the Webfooted Astronomer
News from the Seattle Astronomical Society
August 2008

A beginner's experience in making Dobsonian telescopes

by Jingchun Chen

I was born in a small Chinese village, and childhood memories of the splendid Milky Way under the truly dark sky were simply unforgettable. I don't know when a seed was planted in my mind that one day I shall look into the night sky through my own telescope, but it wasn't until last year when this dream was realized. Living in a two-bedroom apartment alone, and working in a very laid-back atmosphere, conditions suddenly became mature for me to build my own telescope. So in April of 2007, with no previous experience of even touching an astronomical telescope, but with a strong desire to have my first telescope view of the night sky using a self-made, I started my first ATM project. I did some research and landed on the eight-inch F/6 Dobsonian style, considered by many as the sweet spot for beginners. Besides, San Francisco Sidewalk Astronomers provided a complete plan of classical John Dobson style scope of this size.

I started mirror making with a kit bought from Newport Glass Inc. To reduce vibration and noise during grinding, I made an "apartment-friendly" grinding stand using a cardboard box filled with water bottles as ballast and packaging foam to add rigidity. Things went smoothly until fine grinding at 15-micron grit. The tool and mirror got stuck with each other and I just couldn't separate them by pushing. If I were not so eager to go on, I would have been able to calm down and think of many ways to solve the problem. Instead I left my education in the dust and decided to use brute force. While they did separate, a BIG chip was produced on the mirror edge. That was truly devastating, but the next day I decided to accept the reality and continue.

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NEXT MEETING

August 20 — 7:30 p.m.
University of Washington
Physics/Astronomy Building, Room A-102

The scoop on star parties: etiquette, tips, and tricks

As amateur astronomers, we like to get outside and use our telescopes, even share the night sky with others. Star parties take place around our local community, and around the world. There are different types of star parties that astronomers, guests, and the general public should become familiar with, as there are differences to consider.

SAS President Jon Bearscove will share his experiences in attending star parties. He will emphasize the types of star parties, what to bring, what to expect, and rules of the road for astronomers, guests, and the general public.

SAS Calendar

August 20 — 7:30 p.m.
Seattle Astronomical Society Meeting
Guest speaker: Jon Bearscove, on star party ettiquette. Details on page 1.

August 20 — 9 p.m.
UW Observatory — Public viewing night

August 25-31
Oregon Star Party

August 30 — New Moon

August 30 — 8 p.m.
Tiger Mountain Star Party (members only)

September 3 — 9 p.m.
UW Observatory — Public viewing night

September 6 — 7 p.m.
Seattle Astronomical Society Star Parties
- Green Lake, Seattle
- Paramount Park, Shoreline

September 7 — First quarter Moon

September 13— 6:30 p.m.
Amateur telescope makers SIG meeting
Contact: atm@seattleastro.org

September 13
Uranus at opposition

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We promise you the Sun, the Moon, and the stars... and we deliver!

The Seattle Astronomical Society is an organization created and sustained by people who share a common interest in the observational, educational, and social aspects of amateur astronomy.

Established in 1948, the SAS is a diverse collection of over 200 individuals. A variety of programs and activities is presented by the SAS throughout the year. Monthly meetings feature speakers on a wide range of topics, from the Hubble Space Telescope to electronic imaging to personal observing experiences. The club holds public observing "star parties" at Green Lake and Paramount Park every month, dark sky observing parties outside Seattle, plus such activities as meteor watches, public telescope and astronomy displays, National Astronomy Day, and an annual Awards Banquet.

A beginner's experience

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Polishing went well first from the center but the edge turned out to be much more stubborn. When more polishing couldn't make any perceivable difference on the outer half inch segment under the laser pointer test, I accepted my theory that it was due to incompleteness during fine grinding, and moved on. Before starting figuring, I made a mirror stand and a knife edge Foucault tester. Using a traditional Couder Mask or pin stick I found it difficult to objectively name the nulled zone on the mirror surface. Therefore I decided to use my Pentax camera to capture Foucault test images and manually find the nulled zone of each image on the computer. But with data being read, the interpretation of those data was even more challenging. I will never forget those long hours of work every night trying to understand what the mirror surface was like. About one month after the first grinding noise was heard, I decided that the curve of the mirror is good enough for me, though I never tried to calculate the wavefront error of this mirror.

