber@gmail.com

Tombaugh: Steve Shaffer, VP@aslc-nm.org

Outreach: Chuck Sterling; csterlin@zianet.com

Web-Site: Steve Barkes; steve.barkes@gmail.com

*HDO* Editor: Ron Kramer; ronjkramer@aol.com

Recent Outreach Events

by Jerry McMahan

**Saturday, July 19; Leasburg Dam State Park Observatory (Music and the Stars)**

We had a great turnout of club members participating. Early clouds gave way to a good observing session. Dave Doctor and Sid Webb manned the 16-inch. I heard a number of people state how impressed they were seeing Saturn through the big scope. Ed Montes and Daniel Giron brought small refractors. Ron Kramer had his 5-inch refractor on a new mount. He had slewing problems, but is well on the way to getting that scope back into action. Tracy Stuart and Jerry McMahan set up 8-inch Schmidt Cassegrains. Moe Azzolini and family used their 6-inch Dobsonian.

Other club members that participated in the star party included Judy Kile and Carol and Stan Chiocchio. Stan says he intends to bring their new ETX 90 to future events.

Other objects observed included the Globular clusters M13, M22, M4 along with Mars, the Lagoon Nebula and the Triffid nebula.

**Saturday August 2, 2014; Moongaze, International Delights Café**

We have rarely been clouded out for Moongaze. Last month we had about 2 minutes observing time. This time we had two minutes less. You could not see even a glow from the Moon through the clouds. Since I have been going, it has never happened two months in succession.

That doesn't mean that we didn't try. I set up the ETX 125. It was covered, for a while, with a trash bag when a few drops of rain were felt. Carol and Stan Chiocchio participated as did Chuck Sterling. Chuck did get some teaching in when a Cub Scout, working on an Astronomy merit badge came to look through the scope. Even though there was nothing to see in the sky, Chuck showed him how the ETX worked. Maybe we will have better luck on the August 31 Moongaze.

It was also the day before Chuck's birthday. He is catching up with me. By my calculations he will be older than me in four years.

\* \* \*

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

AUG 17	06:26	Last Quarter Moon
18	07:00	Venus - Jupiter Conjunction (24' separation!)
18	11:46	Moon - Aldeberan Conjunction
22	19:00	ASLC Meeting; Room 141, DACC Main Campus, Technical Studies Bldg.
23	Dusk	DSO at Upham
25	08:13	New Moon
26	21:10	Mars - Saturn Conjunction
29	07:08	Neptune at Opposition
29	13:08	Moon - Spica Conjunction
30	Dusk	OUTREACH: MoonGaze at International Delights Café
SEP 02	05:11	First Quarter Moon
08	19:38	Full Moon
12	21:00	OUTREACH; Tombaugh observatory Open House
13	18:00	OUTREACH; Music and the Stars; Leasburg Dam State Park; music by ARDK
14	19:01	Moon - Aldeberan Conjunction
15	20:05	Last Quarter Moon
20	07:54	Mercury - Spica Conjunction
20	Dusk	DSO Upham
20		Oki-Tex Star Party (through SEP 28)

22	20:30	Autumnal Equinox
24	00:14	New Moon
25	18:48	Moon - Spica Conjunction
26	19:00	ASLC Meeting; Room 141, DACC Main Campus, Technical Studies Bldg.
28	00:30	Mars - Antares Conjunction

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

### **July Meeting Minutes**

by John McCullough

#### **Show & Tell**

A pre-business meeting presentation was made by Dr. Al Grauer about the Cosmic Campground in the Gila National Forest. The campground is considered a world-class astronomical site and is located 8 miles north of Alma, NM. A \$50K grant was received as seed money to develop the campground and Dr. Grauer is applying for another \$40K grant to be ADA compliant. Much more information is available at [cosmiccampground.org](http://cosmiccampground.org). Dr. Grauer is also putting together a series of radio programs called *Travelers in the Night* to be broadcast on National Public Radio (NPR) stations.

#### **Call to Order**

Rich Richins, President, Astronomical Society of Las Cruces (ASLC, the Society), called the July business meeting to order at 7:41 pm, 25 July 2014, Room 141, Doña Ana Community College (DACCC), Las Cruces, New Mexico.

