

# The High Desert Observer

## The Bulletin of the Astronomical Society of Las Cruces

Sharing the Universe with our Community for over 60 years



Photo by John McCullough

October, 2013

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

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, 2013

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Grants: Sidney Webb; sidwebb@gmail.com

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

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- Leasburg Dam: Ron Kramer; ronjkramer@aol.com;

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- Tombaugh: Steve Shaffer; Director1@aslc-nm.org

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### October Meeting

**Our October meeting will be held on Friday, October 25, in Room 77 at Doña Ana Community College, with the following schedule:**

**7:00 pm - 7:30 pm Show & Tell**

**7:30 pm - 8:00 pm Business Meeting**

**8:00 pm - 9:00 pm Guest Speaker & Presentation**

**This month our speaker will be Dr. Jon Holtzman, Head of the NMSU Astronomy Department. His topic will be the Sloan Digital Survey**

### Elections

It's election time! On page 7 is the **BALLOT FORM** which needs to be submitted at the upcoming October meeting, or sent via email to the secretary before October 25. At the moment, there is only one candidate per office.

### 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.

## The President's column-inch...

Our October 25th presentation is by Dr. Jon Holtzman from the NMSU Astronomy Department, who will talk about the Sloan Digital Survey.

Four of us attended the Okie-Tex Star Party the first week of the month, and it was the best yet in the few years ASLC has been represented there. Saturday through Wednesday nights were all crystal clear with moderate seeing, and practically no wind at all, comparing favorably with last year when the wind never stopped.

Thursday night the wind started, but we still got some imaging and viewing in, then on Friday the last of us left for home. Look for some good images from our guys.

The 16" LX200 installed at the Leasburg Dam State Park has now been retrofitted with the upgraded electronics system, and has been reinstalled at the observatory. The Music and Stars in the Park event of October 5th used the new system, which we hope will resolve all the chronic problems with the mount.

ASLC is starting to receive requests for star parties for this fall and winter from various groups including pre-school, home school, and the Doña Ana County Health and Human Resources Department, with their recently started Youth Initiative program.

Here again is a reminder about the (first annual) New Mexico Star Party to be held November 1st and 2nd at Sevilleta National Wildlife Preserve, between Socorro and Albuquerque. ([www.nmstarparty2013.net](http://www.nmstarparty2013.net))

The same weekend, November 2nd and 3rd, ASLC will have a booth in the Renaissance Arts Faire in Las Cruces at Young Park. Busy, busy... ([www.las-cruces-arts.org/events/renaissance-artsfaire](http://www.las-cruces-arts.org/events/renaissance-artsfaire))

Have a Good Year; keep looking UP.

Chuck Sterling



## ***Outreach Events for September, by Jerry McMahan***

### **Saturday, September 7; Music Under the Stars, Leasburg Dam State Park Observatory**

Early clouds cleared up by the time for observing to begin at the Leasburg Park Observatory. A thin crescent Moon, Venus and Saturn were visible early. Deep sky objects such as the Dumbbell Nebula, open star clusters M6 and M7, the Double Cluster, globular star clusters M13 and M22, double stars Alberio and Mizar were among the objects observed.

Chuck Sterling had his 10-inch set up on the grass near the concert area. Daniel Giron set up his 80mm Meade refractor on the concrete just south of the observatory. Sid Webb was in the same area with his 10-inch Orion Dobsonian. Jerry McMahan joined them with an 8-inch Schmidt Cassegrain.

Jerry Gaber and Ron Kramer were in the observatory running the 16-inch scope. Previously, the 16 had got problems, but tracked well when an object was being viewed. This time the tracking was bad as well, so they had to get whatever was being seen, back in the field of view, pretty often. After the viewing session ended, the telescope was taken down and transported to Jerry's where a new set of electronics will be installed. The scope should have updated capabilities and we will have a fully functional telescope.

Jerry Gaber came outside to see what we were observing. I had M13 at the time and was about to show him how to operate the electric focuser, when I remembered that I bought the telescope from him and he installed the focuser, so I guess he knows how to operate it.

One family brought their 6- or seven-year-old daughter to look through the scope. She seemed much more interested than most kids her age. The mount had the Audiostar controller, which gives an audio description of various objects. She was fascinated by it, and wanted to listen to several descriptions. She listened to the

one about the Orion Nebula. She understood what was being explained and excitedly announced that stars are made of gas. I was impressed. I know I wasn't that smart at that age. No comments about that not changing much at the present, please.