Jingchun Chen and his first scope, BoJi. The two have been a familiar pair at recent SAS events, such as the lunar eclipse viewing in February of 2008. Photo by Jingchun Chen.

Waiting for the mirror to be coated by Newport Glass, I began the construction of the OTA and mount. Without powerful tools and convenient workspace, this part of work was no easier to me than mirror grinding. For example, cutting the wood dowel at exactly 45 degrees using a handsaw was a rather challenging task. Another challenge was to spray-paint the tube exterior blue in the living room but still keep carpet, wall and myself from getting blue. Nonetheless I got most of the parts ready around mid-June, except the finder scope. Pondering for a while whether to buy or to make, I eventually decided to build a finder using binocular parts. I visited a local binocular store and picked up a box of junkies, including three broken military scopes, some extra tubes, and a 50mm doublet lens. By trial and error, I made a finder with about 6.5 degrees of view. Later on I made two attempts to make it a right angle finder so as to ease the pain on my back and neck.

First I got a hand mirror from Walgreen and attached it to the front of the finder at 45 degrees. It worked quite well but it collected stray light, got dewed up easily, and didn't stay on very long. Then I broke the mirror and put a piece between the objective and the eyepiece, as a "diagonal". I was puzzled by ghost images formed on both sides of the main image, and realized the next day that this was because household mirrors are

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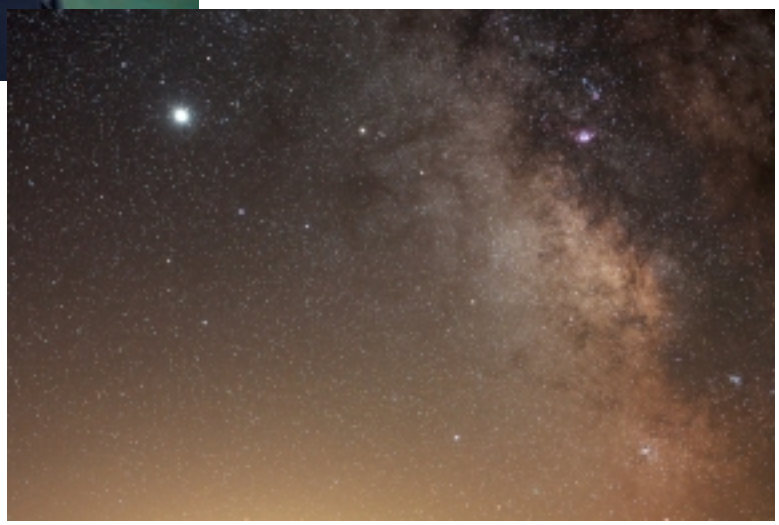
SAS Gallery

The "SAS Gallery" on pages four and five features Maxine Nagel's photographs from this year's Table Mountain Star Party. Above, a panorama of the encampment. At left, the photographer plots her next shot, which may have been the excellent photo of Jupiter gliding through the Milky Way, below.