#### **President's Comments**

The President, Rich Richins, welcomed the group to tonight's meeting. Rich welcomed the members and recognized guest Nancy Hastings, who teaches at New Mexico State University (NMSU) and is the wife of tonight's speaker, Dr. Robin Hastings. Gary Starkweather from the Astronomy Village north of Deming was also visiting. Rich then addressed the following topics:

1. Night on Kitt Peak - Rich presented an email from former member and current Kitt Peak docent George Hatfield that outlined the activities and amenities that could be available at the observatory. The proposed date for the ASLC excursion is 18 October. As there are several viewing options with associated costs, the Society needs to let George know as soon as possible what participants would like to do. Rich polled the members present and there were still about 12 interested. Most would like to take their own telescopes as well as use equipment at the observatory.
2. 2015 Budget - The proposed budget is supposed to be presented to the membership at the July meeting. Because of conflicts, it will be presented at the August meeting. The Budget Committee will consist of Rich Richins, President, Trish Conley, Treasurer, and Ron Kramer, member-at-large, and will meet in two weeks. This action was approved by the members present.
3. Officer Nominations - A committee needs to be formed to assemble a slate of candidates for officers for 2015. Trish Conley, Chuck Sterling, and Steve Barks volunteered to form the committee. This action was approved by the members present with objections from Chuck Sterling and Steve Barks.
4. Loaner Telescope Program - Rich reported that the Board of Directors has recommended eliminating requiring fees and/or deposits for the program. Bert Stevens pointed out some of the issues that drove fee collection. The Program Coordinator (Frank Fiore or Steve Shaffer) and the Board of Directors could also recommend the sale of excess or duplicate telescopes with Society members having first choice. Funds generated in this manner could be used to expand the range of telescope choices or obtain other accessories. Frank Fiore wanted to know if the classic 4" Unitron was being sold at tonight's meeting; Rich responded that it was not. Frank also wanted to know if the telescopes in the program were insured either through the Society's general policy or via a policy rider; Rich said no because of an excessively high deductible. Rich also noted that the sign-

out form would remain in effect for the program. Ron Kramer moved that the changes in the Loaner Telescope Program be adopted, Bert Stevens seconded. The motion carried.

### **Committee Reports**

#### **Apparel**

Ron Kramer, acting Chairman, has one of the new dark green Society golf shirts remaining. He is preparing to order additional items with the Society logo in various sizes. He urged members to "Keep buying."

#### **ALCon 2015**

Ron Kramer, Judy Kile, and Sid Webb attended ALCon 2014 in San Antonio, TX, earlier this month. There were about 165 registered attendees. There was a scheduling issue with the venue for the Awards Banquet on Saturday evening that caused some unpleasantness. Ron reported that Joel S. Levine, a prominent Mars scientist, is the potential key note speaker at the 2015 banquet, if scheduling permits. Twelve (12) additional session speakers have been arranged, vendors are being lined up including sponsorship support. Hotel Encanto will be the flagship venue for the week. The Society will receive approximately 40% of the registration and meals payments (forecast as \$3000 to \$6000). Volunteers are still needed. The Astronomical League (AL) expects to provide \$3000 in discretionary funds to support planning activities. Convention registration will be free for working volunteers.

#### **Outreach**

Chuck Sterling, program coordinator, reported no school events are planned in the immediate future. There was a good turnout at the last evening at Leasburg Dam State Park (LDSP). The next Moon Gaze at International Delights Café will be 02 August. Daniel Giron has announcements in local media. There will be a second Moon Gaze on 30 August. There will also be a "Mega Music and the Stars" event at LDSP on 16 August. There will be a \$10 admission fee for the public; admission will be free for astronomers with a telescope.

### **Officer's Reports**

#### **Secretary's Report**

Rich Richins reported the minutes for the June meeting had been submitted by the Secretary, John McCullough, for publication in the July issue of the Society newsletter, the *High Desert Observer* (HDO). If there are no corrections or discussion, Rich asked that the minutes be accepted as submitted. Bob Armstrong moved that the minutes be accepted as published, Chuck Sterling seconded and the motion passed by acclamation. There was not an additional Secretary's report.