#### **Thursday, September 12; Veterans Home**

Chuck Sterling, Steve Shaffer, Daniel Giron and Jerry McMahan attended a star party for the Veterans home. It was cloudy. We had the Moon for 10 seconds and clouds for 10 minutes, the Moon for 10 seconds and clouds for 10 minutes, the Moon for 10 seconds and ..... oh, you get the idea. Chuck did get the Ring Nebula for awhile. Daniel and Steve didn't bring their scopes out since we didn't have many targets. They answered questions and talked to participants. Because of the clouds, we didn't have many spectators, but those we did have seemed very interested and stayed for a long time.

#### **Friday, September 13; Tombaugh Observatory Open House**

Steve Shaffer and I attended the Open House. First, a list of the things we saw through the telescope. Now that the list is complete (nothing, due to clouds), we did have some people show up anyway so we told them about Moongaze. The people who came did not include the Astronomy Department. They did leave a note saying that the open house was cancelled.

#### **Saturday October 5; Leasburg Dam Observatory**

Yes, I know, October is not in September, but this event occurred before Ron's deadline for the HDO, so I will include it here.

This was not a Music Under the Stars event so we did not expect much of a crowd, but the park advertised a lecture on Indian legends about the stars and constellations, so the turnout was pretty good. It was also a good, clear night for a change, so we had a pretty successful star party.

Jerry Gaber had installed new electronics in the 16-inch telescope and had it working in time for the event. He did a great job and spent a lot of time and effort in getting it ready. There is still a glitch that he is working to correct, but he was able to work around it and had the scope pointed at the Globular M22, Alberio, the Whirlpool Galaxy (M51), the Ring Nebula (M57), the Dumbbell Nebula (M27) and the Andromeda Galaxy (M31), along with its companion M32. This was a good indication that the goto function of the telescope worked well enough. The session with the 16-inch was cut a little short due to an electrical connection being kicked in the dark causing the telescope to lose power.

Jerry also set up a projector, on the North side of the building, to show what the telescope was pointing at through the camera that was in the 4-inch refractor telescope riding piggyback on the 16-inch. That also worked very well. Ron Kramer and I (Jerry McMahan) stayed outside to explain, to the spectators, the nature of the image being projected. Mike Zura helped inside the observatory and brought some two-inch eyepieces to provide different magnifications for the 16-inch. Judy Kile also assisted.

We also had a number of telescopes set up on the South side of the building. Sid Webb brought his 10-inch Orion Dobsonian. Frank Fiore had a ten-inch Meade Cassegrain on a Meade LX80 mount. Trish Miller had an 8-inch Meade LX90 Schmidt Cassegrain. Bob Armstrong also participated. I did not spend much time on the South side, so I don't know what objects were viewed, but they had a clear view of Sagittarius, so I assume a number of targets were there. Venus was visible early and I know that Sid did view the Double Cluster in Perseus.

I apologize to anyone that may have been left out. I have not learned all of our new member's names and we had a lot of participation from them. It was a pretty good night for us and the people who came to observe.

**Calendar of Events: October 2013 - December 2013 (Mountain Time - 24 hr. clock)**

OCT 18	17:38	Full Moon
18	17:51	Penumbral Lunar Eclipse
21	04:17	Orionids Meteor Shower
25	19:00	ASLC MONTHLY MEETING
26	17:41	Last Quarter Moon
26	19:30	City of Rocks Star Party (contact matthewdwilson@q.com)
NOV 01		Venus; greatest eastern elongation
01-02		New Mexico Star Party, Sevilleta National Wildlife Preserve (www.nmstarparty2013.net)
02-03	09:00	OUTREACH EVENT; RENAISSANCE FAIRE; Young Park, Las Cruces
02	19:30	City of Rocks Star Party (contact matthewdwilson@q.com)
03	05:50	New Moon
05	03:45	South Taurid Meteor Shower
08	19:00	OUTREACH EVENT; OPEN HOUSE; Tombaugh Observatory at NMSU;
09	19:00	OUTREACH EVENT; MOONGAZE; International Delights
09	22:57	First Quarter Moon
12	03:02	North Taurid Meteor Shower
15	TBD*	OUTREACH EVENT; Visiting RV group from Northeastern US; Leasburg Observatory
17	08:16	Full Moon
17	09:19	Leonid Meteor Shower
17	18:59	Mercury; greatest western elongation
18	13:00	Moon - Aldeberan Conjunction
23	19:00	City of Rocks Star Party (contact matthewdwilson@q.com)
25	12:28	Last Quarter Moon
29	09:43	Moon - Spica Conjunction
30	19:00	City of Rocks Star Party (contact matthewdwilson@q.com)
DEC 02	17:22	New Moon
06	19:00	OUTREACH EVENT; OPEN HOUSE; Tombaugh Observatory at NMSU;
07	18:00	HOLIDAY DINNER; Lorenzo's Italian Restaurant, Pan-Am Plaza
09	08:12	First Quarter Moon
13	22:30	Geminid Meteor Shower
15	19:45	Moon - Aldeberan Conjunction
17	02:28	Full Moon
21	10:11	Winter Solstice
22	07:00	Ursid Meteor Shower
25	06:48	Last Quarter Moon

