Mount Diablo Astronomical Society

Diablo MoonWatch

February 2014

General Meeting

Tuesday February 25, 2014

The James Webb Space Telescope:

Science Potential and Project Status

By Dr. Tom Greene (NASA ARC)

Doors open at 6:45 p.m.
Lindsay Wildlife Museum
1931 First Avenue,
Walnut Creek, CA 94597

Please park East of the museum, follow the instructions on the last page

The unprecedented sensitivity and resolution of the James Webb Space Telescope (JWST) will significantly advance a broad variety of astrophysics soon after it is launched in 2018. Its large (6.5-m diameter) primary mirror and infrared instruments will allow it to see some of the very first luminous objects that formed in the Universe after the Big Bang. Other major science themes of JWST encompass studying the assembly of galaxies, the birth of stars and planetary systems, and planetary systems and the origins of life. JWST will be the premier astrophysics space observatory for NASA and ESA over its 5 - 10 year mission lifetime, supplanting the Hubble Space Telescope (which primarily works at visible and ultraviolet light wavelengths). In addition to the topics covered in this talk, many scientists will use JWST to make discoveries that we have not yet imagined.

JWST employs many unique technologies, and the mission has been in development for over 10 years. Many major hardware components-all large optics and all science instruments - have been completed, and integration of major components has begun. In this talk I will illustrate the mission's science potential and highlight the status of this development effort.

Tom Greene is an astrophysicist at Ames Research Center where he has *(Continued on page 4)*

Remembering John Dobson (1915-2014)

By Mel Bartels

The phone was ringing; I had a grinding tool in my hands. Could I pull the tool off the mirror, throw some water on my hands and answer the phone in time? In those days there were no smartphones, no answering machines; phones were tethered to the wall with a cord.

I managed to grab the phone off the hook my hands dripping with water and grit and say, "Hello". It was Rob on the other end, asking if I'd seen the article in the Register-Guard: something about telescopes and Crater Lake. News came by newspaper tossed on your doorstep by a delivery boy. This article was talking about "18 inch and 24 inch Sidewalk telescopes available for public viewing". Rob was pretty excited. The year was 1981 and I was skeptical (I guess some things never change).

"Yes, I saw the article. But Rob, there's no such thing as an 18 or

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What's Up

A Tour of Mauna Kea

Inside the Gemini and CFT observatories presented by Chris Ford.

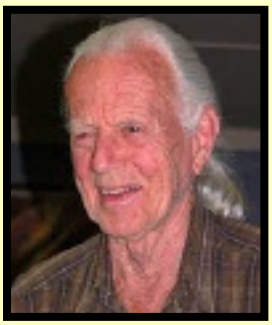
President's Corner

A collection of news and events

by Jim Head

John Dobson, RIP

If you're old enough to recall, once there was a time when the idea of owning a telescope larger than 8" was not practical, the thinking was that an equatorial mount was necessary to study the sky effectively, the weight and stability of a large scope prevented anything larger than about 8" in diameter. Then came along a guy who enjoyed looking through a large telescope so much that they kicked him out of the monastery where he was studying.. John Dobson, the sidewalk astronomer who made that term famous, passed away last month. He spent much of his life dragging a 24"Dobsonian Telescope to street corners, National Parks, and to the top of many peaks, showing how it was possible to own a large telescope. Fellow astronomers named his simple altitude-azimuth mount a "Dobsonian", and the rest is history. . .



John Dobson 1915-2014

If you've ever enjoyed the simplicity and power in a good "Dob" you could appreciate the genius of his invention, although John would be the first to say it wasn't an invention at all, it's just a canon mount with a mirror instead of a projectile. When the Dobsonian telescope first became popular, there weren't too many believers, what was the point of a big scope if you couldn't crank up the power on a night of good seeing, there's no tracking, how could I enjoy the view in the eyepiece over a longer time period, it would require a constant push to keep the target in view...Then a guy named Mel Bartels came along, he developed the first workable electronic tracking for the alt-az Dobsonian telescope. Finally there was a solution to observe with a scope larger than 8"! Mel offered the plans for free, thousands worldwide began building large Dobs. The revolution started, large tracking scopes for personal use became a reality. Appropriately, Mel Bartel's recollection of John Dobson is in this month's Moonwatch. Mel is a great designer of telescopes too, check out his 13" tri-fold ZipDob at his website, http://www.bbastrodesigns.com/

Drought Cure

After months of dry days and beautifully clear nights, we finally figured out what cured the drought, schedule outreach stargazing events! I am not superstitious, but this coincidence has been entertaining. What's that old British saying, "We'll weather the weather whatever the weather"....