#### **Treasurer's Report**

The Treasurer, Trish Conley, provided a status of the Society's various accounts. She also reported that an audit of the accounts is necessary and the Society needs to select an auditor. Bert Stevens volunteered to act as auditor. There was not an additional Treasurer's report.

Bert Stevens moved to adjourn the business portion of tonight's meeting, Janet Stevens seconded. The business meeting concluded at 8:12 pm.

### **Presentation**

This month's presentation was by Robin Hastings on *Voyager: The Grand Tour* (Abridged). Robin was a part of the Voyager 1 and 2 missions, launched in the late 1970's. He presented pictures, accomplishments and anecdotes from those heady times at the Jet Propulsion Laboratory (JPL) in California. The Voyager missions were (and continue to be) some of the most ambitious explorations of the outer Solar System ever undertaken.

The July meeting of the Astronomical Society of Las Cruces concluded at 9:07 pm.

-Respectfully submitted by John McCullough, ASLC Secretary

Back at the Telescope

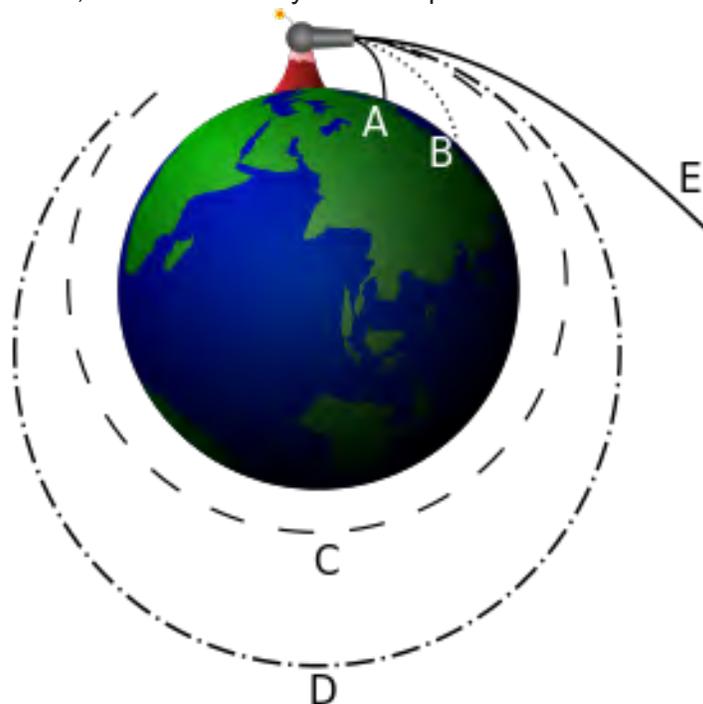
by Berton Stevens

I was watching the movie *Gravity* on HBO the other day. If you have not seen it, the premise is a Hubble repair/upgrade shuttle mission is underway and a spacewalk is in progress when the Russians fire an anti-satellite missile at one of their own satellites. This creates a debris cloud that causes havoc through the rest of the movie. Astronauts Sandra Bullock and George Clooney must find some way to return to Earth after their shuttle is destroyed by the debris cloud. In the process, they have to travel first to the International Space Station (ISS) and then the Chinese Tiangong space station.

In the movie, the process of transiting to the ISS is initiated by pointing their spacesuit thrusters in the opposite direction of the ISS and firing away. This gets them there in short order and they manage to grab onto the abandoned ISS as they sail past it. This looks good in the movie, but does it really work in space?

Let's review what it means to be "in orbit". The basic thought experiment to help us understand an orbit is the cannon firing a cannonball horizontally from a high mountain. We will just pretend there is no atmosphere. When the cannon is fired, how far the cannonball travels depends on the speed of the cannonball as it leaves the cannon. Gravity is pulling the cannonball downward at a constant rate, so the faster the cannonball travels, the further it will be when it hits the ground.

Since this is happening on a round world, as the cannonball moves forward, the ground curves away from the cannonball, so a fast cannonball may not hit the ground until it is a quarter of the way around the world. Now if we fire the cannonball really fast, the curve the cannonball follows as it falls toward the ground matches the curve of the ground falling away from the cannonball's path. We now have the cannonball "in orbit." The key factor here is the speed of the cannonball. When we watch a rocket launch a satellite into orbit, the rocket lifts-off vertically. This is to get the rocket out of the thickest part of the atmosphere as quickly as possible. But even as it gets a few thousand feet in the air, it already starts to pitch-over to begin building horizontal speed. The horizontal speed is the critical factor in establishing an orbit.