\*TBD = time to be determined

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

**Minutes, September 2013 ASLC Meeting**

**Show & Tell**

David Anderson spoke about the science exhibition at the Las Cruces Museum of Nature and Science which featured a display including a telescope built by Clyde Tombaugh and how an old lawn mower was used to transport a telescope for public viewing.

John Kutney has made a refrigeration box for his astronomical camera and will bring it to the next meeting. He mentioned that he was going to Datil for a few days rather than driving all the way to the Okie-Tex Star Party.

Ron Kramer gave a short review of the movie "Europa Report", which he characterized as being very scientifically accurate for a science fiction movie.

### **Call to Order**

Chuck Sterling, President, Astronomical Society of Las Cruces (ASLC, the Society), called the September business meeting to order at 7:30 pm, 27 September 2013, Room 77, Doña Ana Community College, Las Cruces, New Mexico.

### **President's Comments**

Chuck Sterling, President, welcomed the group to tonight's meeting. He thanked everyone for the Show and Tell items. There was one (1) new member attending tonight's meeting: Dr. Dave Doctor, formerly of Massachusetts. There were no visitors attending tonight's meeting. Chuck forgot to print out an attendance sheet, but Steve Shaffer made one up on the spot and set it out for folks to sign in.

### **Secretary's Report**

The Secretary, John McCullough, was not present at tonight's meeting. There was no Secretary's report.

### **Treasurer's Report**

The Treasurer, Trish Conley, had to leave early and was not present for the business portion of tonight's meeting. Chuck Sterling read the Treasurer's report tonight. There was no additional Treasurer's report.

### **Committee Reports**

#### **Apparel**

Ron Kramer, acting Committee Chairman, asked for a volunteer to take over the apparel, but in the meantime brought items for sale to the meeting.

#### **Loaner Telescope Program**

Ron Kramer, Committee Chairman, reported there are a few that need to be repaired but that he had not had time to address them yet.

#### **ASLC Observatory at Leasburg Dam State Park (LDSP)**

Jerry Gaber, Co-chairman, has installed the new electronics in the 16" observatory scope, currently in his garage and expects to reinstall it in time for the next "Music and Stars in the Park" event on 05 October.

Ron Kramer, Co-chairman, mentioned that the 05 October event has been scaled back to accommodate a scheduling conflict with The Whole Enchilada Fiesta in Las Cruces the same day.

#### **Outreach**

Chuck Sterling, Outreach Coordinator, listed a Home School Group star party, possibly at Veteran's Park, for 26 October. The next Tombaugh Observatory event is 11 October and the next MoonGaze is 12 October.

The State-Wide Star Party at Sevilleta National Wildlife Refuge is scheduled for 01-02 November; several clubs are involved. Registration is about \$40 "at the door" for those that wish to participate.

The Renaissance Faire is 02-03 November, so our members will be split between the two events that weekend. Doña Ana County Health and Human Resources has a Star Party scheduled with ASLC for 09 November at their facility in Organ, NM, for kids in their Youth Initiative program.

12 November will include a star party for a church pre-school, similar to other events we have done in the past.

#### **Presentations**

The October meeting will feature Dr. Jon Holtzman, who will speak on the Sloan Digital Survey.

#### **Holiday Party**

Our holiday party location is undetermined. We had planned on Lorenzo's but their price structure has changed and will be too expensive.

There were no additional committee or officer reports.