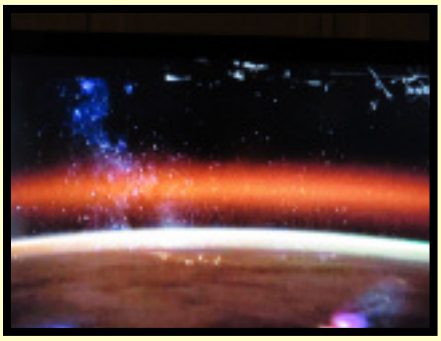
I don't agree, build that elevator to space so we can place our observatories above the clouds! That isn't going to happen anytime soon, but there might be an interim solution...

(Continued on page 3)

A collection of news and events (Continued from the previous page)

Wrong way cameras?

There's much news on the new Ultra High Definition cameras that were recently installed on the ISS, to provide near-real-time views of the Earth for anyone with an internet connection. I have to ask, why don't we also install cameras to look into the space around us? The ISS has all the qualifications for a great observatory, no clouds, great seeing, 45 minutes of night every 45 minutes... I just don't get it. Sometimes when watching live views of the ISS on NASA TV, a



slightly overexposed image of the Universe comes into view. When the ISS is exiting Earth's shadow, the camera's AGC readjusts from

Image Credit: NASA TV

night to day, sometimes, just for a second or two, it goes too far to find the correct exposure, and then, amazingly, the Universe comes into view in the background, vast swaths of nebulosity are seen with stars in comparatively bright colors. How difficult would it be to install a camera with wide spectral range, then beam it down to the internet, to see the Universe in living high-definition extended-range color? Students in classrooms would be amazed, museums and libraries could schedule special programs. Installing specialized cameras for Universities and researchers might be within their budgets... UrtheCast is already doing all this except that the cameras are pointed in the wrong direction! Where's that company called SpaceCast?

New Imaging Committee Formed

In the meantime, we are doing what we can down here on Earth, having just formed the Imaging Committee, with Chris Ford as Chair and Stuart Forman as Vice-Chair, to take advantage of the wide open choices in imaging practices today. The detail can be found in Chris's article in this issue of the Moonwatch. One example that might contribute to the imaging revolution, the new Ultra-High Definition TV's are just entering the market. I can't wait to see what a high-definition image looks like on the ~4000x2000 pixel displays (seeing permitted.)

Soon we hope to regularly provide near-real-time images on a display for our outreach events and Public Programs. There are many reasons why we would go to the trouble. When a group is around a display and refer to the same features together, it becomes more meaningful, the discussion can go deeper without public fright. Also it is one solution for accommodating anyone in a wheelchair and those who can't get a good view at the eyepiece. During one of our starparties at a local elementary school, a challenged child saw the crescent moon through the telescope for the first time, although it took a few minutes for her parents to hold her head still to align her eyes, and signing to her what to look for, it became cumbersome as she had to take her eye away to see what her dad was signing, then try to find the eyepiece again. if we had a display it might have helped her to see what her parents were seeing at the same time, then when it was her turn at the eyepiece she would know what to look for. If we had a display setup for our Public Programs we wouldn't have to worry about turning away someone who is in a wheelchair.

Help NASA discover embryonic planetary systems

If you want to do research without spending a lot of money, help out NASA with the newly announced Citizen Science Project - Disk Detective. From the Press Release: NASA is inviting the public to help astronomers discover embryonic planetary systems hidden among data from the agency's Wide-field Infrared Survey Explorer (WISE) mission through a new website, DiskDetective.org. Disk Detective

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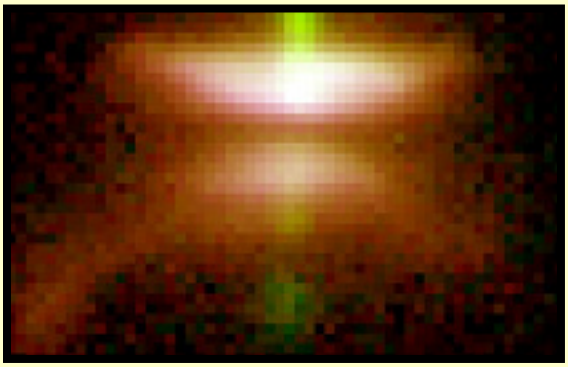
A collection of news and events (Continued from the previous page)



Herbig-Haro 30 is the prototype of a gas-rich "young stellar object" disk around a star. The dark disk spans 40 billion miles (64 billion kilometers) in this image from NASA's Hubble Space Telescope, cutting the bright nebula in two and blocking the central star from direct view. Image credit NASA/Hubble/STScI

is NASA's largest crowdsourcing project whose primary goal is to produce publishable scientific results. It exemplifies a new commitment to crowdsourcing and open data by the UnitedStates government. "Through Disk Detective, volunteers will help the astronomical community discover new planetary nurseries that will become future targets for NASA's Hubble Space Telescope and its successor, the James Webb Space Telescope," said James Garvin, the chief scientist for NASA Goddard's Sciences and Exploration Directorate."