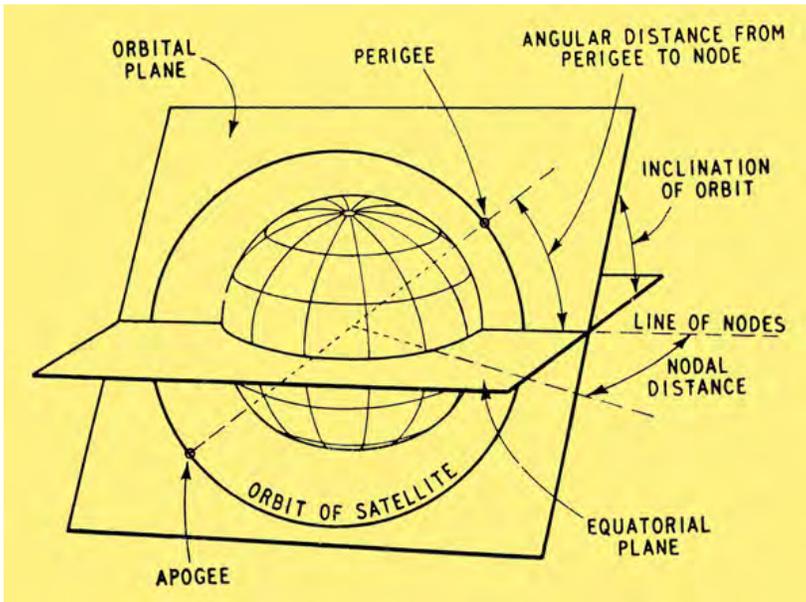


*An orbit depends on speed. For a thought experiment, cannonballs are fired at increasing speeds. The faster the cannonball travels, the further it travels before it impacts the ground. Finally, the cannonball travels so fast that the cannonball never hits the ground: it is in orbit.*

Another factor in establishing an orbit is the direction the rocket takes as it pitches over. Once it starts to pitch over, the inclination of the orbit is immediately determined by the direction the rocket takes. The inclination is referred to the equator, so it does not matter when you launch, only the launch site location and the direction the rocket takes after pitch-over that determines the inclination. The other parameters that complete the orbit definition depend upon when the rocket gets launched and the performance of the rocket during the launch.

When the rocket finally stops boosting, its altitude and speed controls the high and low points in the orbit. If no maneuvering is done in the mean time, the high point (apogee) is on the opposite side of the Earth from where the boost phase ended. The low point (perigee) is back where the boost phase ended. The average of the high and low point is the semimajor axis of the orbit (all measured from the center of the Earth).

Most of the time, when a satellite reaches its first apogee, it fires a motor to speed it up, resulting in the perigee being raised to a higher altitude. If you are firing a rocket motor along the path the satellite is traveling, its main effect is the change the altitude at the opposite end of the orbit.



*The parameters that define an orbit. In satellite tracking circles, these parameters are part of the "two line elements" or TLEs. The elements change over time due to irregularities of the Earth's magnetic field, atmospheric drag on low satellites, the Moon's gravity and other factors.*

So in *Gravity*, our astronaut-heroes are going to fire their rocket to get to the ISS from the destroyed shuttle and Hubble. The ISS appears to be behind them in their orbit, and they fire their rockets to push them toward the ISS. What actually happens? By firing their rocket to slow them down a little, they are changing their orbit into one with a lower semimajor axis. This makes them drop lower and as they do, gravity speeds them up. (Recall a low Earth orbit satellite orbits the Earth in just 90 minutes, while the Moon takes twenty-seven days). So our astronauts drop into a lower, faster, orbit that takes them away from the ISS, not toward it.

To get to the ISS, they should have fired their rocket to speed them up in their orbit. This will take them into a higher orbit that will take them longer to go around the Earth so the ISS will catch up with them. But you cannot go at just any speed. It has to be carefully calculated so that when the ISS has caught up to you, you

have come back down to your original height, which means that it will take at least one full orbit to rendezvous with the ISS.