**Old Business**

- 1. Candidates for Office, 2014 -
  - President: Rich Richins
  - Vice-President: Steve Shaffer
  - Secretary: John McCullough
  - Treasurer: Patricia (Trish) Conley
  - Director: Jerry Gaber
  - Director: Tracy Stewart

We will vote next month (October meeting) on these offices.

- 2. ALCon 2015 – The ASLC will host this event in Las Cruces, 08-11 July 2015.

There was no additional old business for discussion.

**New Business**

There was no new business for discussion.

**Recognitions/Achievements**

There are no recognitions or achievements for this month.

**Presentation**

The presentation for this meeting is Dr. Nancy Chanover on “Why is Jupiter’s Red Spot Red?”

-Respectfully submitted by John McCullough, ASLC Secretary, with much assistance from Chuck Sterling, ASLC President

**CLASSIFIEDS**

**For Sale:** Celestron 8” telescope w/synchronous motor drive. Includes the following accessories and options:

- Tripod
- 4 Eyepieces
- Direct and 90 degree eyepiece holders
- “T” camera adapter.
- Polar mount fabricated from 3/4 inch Birch Plywood with space for eyepieces etc.

Total Package Price: \$2,000.00

Available from:

Chuck Mansfield  
498 Quartz St.  
Los Alamos, NM 87544  
voice 505-662-2115  
email coyote2@swcp.com

**OFFICIAL BALLOT**

Election of officers for 2014

**Vote for one person for each office**

**PRESIDENT:**            \_\_\_\_\_ Rich Richins            or            \_\_\_\_\_ (write-in candidate)  
**VICE PRESIDENT:**    \_\_\_\_\_ Steve Shaffer            or            \_\_\_\_\_ (write-in candidate)  
**SECRETARY:**            \_\_\_\_\_ John McCullough            or            \_\_\_\_\_ (write-in candidate)  
**TREASURER:**            \_\_\_\_\_ Patricia Conley            or            \_\_\_\_\_ (write-in candidate)  
**DIRECTOR AT LARGE:**    \_\_\_\_\_ Jerry Gaber            or            \_\_\_\_\_ (write-in candidate)  
**DIRECTOR AT LARGE:**    \_\_\_\_\_ Tracy Stuart            or            \_\_\_\_\_ (write-in candidate)

Ballots may be sent to the secretary prior to the October meeting, or hand carried to the October meeting.

## Capturing Your First Spectrum! A Quick Start Guide, by Dave Doctor

Years ago I participated in a spectroscopy project on Mt. Wilson in California using a very heavy and expensive instrument called a "spectrograph." The cost of the set-up was thousands of dollars. Clearly it wasn't something

I was going to do at home in addition to my other amateur observing activities. That was until I discovered the SA100! The "Star Analyser 100" is a device called a *grating*."

In the 1880's it was discovered that a piece of glass with a grating of fine lines and spaces produces a series of spectra by the interference of light waves (diffraction). The SA100 is mass-produced in a standard 1.25" filter frame that you can screw onto the nosepiece of your webcam, filter wheel or DSLR just like any other filter!

The cost: currently \$179. What!? That's correct. For about 180 bucks you can use the equipment you already have to become involved in one of the growing fascinating branches of our hobby!

The SA grating, is of course, "low resolution" by industry standards, but don't let that fool you. While it is true The Star Analyser was developed mainly to give a simple low-cost introduction to astronomical spectroscopy, the potential of the device to generate scientifically useful data is being explored. Research applications of the Star Analyser's spectra include:

- Make a preliminary identifications of new objects such as novae or supernovae
- Characterize more unexpected objects as was once done in a rare example of gravitational lensing
- Measure the redshift of bright Quasars

The main purpose of this article is to give you a brief introduction to obtaining a spectrum using a Newtonian telescope and a webcam. Many of you I am sure have basic imaging equipment and actually the SA100 typically works best with small CCD chips such as those found in webcams. The SA100 is a grating that contains 100 lines/mm which is a low number, but the resolution in angstroms/pixel can be optimized by adjusting the distance between the SA100 and your camera chip. Use this online calculator to figure out how to adjust your particular set-up to produce the best results you can:

<http://www.rspec-astro.com/calculator/>

Before proceeding you will need to obtain software to analyze your spectra. Many are out there. *Vspec* and *Rspec* are probably the easiest to use. *Rspec* does cost \$99 but you can trial it first. I prefer *Rspec* especially when using a webcam because you can actually obtain a spectral graph in real time! In addition the support and video tutorials are outstanding.