http://www.jpl.nasa.gov/news/news.php?release=2014-032

Discover the fun of helping with our Outreach Programs

Visitors are very curious, they enjoy learning about our programs on Mt. Diablo and our meetings, or perhaps it's wanting to know more about other aspects of our larger environment – meteor showers, comets, or the lives of stars. We have many handouts that help explain many of their questions, now we just need an extra hand to pass them out, and to work with other simple activities, such as the simple solar system scale model, with essential facts written on the props, and to show our meteorites. If you are not a member of our Outreach Group, sign in to our Nightsky Network site, and add yourself to the group, then you'll receive emails of upcoming events and other venues.Then check our event schedule and signup where you can.

I hope you enjoy this month's MoonWatch, and when the weather permits, get out there and observe!

The James Webb Space Telescope: Science Potential and Project Status (Continued from page 1)

been working on NASA astrophysics observatories and conducting observations of young stars and extrasolar planets for the past 15 years. He received his PhD in Astronomy from the University of Arizona in 1991 and then came to Ames as a National Research Council Postdoctoral Fellow. Dr. Greene then joined the research faculty of the University of Hawaii and the staff of NASA's Infrared telescope facility.

Before rejoining Ames, he worked on developing JWST and Spitzer Space Telescope science instruments at the Lockheed Martin Advanced Technology Center in Palo Alto. Dr. Greene has authored or co-authored over 100 scientific papers, including 60 peer reviewed ones. He is on the science teams of 2 JWST instruments, chairs quarterly meetings of Bay Area exoplanet scientists, and sometimes dabbles in amateur astronomy as well.

Remembering John Dobson (1915-2014) (Continued from page 1)

24 inch Sidewalk telescope. The reporter must be confused; he's talking about the length of the telescopes. These scopes must be small refactors, maybe two or three inches in aperture".

Telescopes were occasionally referred to by their length, since aperture very rarely exceeded several inches. Rob was insistent and besides, Crater Lake is a beautiful destination, he argued. So Saturday morning he swung by in his 1980's van equipped with the latest gadget, a miles per gallon sensor and display, for us to play with on the drive. I said that some things never change. We talked telescopes on the way as the scenery changed from valley to forest, from fields to snow drifts, from valley air to crisp cool mountain air.

The final stretch into Crater Lake goes around breathtaking drop-offs and curves in the road, hiding our destination, the parking lot at the rim until the final curve. I stopped talking in mid-sentence. "Rob, those are giant telescopes – look!" Pointing out the obvious is all I could do. Before Rob could park the van and come to a full stop, I swung open the door and jumped out, running.

John showing Rob how to use the 24 inch.

I couldn't believe it: giant telescopes in cardboard and wooden frames. How could this be? A thin wiry guy was in charge, showing people views of the Sun and sunspots. One visitor from Sweden was arguing that the sunspots were not real. The guy in charge was practically yelling, "Those are sunspots. Each one is bigger than the Earth!" The visitor left unconvinced.

I didn't quite catch the guy's name. Did someone say, "John Dobson"? He was a force of nature though, a dynamic personality, and a way of talking that reminded me of cult leaders and gurus.

I could not stop looking, teasing details from the sleeping scopes. There was not a single machined bolt or adjustment screw and the thin mirrors looked to be from plate glass. On the upper end were sliding tubes for focusers and recycled eyepieces. Impossibly crude and contrary to received wisdom. Oh, and John's son was catching a nap in one of the giant telescope's tubes. John had named the telescopes with counterculture names like Delphinium and Stellatrope and 'The Little One' (which wasn't so little). It was all so… different.

I felt tempted in a new way. I had the apple in my hand and couldn't wait to take that first bite. We got in line and waited our turn at the 24 incher. Decades later I still find myself at a loss for words at those first views. Perhaps Ellie's words from Sagan's Contact, "I didn't know, I didn't know" come closest. We got in line again and again.

I asked John Dobson about the telescope's details. He was more interested in talking about what we were seeing through the eyepiece and the universe we live in though he did talk at length about the materials used for the telescope's motions. He didn't build the scope for the scope's sake; he built it to see the universe and to show the denizens of Earth our place in it.

Around midnight the crowd thinned. John suddenly announced that he was tired and going to bed. We could use the scope all night for ourselves as long as we locked it into position and aimed it away from the morning Sun. Are you kidding me? I thought of the contortions I had to go through for permission to use the 15 inch Cassegrain at Pine Mountain Observatory.