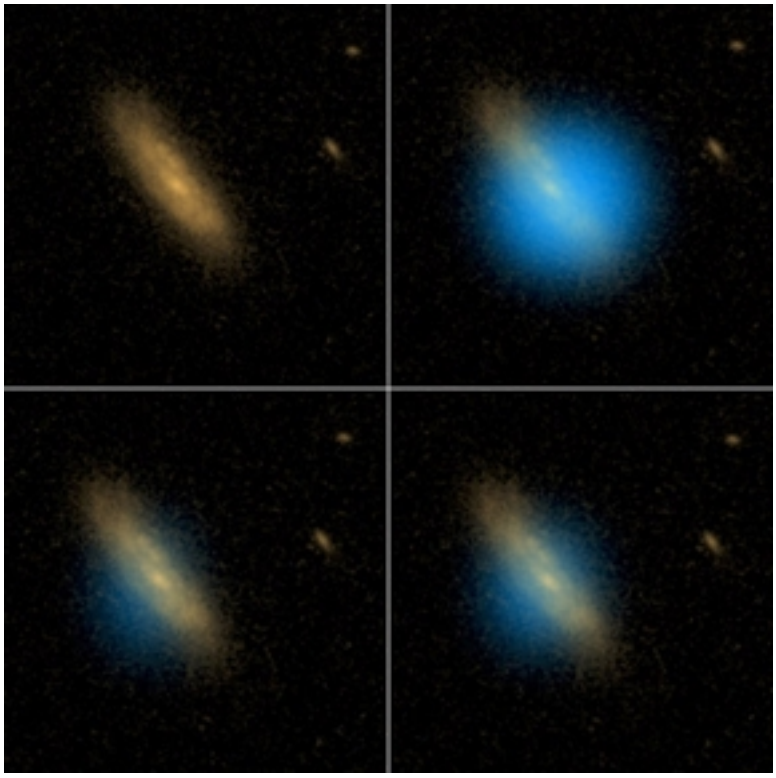


Above, part of the SAS contingent at Table Mountain. Was it cold? At left, the lengths we go to in order to get good cell reception.

Forget what you've heard. In astronomy at least, apparently size really IS everything!

Death of a Supergiant

By all outward appearances, the red supergiant appeared normal. But below the surface, hidden from probing eyes, its core had already collapsed into an ultra-dense neutron star, sending a shock wave racing outward from the star's center at around 50 million kilometers per hour.The shock wave superheated the plasma in its path to almost a million degrees Kelvin, causing the star to emit high-energy ultraviolet (UV) radiation. About six hours later, the shock wave reached the star's surface, causing it to explode in a Type IIP supernova named SNLS-04D2dc.Long before the explosion's visible light was detected by telescopes on Earth, NASA's Galaxy Evolution Explorer (GALEX) space telescope captured the earlier pulse of UV light — scientists' first glimpse of a star entering its death throes.



Sequence of images shows supernova start to finish. The top left image shows the galaxy before the supernova. At top right, the bright UV flash called the shock breakout indicates a red supergiant has collapsed. At bottom left, moments later, the flash is mostly gone. As the debris expands, it heats up again and becomes brighter (bottom right). The supernova became 10 times the size of the original over the following few days, thus becoming visible to supernova hunters.

"This UV light has traveled through the star at the moment of its death but before it was blown apart," explains Kevin Schawinski, the University of Oxford astrophysicist who led the observation. "So this light encodes some information about the state of the star the moment it died."

And that's exactly why astronomers are so excited. Observing the beautiful nebula left behind by a supernova doesn't reveal much about what the star was like before it exploded; most of the evidence has been obliterated. Information encoded in these UV "pre-flashes" could offer scientists an unprecedented window into the innards of stars on the verge of exploding. In this case, Schawinski and his colleagues calculated that just before its death, the star was 500 to 1000 times larger in diameter than our sun, confirming that the star was in fact a red supergiant.

"We've been able to tell you the size of a star that died in a galaxy several billion light-years away," Schawinski marvels."GALEX has played a very important role in actually seeing this for a few reasons." First, he says, GALEX is a space telescope, so it can see far-UV light that's blocked by Earth's atmosphere. Also, GALEX is designed to take a broad view of the sky. Its relatively small 20-inch primary mirror gives it a wide, 1.2-degree field of view, making it more likely to catch the UV flash preceding a supernova.

With these advantages, GALEX is uniquely equipped to catch a supernova before it explodes. "Just when we like to see it," Schawinski says. ★

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

A beginner's experience

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second surface mirrors, not first surface. So this failed again and the final solution was a true diagonal purchased dirt cheap on EBay. The first scope, BoJi, was completed late June, just early enough to get to use it under the precious clear summer skies of Seattle. When the cloudy season started again in October, aperture fever was already at work and I started my second project, a 12inch F/5.3 Dob. Using all the lessons and experiences from the first project and computer programs I wrote to help evaluate shadowgrams of the Foucault test and Ronchi test, the second mirror finished much better, at or close to 1/10 wave p/v error. The scope was designed such that the tube can be pushed into the mirror box when not in use, therefore the OTA can fit into a small car. The spider also deviated from a classical Dob, made out of plumbing parts and screws so the secondary is removable and adjustable. I met my goal of completing my second scope, DouQiang, by Christmas of 2007, and I spent Christmas Eve observing Mars at opposition. ★

At right, Jingchun at the grinding stand he set up in his apartment. Below, DouQiang, his 12-inch Dob. Jingchun was an enthusiastic participant in SAS events and served this year as the society's VP for Programs. Because of life changes, he's had to move out of the area. We hope to cross paths with him again somewhere under clear skies. Photos by Jingchun Chen.

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NEXT MEETING
August 20, 2008

Star party etiquette, tips, and tricks

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