For basic processing, especially video, you can use your favorite stacking program (e.g. *Registax* or *Autostak-ker*). If you are using a CCD camera or DSLR, a freeware program such as *Deep Sky Stacker* can work fine or you can use whatever you are already comfortable with.

There is a lot to learn! I recommend either *Grating Spectroscopes and How to Use Them* or *Astronomical Spectroscopy for Amateurs*, both books by Ken Harrison.

Now let's capture a spectrum! In this example I am using the Star Analyser grating with a typical high frame-rate mono video camera. It is important to remember the star you are observing will produce a star image as it passes through the grating. This is called the *zero order* image. You will see a spectrum to either side of the star image. These are the *first order* spectra and these are the ones we want to analyze as they are the brightest.

The telescope used in this example is a 10" f/7 Newtonian. The first thing I discovered right away was the grating to sensor calculations are not very predictive of what you can expect. According to my initial calculations I needed somewhere between 40 and 60 mm of space between the CCD and the grating to arrive at an acceptable resolution somewhere between 7 and 20 angstroms/pixel as recommended for the SA100. As it turns out in the end I just had to place the grating right onto the end of the standard camera nose piece which is maybe 30 mm!



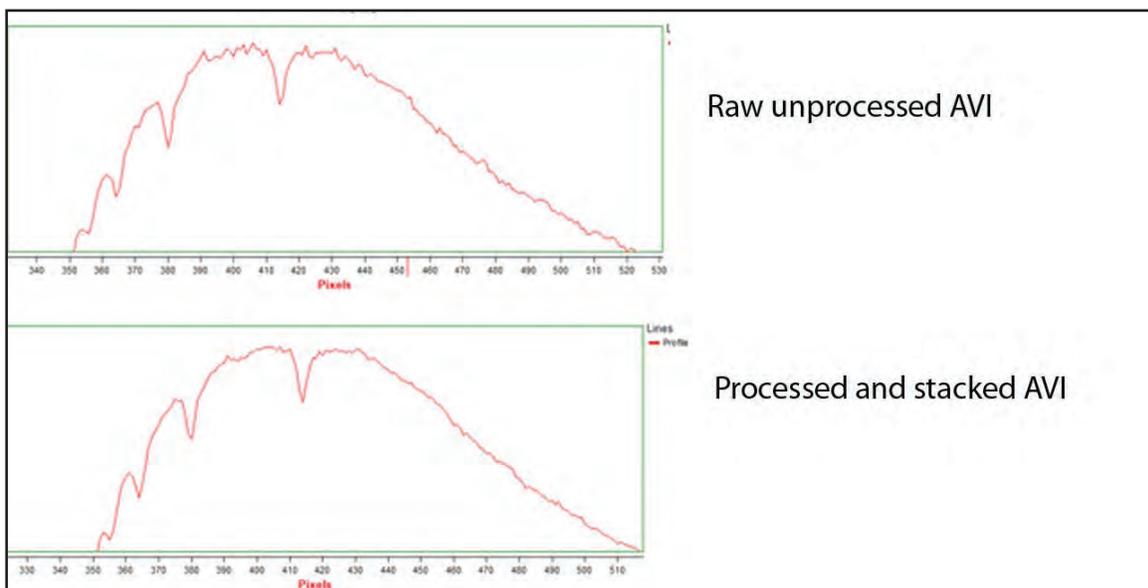
**Capturing the spectra:** Above is a raw video capture of the star Alhena in Gemini. The bottom line is you need to have BOTH the star image and a 1st order spectrum in the field of view (fov). This is a standard 620 x 480 chip with 7.4 micron pixels. Even if you THINK you need a certain distance of nosepiece, don't worry about it. Try the easiest configuration and see where it puts you. If you see something like this you are almost certainly fine. Alignment for first calibration on a brighter star is probably not a big deal, but you should try to orient the spectrum horizontally whenever possible. This will yield the best resolution and minimize artifacts. Exposure is going to be different for different set-ups but if you are using a contemporary planet-cam you can probably use it in standard live video mode at low frame rate. Gain and exposure setting are much lower than I would have thought. As soon as you slide either very far up you blow out the spectrum. It needs to remain VERY thin to see the lines at this resolution.