I'd looked through a couple of 24 inch Cassegrains. The view in Dobson's 24 inch could not have been more different. The tiniest brightest colorful specks of light for stars, the dark field even though the Moon was rising. We stayed at the eyepiece all night, one person at the rear of the scope helping push it along and the other up at the eyepiece. It was our first introduction to the art of ladder observing. "A little more, yes… WOW!" This was quickly followed by the ladder shake from the person below. "Oh

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Remembering John Dobson (1915-2014) (Continued from the previous page)

man, hurry up and look".

Before we could catch our breath the skies brightened – it was 4:30am. We locked up the scope and headed to the van for the drive back in the morning sunlight. "I have got to build a 24 inch", I kept repeating. Finally Rob slowed down and said, "If you say that one more time, I'll throw you out and you can find your own way home!"

Within weeks I had ordered a 24 inch Pyrex blank from Corning in New York and began corresponding by letter with Bob Kestner, one of John's protégés who would later, as a top professional optician at Tinsley, lead the effort to grind and figure the COBE corrective lenses for the Hubble Space Telescope.

John's telescope design was opposite to all that I had learned. He used simple non-precision recycled parts. Everything had to be push-pull adjustable. The scope didn't track, instead it used an altazimuth mount where the scope was pushed into position by hand and when let go, staying put, even in the night breeze.

There was no shaking at the eyepiece. The vast majority of scopes of that era quivered in the wind, shaking after touching the focuser. The Cave Astrola 12 inch f8, a monster of a scope, the largest portable telescope that I had looked through, had a maddening dampening period at the eyepiece. One literally counted to twelve then looked through the eyepiece, being careful to not bump it with one's eye. But John's scope was nothing like that.

Moreover, his 24 inch, 18 inch and 12 inch mirrors were plate glass, a material that drew serious frowns from the experts. John had removed every item and accessory that was not absolutely essential to the task of viewing, simplifying the design and substituting stiff materials like wood and cardboard for metal. His mirrors floated on suspension arms, held in position with slings. Steve Jobs at Apple would become famous decades later for similar design aesthetics.

John Dobson checking John Casino's 36 inch scope.

As I worked on my 24 inch, Mike and I planned a trip to Portland to scour the surplus ship yards for salvage plate glass. John had told me where he got his glass from surplus ship yards. Mike and I hopped from place to place. They all told us the same story. "Some white haired hippie from San Francisco came through a few years ago and bought up all the glass". In desperation, we began looking around the yards, not taking the guy's word who stood behind the counter.

Finally near the end of one Saturday I spied some glass in the back of this joint – a lot of it. The guy up front didn't know about it, otherwise he would have sold it to John Dobson. We negotiated a price, $400 for a huge stack of glass weighing hundreds of pounds. We returned the next weekend with my station wagon. The guy had taken the least interesting half of the glass and moved it to the front, crossed his arms and insisted that this was all that there was the previous week. While Mike argued with him, I looked around and found the missing half in the back. I drove the station wagon to the back and loaded it up. On my return Mike's eyes widened when he saw the glass. We quickly began covering it with the glass stacked in the front as the guy tended to other duties. This guy was ex-Marine ex-fighter and could have pounded the living daylights out of us just by glaring at us. I knew this was true because his tattoos said so. I gave

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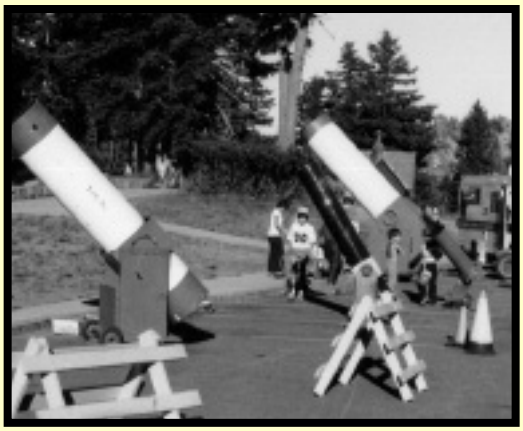
Remembering John Dobson (1915-2014) (Continued from the previous page)

him the check saying, "$400 for all the glass in the station wagon - that was our deal, yes?" I pointed to the station wagon, weighed down with glass. With an evil smile on his face, the guy said, "Yep".

I drove out of there as fast as I could, the station wagon bouncing on its rear axle. Whew, we'd pulled off Mission Impossible. Jim Phelps would have been proud. At least until Mike said, "Say, Mel, that check you handed him. It had your address on it?" I lived in fear and closed the drapes and turned off the lights at night for several weeks until I was convinced the guy was not coming after me.



The sidewalk astronomy setup at Crater Lake, 1981

We had about 60 pieces of plate glass, mostly 12 inchers with a few 16 inchers. Mike immediately began a 16 incher – a size heretofore impossible to contemplate. Between what we turned into mirrors and what we sold, we kept busy for years, happily making mirrors with cheap materials that Mike would scrounge up: bags of titanium oxide for polishing compound and road tar for pitch. The thinnest glass served as tools.