Traveling from ISS to the Chinese Tiangong space station has an added complication. The movie states that the Tiangong station was at a different inclination, some nineteen degrees more inclined than the ISS. Once you are in orbit, it is hard to change the inclination of the orbit. In fact, if you want to change it by 90 degrees, you will need to completely cancel your current velocity and at the same time put that same velocity at a right angle to your motion. This requires a burning more fuel than it took to put you into orbit.

To chase Tiangong, you can only change your inclination at the point where the two orbits intersect, and it is unlikely that Tiangong will be anywhere nearby when you change inclinations at the intersection point. To change your inclination by 19 degrees in low Earth orbit, you need to have enough fuel to change your velocity by 1.65 miles per second, firing the engine perpendicular to your current orbit. That takes a lot of fuel.

So *Gravity* was an exciting movie and they did get many things right, but an actual transfer could not be completed in the time allotted for the movie. This does not make it bad movie, but we simply have to understand that the realities of space cannot be compressed into a movie. Maneuvering in space takes time, and you cannot create tension and excitement while floating around in orbit, waiting to rendezvous.



*The intrepid astronauts drift toward the International Space Station after leaving their destroyed shuttle. © 2013 Warner Bros.*

**Automation Fascination!**

by David Doctor

Automation software has to be considered one of the more significant advances in astroimaging over the last 15 years. I decided to try it since having moved to this area I now could count on clear skies for an entire night on many occasions!

There is nothing like producing a beautiful, rich, color image of a deep-space object. Unfortunately capturing the data takes time and time is something that not many of us have. There is also sleep which I am told we do need. Forty hours of imaging data is therefore going to be a daunting task if we can only manage a couple of hours each night. At that rate you might be lucky to image only a few objects over perhaps an entire year!

Fortunately for us, we now have automation software which can do all of the tasks required for imaging and can turn a couple of hours a night into perhaps 8 or more, while preserving our beauty rest at the same time! Now don't get me wrong. Like most of us I have a passion for the night sky and am not one for operating equipment exclusively remotely from some living room couch somewhere. I enjoy tinkering with the set-up and equipment, watching it go through some of the automated steps and even while that's going on I might take a look at some of my favorite refractor or binocular targets. However, I now have the option of going to bed at a decent hour and don't have to stress that I am losing valuable imaging time!

What is "automation software?" An image automation program is technically an "executive" program that issues commands to other programs, such as that for your camera, focuser, telescope, rotator, dome, etc. All of the tasks that you would do manually during the course of a typical imaging session are now controlled by your automation program. You can enter all of the things you wish to accomplish (even during the day) and your program will then execute those tasks beginning at the appropriate time and even make corrections if things do not go as planned! That sounds too good to be true, but I am happy to say that it most definitely IS true.

What can it do? In short, it does a LOT. Here is a simplified example of a typical automation run:

1. Dusk flats are obtained
2. Dark frames are captured prior to light frames if you wish (or can be programmed afterward)
3. Once the imaging time has arrived, the telescope slews to a star for focusing with the filter you have chosen for the first light frames. Focusing is then carried out.
4. Telescope slews to your target, then plate solves to confirm location.
5. Telescope does a corrective slew/camera rotation to the target.
6. Once the target is confirmed, the guide star is located and guiding commences.
7. Light frames are obtained. The software can perform autodithering between exposures! (shifting the frame a couple of pixels after each exposure to enhance signal during processing)
8. Focusing is repeated as often as you like. The scope will break from imaging, slew to a suitable star for focusing, then go back to your target!
9. Meridian flip is performed, camera is rotated, focusing is repeated and target/ guide star reacquired.
10. Filter is changed for next series of light frames; refocusing is carried out.
11. After light frames are completed, the scope is parked until dawn or if you have dark frames programmed it will take them.
12. Once dawn arrives, dawn flats are obtained.
13. Scope is parked; mission completed!

This represents the very basic operations of most programs, however many other features are often available, such as setting your camera temperature ahead of time and turning the cooler off at the end, specifying east flats or west flats, taking bias frames, etc. There is also dome automation which can be fully integrated into your operation. In fact there is no operation that is not accounted for with ultimate precision. You can even program in parameters such as how far below the horizon the Sun has to be before dawn flats are started, or how low your target can get in the west before aborting imaging. Furthermore every step that is carried out is recorded in explicit detail as well as any problems that come up and what steps were carried out to correct it. Once you see this in operation you will soon be tempted to call your set-up the "HAL 10000" as I have!