I found the easiest way to focus was first to start defocused and in that case you will see the spectrum blurred; then gradually move to the position where the spectral "smear" is the sharpest. If you do planets you will have a good feel for it. There are much more 'elegant' focus tools in some of these spectrum programs but I think you can do just fine judging it visually

**NOTE:** If you don't remember anything else, please remember to first image a type A0 spectral class star!!! These stars have the strongest lines visible and as you will see calibrating these is not that easy.

In the capture above, despite the thinness of the spectrum you can definitely see the absorption lines.

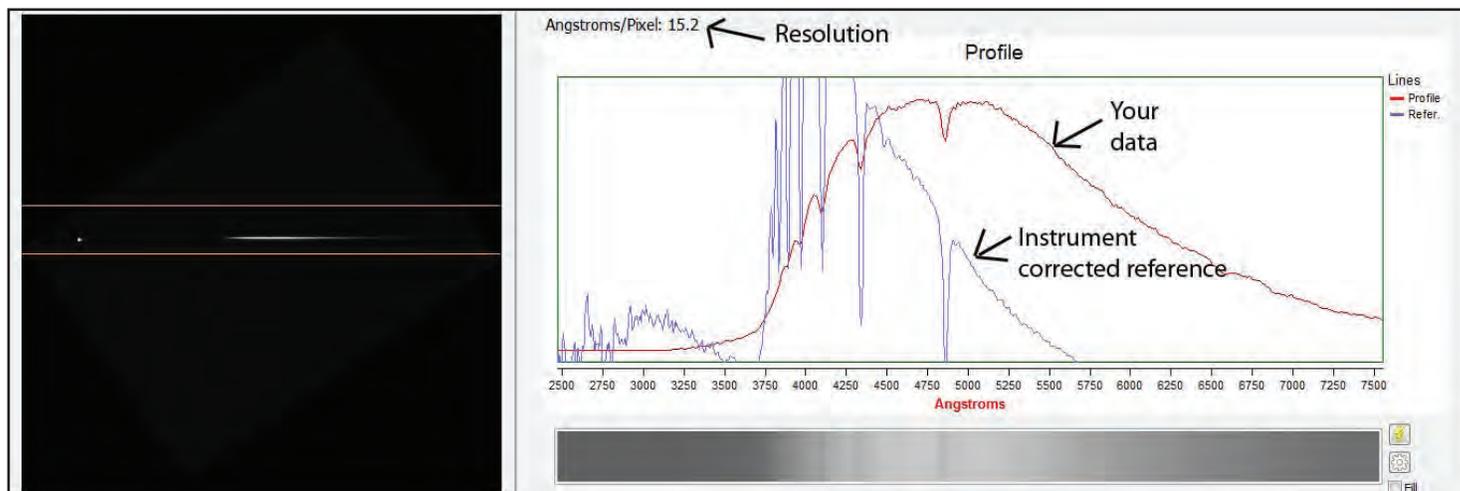
**Processing:** Basic spectrum processing is quite basic. Remember this is science and if you want your data to be meaningful to science, the only thing you should do, if anything, is aligning and stacking. I am sure there are more sophisticated noise reduction methods, but for low-res "Spec 101," I think you're fine. What I have observed is that it is probably worthwhile to stack your AVI even though programs like *RSpec* can read the AVI directly. There is a definite improvement in resolution and noise reduction.



The image above are both raw spectra, however, the top example was the raw AVI loaded into *RSpec* without processing. The bottom example was aligned and stacked in *Registax*. You can clearly see that stacking has resulted in both noise reduction and resolution enhancement especially at the UV end of the spectrum (UV is to the left and IR to the right). I pretty much used the default alignment points settings in *Registax*. Once the alignment process is completed, before clicking on 'limit' you should see a slight sharpening of the lines or at least no decrease in sharpness.

Save the stacked, summed image as a FITS file.

3) **Calibration:** This is covered extensively in the various software packages, so I don't want to spend time on it here, but a couple of points are worth mentioning. There are 2 calibration steps. The main initial calibration step is to figure out what lines are what by converting your camera pixels to angstroms. This is done by measuring the distance in pixels between the star image and an absorption line of known angstroms. To determine that, you compare your raw image to a reference image of the same stellar type. Most likely, your program has a library of those. The problem is that those reference spectra have all gone through the second phase of calibration which is something called the "instrument response." This is an additional calibration step designed to account for your camera's specific behaviors in terms of sensitivity, etc. This results in a totally different shaped curve from your raw data as shown in the image below:



Now I don't know about you, but the first time I saw this I was thinking to myself how the heck are you supposed to possibly recognize any spectral features common to the 2 graphs!