My life would intersect with John's from time to time. The most memorable was a week spent with Dobson at John Casino's place in Seattle in 1989. Casino was finishing a 36 inch and needed help with the final tuning. As you can see from the Ronchigram, the mirror suffered from an overcorrected outer zone. Casino was experimenting with mirror mounts that warped the thin glass into a better figure.

Dobson in private was quiet, thoughtful and prone to thinking in long periods of silence. He talked about WWII, working for the war effort as a chemist, having his soul shaken when the atom bomb went off. He talked about China and his studies of eastern thought. He talked about sneaking out of the Vedanta monastery to get buckets of sand from the beach, sifting the sand into sizes to grind mirrors. I tried sand. It is tough going, grinding itself into mud almost instantly. What sheer determination John had to make mirrors from such crude materials.

John also talked me into the star test. John could do that; he could be quite convincing. John's mirrors were outstanding; they gave superb star tests. They had rather long focal lengths, optimized to work with simple eyepieces to give the best magnification for sidewalk astronomy.

Later I found myself and my newly minted computerized telescope talking to John at an Oregon Star Party. He complimented me on my design.

John Dobson never strayed from his goal: showing as many people as possible the wonders of the Heavens so that they could first see, then understand. He was ignored by the establishment for years: Sky and Telescope's editor-in-chief famously writing that, "...your shortcuts...can hardly lead to satisfactory instruments of the kind most amateurs want in these large sizes. Porthole glass, makeshift wooden altazimuth mountings...are no longer suitable for telling thousands of other people who lack your knack of getting something "passable"." At the Riverside Telescope Makers Conference, a senior editor gave icy stares, refusing to look through Dobson's telescopes because of the wooden slatted spider vanes, un-machined construction and psychedelic paint schemes. It is a cautionary tale that expertise can be at a loss when confronted by invention. Even after his breakthrough, John spent years trying to get his book, "How and Why to Make a User-Friendly Sidewalk Telescope", published. The book is unusual in that it combines product vision and simplified telescope making techniques, honed through the teaching of thousands of telescope and mirror making students.

What people failed to understand and sometimes do not understand today is the revolutionary nature of John Dobson's

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Remembering John Dobson (1915-2014) *(Continued from the previous page)*

design, taking advantage of a mix of precision parts where it mattered (large aperture thin plate glass mirrors, mirror mountings with floatation levers and slings, stiction based Teflon, cork and Formica movements) and non-precision parts where it did not matter (cardboard tubes, slide focusers, wooden altazimuth mounts). Through his perseverance and intelligence, John gradually came to understand what it meant to support large thin mirrors, materials that led to smooth high powered motions at the eyepiece and a mounting design that was rock solid. Prior to the Dobsonian, there was hardly a single telescope that I can remember that didn't have some shake at the eyepiece, that didn't have trouble making small motions at high magnifications.

John radically removed features that were not essential to the mission of showing objects through the eyepiece of a large aperture telescope.

John Dobson and his 14 inches at Crater Lake

In particularly, John eschewed tracking mounts, expensive eyepieces and focusers. This made his design all the more compelling for its single mission to show people the heavens through large aperture telescopes.

Further, John developed mirror making techniques for large diameter thin plate glass mirrors and their mounting in a telescope. John was first to widely disseminate large pitch lap making techniques. He brought back to life star testing, first used successfully by John Hadley in 1722 to make the first true reflecting telescope with a parabolic mirror. Along with his sidewalk astronomy, we must never forget the countless telescope and mirror making classes he conducted over the decades, particularly up and down the west coast. He made mirror making accessible for anyone.

Further, it was a requirement of John's that the design use inexpensive recycled materials. Since John did not invent a gadget or material (as he sometimes pointed out), his design could have been built decades prior. But it wasn't, because no one thought of or put in the blood sweat and tears it took to create a revolutionary new design.

Today we celebrate design and understand its importance. Product design is the focus of individuals and companies worldwide. In John's time, it was novel and misunderstood. For example, look at the early copies of his telescope design by some amateurs. They tried to add precision back in, walking away from the compelling simplicity of the Dobsonian. It took years for amateurs to appreciate the design. John's students made numerous large aperture telescopes, introducing the era of the large aperture, low cost telescope in amateur astronomy. Through articles written by John's students in Richard Berry's Telescope Making Quarterly, the design and techniques spread like wildfire. Most popular was the 16 inch f5, a size and focal ratio that continues in popularity today.

John would say that the value of a telescope is in how many people look through it, not how burnished the wood. He put his design in the public arena, eschewing financial reward. John was proud of his design and pleased with the growth of sidewalk astronomy, though the world didn't turn out exactly how he wanted: amateur astronomers too often focused on the telescope design rather than sidewalk astronomy; his cosmology fell into disfavor.