Typical "session page" (this one from CCD Autopilot) which confirms focus occurs with each filter change, number of subs to be acquired, binning, exposure time etc. At the top you have the option of setting up dusk flats, darks and bias frames before lights if you have time, darks and bias frames afterward and dawn flats if you wish!

Here is an abbreviated piece of a recent automation log demonstrating the operations in detail as recorded by the HAL 10,000 from the very start of the session to capturing the first image. The target was NGC2903, a popular spiral galaxy in Leo but in this case happens to be labeled "Fov center 3" by the program's built in conventions:

Session starting on 09 Mar 2014

20:34:04

Log:

C:\Users\Doc\Documents\CCDWare\CCDAutoPilot5\Images\CCDAutoPilot\_Logs\ccdap20140309\_203404.log

Starting Image Count: 1020

20:34:08 Telescope tracking off

20:34:09 Imager cooler at -25.4 °C

20:34:10 Guider cooler at -25.4 °C

20:34:16 Target Loop 1 of 1

20:34:20 Telescope tracking on

20:34:20 Target: FOV center3 at RA: 09 32 09.7, Dec: +21 29 57, PA: 292.7

20:34:27 Rotating to PA: 292.7E

20:34:27 Rotator moving to: 312.23

20:35:13 Rotator moved to: 312.23

20:35:14 Slewing scope...

20:35:26 Slewed to RA: 09 32 59.5, Dec: +21 25 57

20:35:26 Mount settling for 3 sec. after slew.

20:35:32 Series Loop 1 of 1

20:35:33 Series 1, 13 Exposures, 720 sec., 2x2, Green filter

20:35:33 Telescope RA: 09 32 59.5, Dec: +21 25 57  
20:35:33 Exposure 1 of 13  
20:35:37 Focusing using Green filter...  
20:35:37 Telescope RA: 09 32 59.5, Dec: +21 25 57  
20:35:44 Moving to focus star number 1, Asellus Borealis at 60.4 deg. altitude  
20:35:45 Slewing scope...  
20:35:51 Slewed to RA: 08 44 08.0, Dec: +21 24 49  
20:35:51 Mount settling for 3 sec. after slew.  
20:36:44 Focus position: 10733 HFD: 3.9 arc-sec., Temp.: n/a  
20:36:44 Focus Time: 67.3 sec.  
20:36:47 Returning to target...  
20:36:48 Slewing scope...  
20:37:06 Plate solving...  
20:37:06 Telescope RA: 09 32 59.5, Dec: +21 25 57  
20:37:27 C:\Users\Doc\Documents\CCDWare\CCDAutoPilot5\Images\SyncImages\Sync\_20140309\_203706.fit  
20:37:31 Solved RA: 09 32 30.1, Dec: +21 32 15, PA: 291.5  
20:37:31 Plate Solve Time: 25.5 sec.  
20:37:31 Pointing error (arcmin): RA -5.1; Dec -2.3  
20:37:35 Location corrected  
20:38:00 Forcing filter change 22  
20:38:05 Getting guide star location...  
20:38:37 Peak guide star ADU: 1458, measured at 5.00 sec.  
20:38:37 Guider x: 156.0, y: 121.0, Array: 328x247  
20:38:41 Guider x: 156.0, y: 122.0  
20:38:41 Guider stopped.  
20:38:41 Dither: 0.0, 0.0  
20:39:06 Guide Error X: 0.84, Y: 0.32  
20:39:12 Altitude: 51.0°  
20:39:12 Hour Angle: -2.8  
20:39:13 FOV center3, exposing...  
What hardware is required? Chances are if you are already imaging with guiding, you are probably almost there in terms of hardware.

You will need a focuser with a stepper motor that can be operated through your PC. You will also need a PC controlled camera rotator. A “permanent” scope set-up is obviously more practical but not absolutely required although you should make sure your scope pointing accuracy is good enough so you can repeatedly land an object somewhere on your camera chip using your planetarium program.