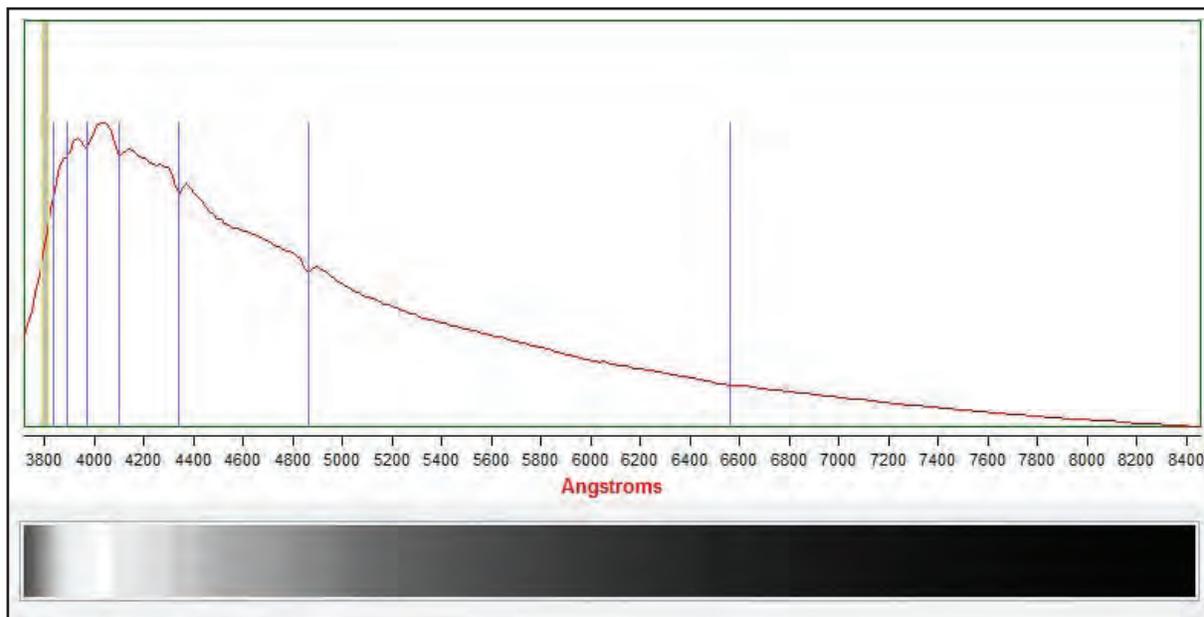
It took me a couple of tries to get it, but this is what it should look like. Basically the biggest downward lines in the reference instrument-corrected graph should intersect or line up with the "troughs" in your raw image. This is why they say use a type A star because the features are way exaggerated. The Balmer lines are pretty well known and you can always check in your calibrated result to see if it makes sense.

Note that the resolution in angstroms/pixel is 15.2 which falls in that 7-20 target range!

4) **Final Result:** You obtain your own instrument response curve which is shown on the next page. This is the final result showing the actual spectral behavior of the star displaying the absolute intensity values. The lines are the Balmer absorption series which are just overlaid temporarily to check the curve accuracy and as you can see they line up quite well!

And now we know how to capture a calibrated spectrum and it's onward and upward!

Welcome to spectroscopy!



Below is one final image, taken just before I moved to Las Cruces.

Kappa Draconis is a magnitude 3.9 blue giant, spectral type B5iv - B8. It's thought to be entering the red giant phase, is 5 times the mass of the Sun and is about 480 light years away.

It belongs to a class of stars called B(emission) or Be. It is a hot star that spins very fast (200 km/s) and has 1 or more Balmer lines in emission rather than absorption. The stars have huge stellar winds and high mass-loss rates. What causes a B star to transition to a Be is not well understood. The calibrated spectrum above does show the emission H alpha line on the right!

This spectrum was obtained using a Star Analyzer 100 slitless grating, 10" Newtonian and Skynyx 2-0M video camera. The resolution is about 15 angstroms/pixel.