John was unfailing kind to me over the years. John was a force of nature that comes along once every few generations. John will be missed; the Earth is a lonelier place without him. But like a great comet, John will not be forgotten.

Mel Bartels, January 2014, upon John Dobson's death at 98.

The Imaging Committee Manifesto

by Chris Ford

Since 2006, the MDAS has maintained an active Special Interest Group (SIG) for astrophotography, colloquially known as "imaging", that meets regularly each month.

In recognition that imaging has now become such a central aspect of amateur astronomy, the MDAS is establishing a new Imaging Committee with this author as Chair and Stuart Forman as Vice Chair. We would like to make any member of the MDAS who is interested in exploring this fascinating and rewarding pastime, aware that we are here to both help and encourage you!

Super Nova in M82 captured by Mike Harms, Saturday January 25, 2014

It is important to define precisely what is meant by the use of the term "imaging" and the scope of the Imaging Committee as it applies to your personal interests. Typically imaging is most commonly associated with deep sky "pretty picture" astrophotography and it is true that is the most popular aspect, however it also embraces lunar, planetary, solar and eclipse imaging, general night sky photography, video-astronomy, and image intensifiers. In addition, photometry, spectroscopy, and extra solar planetary detection,

CCD image? No, this what is possible in 30 seconds. Canon 60Da DSLR image exposed through a 24" dobsonian.

are imaging based endeavors accessible to the more research and scientifically inclined amateur astronomer. In other words imaging is an extremely broad range of astronomical pursuits relevant to a very wide audience indeed, all unified by a common interest in using digital camera and processing technologies to amplify the light coming from astronomical objects to visualize them in a manner beyond the possibilities of purely visual astronomy. The manifesto of the new Imaging Committee can be expressed by the following core principles:

(1) To promote interest in all aspects of astrophotography for everyone interested in exploring lunar, planetary, solar, and deep sky imaging.

(2) To provide a friendly and accessible forum for any interested MDAS member to seek help, encouragement, and advice from existing astrophotographers, where there are no dumb questions.

(3) To organize a monthly meeting where face-to-face conversation is preferred as the most efficient method of conveying advice and experiences within a welcoming and inclusive atmosphere.

(4) To demystify the technologies, processes, and many myths associated with astrophotography in what is now a rapidly advancing discipline of major importance to amateur astronomy.

(5) To spread knowledge of imaging within the MDAS, to contribute regular articles to moonwatch, and to maintain an informative presence on www.mdas.net

(6) To explore how aspects of imaging can be used during outreach events to broaden the visitor's perspective of the Universe, and to make astronomy more accessible to those who might have difficulty using an eyepiece.

(7) To have fun experiencing all of the above!

The imaging group meets regularly at Walnut Acres Elementary school on the third Thursday of every month at 7.00 PM and everyone is welcome. In particular we want to encourage anyone who is completely new to imaging and the meeting format is highly flexible and responsive to new attendees. A large budget or advanced technical skills are unnecessary to explore the world of astronomical imaging and there are more possibilities than ever before now available to help you produce amazing images that you will be proud of. The Imaging Committee above all exists to help you realize your goals, and we look forward to seeing you!

Chris Ford

It's Membership Renewal Time for April members!

Renew your MDAS membership and your magazines online!

ANNUAL MEMBERSHIP DUES OF $25 ARE DUE MARCH 31, 2014.

For members on the April membership cycle only. Some of our members renew in October, but they will be notified separately.

You should have already received an email if your membership needs renewing. To renew your club membership, you may either:

• Renew online using Paypal or your credit card at http://mdas.net/mdas_store.html , select Membership Renewal. On the same web page, please consider making an additional MDAS Donation or MDOA Donation (for our Observatory on Mount Diablo)

• Or if you do not have internet access or prefer not to make online payments, you may mail a check for $25 (or more!) made payable the M.D.A.S. to this address:

Mount Diablo Astronomical Society
P.O. Box 4889
Walnut Creek, CA 94596

MAGAZINE SUBSCRIPTION RENEWALS

All Sky & Telescope and Astronomy magazine subscriptions renewals are handled online, at the club discount rate.

The Astronomical Society of the Pacific has made arrangements with these magazines to allow members of the NASA Night Sky Network to renew at the club discount rate. All you need is a login for the Night Sky Network (NSN) through our club.

You can log into Night Sky Network and go to the Magazine Subscriptions and Links page to find the "New and Renewal Subscriptions" link. Here's the direct link: http://www.astrosociety.org/magazine/

If you don't have access to a computer, please renew by mail directly with the magazine using your renewal notification.

Any questions?

Please email memberinfo@mdas.net or call Marni Berendsen at 925-930-7431.