What software do I need? Several automation programs are out there. My advice would be to try them and see which one fits your set-up the best. They all allow free trial periods of varying lengths (see links below) Prices vary, but most average less than \$100 for a full license. Beyond that you will need of course a planetarium program (*The Sky*, *Starry Night Pro*, *Carte du Ciel*, etc), a focus program (e.g. *FocusMax*), a camera control program (*CCDSOFT*, *MaximDL*, *AstroArt*, etc), a plate solve program if your camera program does not have that (*Astrotortilla*, *Pinpoint*, etc). Most if not all of these you may be already using. You will finally have to install the *ASCOM* platform which is free and is the critical software that enables your automation program to communicate with all of your other operations (see link below).

What else do I need to know? Of course there is always more! Most of the programs I have seen have excellent documentation and support. If you are already doing imaging with guiding and using a focus program, then once you have a camera rotator the rest is easy. Be patient and follow the instructions carefully! Imaging is challenging enough without automation but once you get it going, there is no turning back! I would say that the two absolute musts for success besides accurate pointing, tracking and guiding are:

1. You MUST have the capability to plate solve reliably. This is probably the most important task that the program will perform and there is no way you can automate your session without this operation

happening accurately and reproducibly. Read the documentation on your program to learn how to optimize this function.

2. You MUST have an accurate camera rotator. There are almost always rotational errors that come up during slews and cannot be corrected without it. Additionally there is the meridian flip if you are using a GEM mount. One of the coolest things about this technology is the ability for a properly set-up system to accurately rotate the camera 180 degrees, flip your scope and reacquire the guide star with precise accuracy so there is absolutely no change in object framing! Incredible!

The following are links to popular automation programs. I think the best approach is to test and see which ones work best with your current software. They all have free trial downloads of around 45 days.

*Sequence Generator Pro* is the “new kid on the block.” A lot of people like this one as it works very well with a very wide variety of equipment and software. Very active user forum. <http://www.mainsequencesoftware.com/Products/SGPro>

CCDAutopilot. <http://www.ccdware.com/products/ccdap5/>

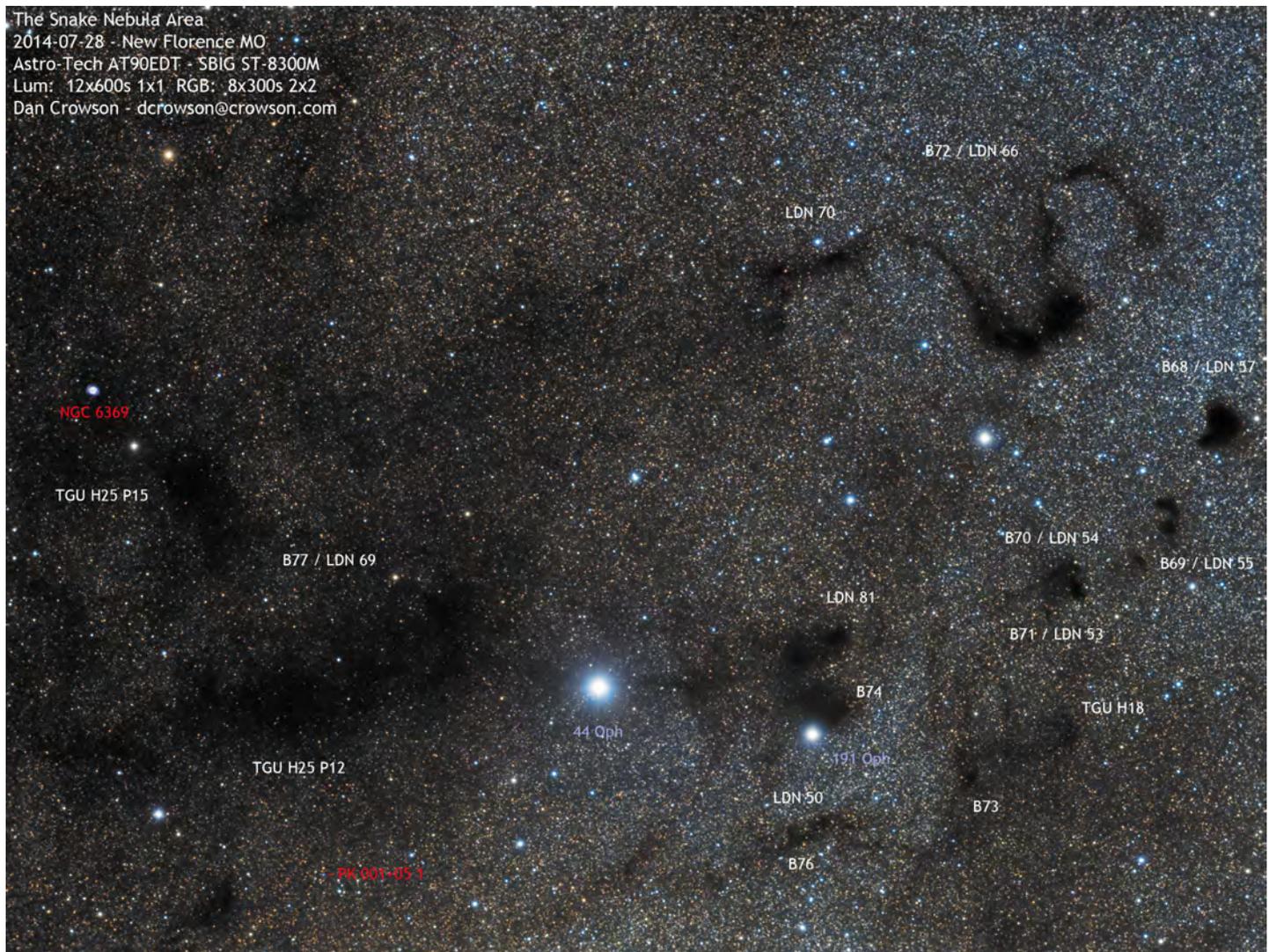
CCD Commander <http://ccdcommander.com/>