Scopes Are Needed!

Upcoming Mount Diablo Astronomical Society Events:

Many events are scheduled, we'll see what the weather brings, check your calendars and signup where you can, Thanks!

Tuesday, February 11, 2014—7:00 p.m.- 9:00 p.m.

Hercules Library Star Party, Hercules Public Library, Hercules, CA Setup 5:30 p.m.

Thursday, February 13, 2014—6:00 p.m.- 8:00 p.m.

Hidden Valley Elem. Science Fair, Hidden Valley Elementary School, Martinez, CA Setup 5:00 p.m.

Saturday, March 1, 2014—9:00 a.m.- 11:00 a.m.

MDUS District Science Fair, Willow Creek Center, Concord, CA Setup 8:30 a.m.

Tuesday, March 4, 2014—7:00 p.m.- 8:30 p.m.

Cambridge Ele mentary Stargazing, Cambridge Elementary School, Concord, CA Setup 6:00 p.m.

Wednesday, March 5, 2014—7:00 p.m.- 8:30 p.m.

Ron Nunn Elementary Stargazing, Ron Nunn Playground or Park, Brentwood, CA Setup 6:00 p.m.

Friday, March 7, 2014—7:00 p.m.- 9:00 p.m.

San Ramon Parks Astronomy Night, Old Ranch Park, San Ramon, CA Setup 6:00 p.m.

Saturday, March 22, 2014—7:00 p.m.- 11:00 p.m.

First Public Astronomy Program, Mount Diablo, Lower Summit Parking Lot, Clayton, CA Setup 5:30 p.m.

Making Flats

By Stuart Forman

Dust is everywhere. Even if your kept your telescope and camera in a hermetically sealed negative pressure room with white suits everywhere, you're still going to get dust.

Under normal visual circumstances, you don't notice it and if you see a little dust on your eyepiece you either ignore it or brush it away. In astrophotography, however, dust and other problems like vignetting can mar an otherwise pretty picture. Often these defects can be fixed in post-processing, but why fix them when you can correct them before they start? This is where flat field frames come in.

In addition to flat field frames, astrophotos are calibrated with dark, bias, and sometimes dark-flat frames, which will be the subject of another article, but with this article I would like to talk about how to create and use good flat frames in post processing.

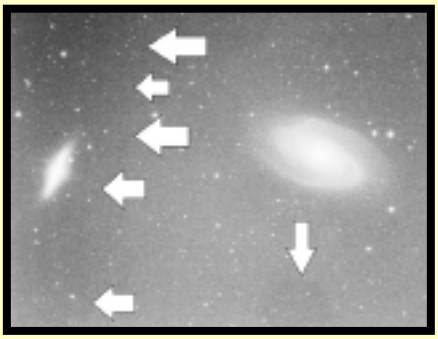
So how to fix this? This is where flat field calibration comes in.

Now you see the defects that are inherent in this optical system. There's vignetting to the left, and lots of dust motes. I probably can stand to attack my objective with a soft camel haired brush, but actually, this is a pretty average flat frame.

Here is an example of an uncalibrated 10 minute exposure of M81 and M82 from my red filter (I chose this one because the dust pattern was particularly ugly.)

(Continued on page 12)

Making Flats *(Continued from the previous page)*



It doesn't look too bad, right? But if you stretch it out and look at it very closely, you'll see that there is significant vignetting and a couple of dust mote shadows.

Here is a stretched picture of the flat field of this particular optical configuration.

What calibration software will do (CCD stack, Deep Sky Stacker, Nebulosity, Maxim, Pixinsight, etc) is take this flat field and mathematically divide out the vignetting and shadows. When this is done, you get a much more pleasing result:

Taking flat frames

What is the proper method for taking flat frames? There are three rules:

1) Use exactly the same optical assembly as your lights. This includes filters, focusing, camera orientation, and, of course, telescope. Any of those can add optical defects and you want to make sure that any dust specks are that are in your lights are in your flats. If you use a DSLR with a dust reduction routine, try to take your flat without first turning off and on the camera as that will shake off any dust off the CMOS or CCD chip.

2) Shoot an even, neutral white background. You want the same illumination at the edges as you do the center. There are many ways to do this. Some will shoot at a neutral portion of the sky at twilight. Some will stretch a white t-shirt over the objective. Some shoot at a blank wall. I use an evenly illuminated flat field panel. The main thing is it has to be neutral, without defects, and even.

3) Aim for an illumination about 45-50% of your max for your camera. 14 bit cameras (like most DSLRs) have a max ADU of 16,384, and 16 bit cameras have a max ADU of 65,536. So your goal mean flat illumination for 14 bit cameras ADU is 7000-8000 and for 16 bit cameras 30,000-35,000.