ACP <http://acp.dc3.com/index2.html>

ASCOM <http://ascom-standards.org/>

\* \* \*

### Image of the Month



**White Sands Star Party**

The New Mexico Museum of Space History and the White Sands National Monument is looking to hold a reduced-scope "White Sands Star Party" on weekend of October 17-19th. Will be limited to 25 camping spaces. For further information, please contact James Tomaka at [jptomaka@msn.com](mailto:jptomaka@msn.com)

***The 31st Okie-Tex Star Party (OTSP)***

September 20-28, 2014.

The Okie-Tex Star Party is held at Camp Billie Joe just outside the town of Kenton, Oklahoma in the Western end of the Oklahoma Panhandle and offering some of the darkest skies in the Southwest USA.

Check the website at <http://www.okie-tex.com/> for everything you will need to know about the OTSP.

Several speakers will be making presentations daily. A list will be available before the event.

Meals will be available daily. You must sign up and pay by August 29, 2014. The price for breakfast is \$8, lunch is \$10, and dinner is \$13. All meals are catered by the Cimmaron Heritage Center. Download the meal reservation form from the "Meal Menu" link on the website.

There are bunk houses available on a "first-come, first-served" basis. Tent and trailer camping can be done on the perimeter. Sorry, although RVs are welcome, there are no hookups available. See the "Accommodations" link on the website for more information.

As usual several vendors will be there with many of their products available for you to examine and get more information. Please support these vendors when you purchase your astronomy products. They support your star party! See the "Vendors" link on the website.

There are many things to see and do in the area during the daytime. Bird watching is good. Clayton, New Mexico is a short, scenic drive as is the Capulin Volcano National Monument. See the dinosaur tracks. Hike the Black Mesa Get out and explore! See the "Black Mesa Area" link on the website.

**ALCON 2015**

ALCON 2015 is rapidly approaching. We are looking for speakers to give 45 minute lectures about pertinent subjects. More than 150 members of the Astronomical League and A.L.P.O. are expected to attend. Lectures and the Awards Banquet will be held at the Hotel Encanto, from July 8 to July 11, 2015. There will also be a Star-B-Que at Leasburg Dam State Park on Friday, July 10. The Star-B-Que will include food, entertainment and a star party. Bring your scopes and have a blast!

We are also seeking addition volunteers to assist during Registration and other times.

Please contact Ron Kramer at [ronjkramer@aol.com](mailto:ronjkramer@aol.com) for further information.