How do you measure the ADU in the field? Many camera acquisition software programs will give you image statistics (unfortunately, not Backyard EOS) and you can rapidly tailor your flat to your goal illumination. If you don't have access to field image statistics you can look at the histogram of the flat and aim for a peak about 50%, but I've found that that tends to underestimate the needed illumination.

Once you have your illumination nailed down, then take a bunch of flats—I would suggest at least 15-20 frames, and then average them out for a master flat.

There are many picky aspects of astrophotography, but flat fields are probably one of the most misunderstood and done incorrectly. I'm hoping that this article will put people on the right path to taking good flat images. If you have any questions, or you would like me to test out a flat field for you, please don't hesitate to email me at s24man@gmail.com, join our imaging Yahoo group (again, emailing me is the best way) or come to one of our meetings.

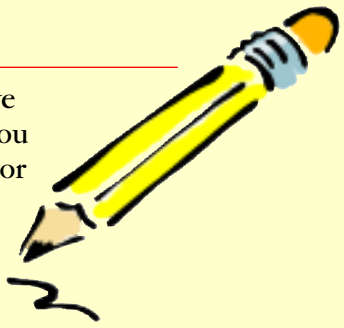
Mount Diablo Astronomical Society Event Calendar–February 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26	27	28	29	30	31	Society Observing (Private) 1 Sunset: 5:34 PM
2	3	WE Science Night (Private) 4	5	6:30 PM Larkey Park Lindsey Wild 6	ASP 125th Anniversary 7 7:00 PM Gregory Gardens	Observatory Maintenance (Private) 8 Sunset: 5:42 PM
9	Board Meeting (Private) 10	7:00 PM Hercules Stargazing 11	12	6:00 PM Hidden Valley Elem. Scien 13	14	15 Sunset: 5:49 PM
16	Washington's Birthday 17	18	Globe at Night: February 19	Globe at Night: February 20	Globe at Night: February 21	Globe at Night: February 22 Society Observing (Private) Sunset: 5:57 PM
Globe at Night: February 23	Globe at Night: February 24	Globe at Night: February 25 7:15 PM Gemmtg: James Webb ST	Globe at Night: February 26	Globe at Night: February 27	Globe at Night: February 28	1

Mount Diablo Astronomical Society Event Calendar–March 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
23	24	25	26	27	28	1 Society Observing (Private) 8:00 AM District Science Fair Sunset: 6:04 PM
2	3	4 Cambridge Astronomy Night (Private)	5 Ron Nunn Astronomy (Private)	6 Lafayette Elementary Astr (Private)	7 7:00 PM San Ramon Astronomy	8 6:00 PM ISAN 12:00 PM J Dobson Memorial Solar Sunset: 6:10 PM
9	10 Board Meeting (Private)	11	12	13	14 Oak Grove Middle school (Private)	15 Sunset: 7:17 PM
16	17	18	19	20 March Equinox MDAS Imaging Meeting (Private)	21 Globe at Night: March	22 Globe at Night: March 7:00 PM Public Astronomy: Stars Sunset: 7:24 PM
Globe at Night: 23 March	24 Globe at Night: March	25 Globe at Night: March 7:15 PM GenMig:Galactic Evolution	26 Globe at Night: March	27 Globe at Night: March Burton Valley Astronomy (Private)	28 Globe at Night: March	29 Globe at Night: March Observatory Maintenance (Private) Sunset: 7:31 PM
Globe at Night: 30 March	31	1	2	3	4	5

Always in Need of Articles



We are always looking for new articles, images or photos and content. If you have astronomical perspectives or experiences to share with your fellow members that you would us to consider, please feel free to contact me Jim (jamesnhead@comcast.net) or our newsletter editor Vianney. (veloroute@hotmail.com)

Clear skies!

Chris and Vianney

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General Meetings:
Fourth Tuesday every month, except on the third Tuesday in November and December. Refreshments and conversations at 6:45 pm; Meeting begins at 7:15

Where:
Lindsay Wildlife Museum
1931 1st Avenue
Walnut Creek, CA 94597
(925) 935-1978
wildlife-museum.org.

Directions to facility:
From the North: Take 680 South to Treat Blvd. exit. Turn left at light onto North Main St. Turn right on Geary Road. Turn left on Buena Vista. Turn right on First Avenue. The museum is halfway up the block on the left.

From the South: Take 680 North. Take the Treat Blvd./Geary Road exit and turn left over freeway. Go three more lights and turn left on Buena Vista. Turn right on First Avenue. The museum is halfway up the block on the left.

Parking:
The museum is located in a residential area. There are no parking fees nor meters. Please park only in the museum parking lots on the east side of the museum, the Friends Church lot across the street (except Sunday mornings) or on Buena Vista Avenue. Please do not park on First Avenue in front of our neighbors' homes — you will get a parking ticket.