The Objective View

February 2010

Newsletter of the Northern Colorado Astronomical Society

Robert Michael, President
pres@ 970 482 3615
Dan Laszlo, VP and Newsletter Editor
objview@ Office 970 498 9226
Chad Moore, Secretary
sec@
Jon Caldwell, Treasurer
treas@
Greg Halac, Web Editor
web-edit@ 970 223 7210
Dave Chamness, AL Correspondent 970 482 1794
add ncastro.org to complete email address

Next Meeting: February 4 7:30 pm

Video Astrophotography
By Vern Raben

Club Business at 7:15 pm

Fort Collins Museum, 200 Mathews St
Fort Collins

http://www.fcgov.com/museum/

Club Brochure: http://www.ncastro.org/Contrib/2009_Brochure.pdf

NCAS Programs

March 4 TBA

NCAS Public Starwatch at Fossil Creek Reservoir

Feb 19 6:30 to 10 pm
Mar 19 6:30 to 10 pm

http://www.co.larimer.co.us/naturalresources/fossil_creek.htm

City of Fort Collins Natural Area Program at Sunset

Bobcat Ridge: March 11, Apr 8, May 13

Dark Site Observing Dates

Feb 12, 13 Keota site, ask FRAC

Other Events

Chamberlin Observatory Open House, 7 to 10 pm
Feb 20, Mar 20, Apr 24, May 22, Jun 19 303 871 5172
http://www.du.edu/~rstencel/Chamberlin/

Cheyenne Astronomical Society 7 pm Feb 19
Cheyenne Botanic Gardens
http://home.bresnan.net/~curranm/

CSU Madison Macdonald Observatory Public Nights
On East Drive, north of Pitkin Street
Tuesdays after dusk if clear, when class is in session

Estes Park Memorial Observatory. 7 pm. Feb 25 and 27
http://www.angelsabove.org/

Little Thompson Observatory, open 7 pm Feb 19, Edward Armstrong, Celestial Navigation at 7:30 pm
http://www.starkids.org

Longmont Astronomical Society 7 pm Feb 18
http://www.longmontastro.org/

January 7 Program: Night Sky Network
by Chad Moore and Greg Halac

The Night Sky Network is a NASA sponsored resource for amateur astronomy clubs. The website draws on the talents at the Astronomical Society of the Pacific, among others, to promote and support outreach activities. Content is provided in the form of videos and Powerpoint shows. Tool kits which have been audience-tested are provided. Popular topics include the Solar System, black holes, galaxies, and the Big Bang. Scripts are provided, including answers to anticipated questions. The Black Hole topic is accompanied by a sky map for the sites of these invisible objects. There is a Supernova map with candidate stars including Betelgeuse. There is a Cook up a Comet recipe, and DVDs for 400 Years of the Telescope and Eyes on the Skies. The Kepler mission kit uses a couple balls to show a transit, and a sky map of exoplanet locations. The Night Sky Network website has an event calendar application. It is designed to coordinate recruitment of volunteers, and allows visitors to find outings in their region. Greg and Chad will be registering NCAS members to access the volunteer functions of the site. To view, see:

http://nightsky.jpl.nasa.gov/

January 7 Club Business

President Bob Michael called the meeting to order. Events were reviewed. Tom Teters proposed a club donation to the Intl Dark Sky Assn which was approved. Officer elections were completed, and all were reelected. Congratulations to Bob Michael, President; Dan Laszlo, Vice President; Chad

Moore, Secretary; and 2010 Treasurer John Caldwell. John reported on the club account Outreach coordinator Greg Halac tallied 33 events in 2009, a total of 2100 guests served. A big thank you to Tim Antonsen, David Auter, Jon Caldwell, Dave Chamness, Tom Fay, Robert Grover, Greg Halac, Dan Laszlo, Chad Moore, Nate Perkins, Jolene Pilcher, Gerry Reynolds, Tom Teters. Thanks also to Tom Fay for his telescope donation for Discovery Science Center's Brainiac Bowl 2009. Next outreach events in 2010 are for Rice Elementary in Wellington, Erwin Middle School in Loveland, Shepardson STEM night in Fort Collins and the public starwatch at Fossil Creek Reservoir.

From Tim Antonsen: Observing Report Dec 17-18 2009

After a spectacularly clear day (which was against NWS predictions), I decided to make a trip out to the Keota dark site (KDS) for a night of new-moon observing. I was a little concerned that there might be snow on the ground there, given the cold temperatures we've had following recent snow storms. However, I decided I could probably find some kind of space to set up; in the worst case, I could set up alongside the main road (CR103) since it has so very little traffic.

When I turned off CR103 on the road into the KDS I was quickly into some minor drifts across the road. With the Land Cruiser, these posed no problem and I crunched right through them; no need even for 4WD. Anyone with a high-clearance vehicle (SUV or pickup truck) would easily get in, but I can't really recommend it right now for passenger cars. Some of the drifts are ±8" deep; crunchy corn snow. A well-driven passenger car would likely make it, but you better have a tow-vehicle in your party in case you get high-centered!

The observing site itself, I was glad to discover, is totally free of snow! I guess it's been wind-scoured, but last night there was only the slightest air movement; at times it was perfectly still. In any case, it's as bare and dry now as it is in August.

I arrived about 7PM, and as I noted excitedly during a call home, the sky was magnificent. There were a few clouds in the far west and deep south, but everywhere else was clear. The Milky Way flowed gloriously overhead from east to west. That didn't last long. By the time I'd set up the 12.5" truss Dob, clouds had largely overtaken the entire sky. For the next 2½ hours I mostly cooled my heels (fairly easy to do, given the ~30°F temperature). I could get occasional peeks here and there; in particular I had a nice porthole for a while on M42/43 and the Flame Nebula (NGC 2024). But by 9:15, it looked pretty grim; heavy clouds blocked the entire sky, save for a sliver deep in the west where I glumly watched Jupiter set. Still, having driven that far with fuel prices this high, I was in no hurry to go back home.

I'm glad I stayed. Right at 10PM, the cloud cover vanished. Just vanished! For the next 4 ½ hours the sky was terrific; transparency was 4-of-5, although seeing was poor all night. At 2:30AM another wave of clouds rolled over, but that assault broke by 3:15AM and things remained good until I packed up an hour later.

I had my coffee and my laptop, and had a wonderful evening. I used SkyTools 3 to select targets and give me good charts; I powered it off a big ol' deep-cycle marine battery with twin standard 12V outlets mounted on the carry box, my home-made Power Tank.

I had one near-crisis during the night: at about 1AM, perfectly still air let the frost come in with a vengeance. I was wondering why my target was hazing out on me when I discovered that the secondary was entirely frosted over. Fortunately, my secondary holder is from AstroSystems and has the Dew-Guard heating element. I popped a 9V battery on it and … nothing. After a while, I fetched another 9V battery from my toolkit. Gradually the mirror cleared. The first battery wasn't dead; it was just too cold to work. Until a very slight breeze came up, I kept one battery in my pocket and one on the secondary, and switched them whenever the secondary would show signs of frost. This strategy kept me in business despite the heavy frost. Once the air began to move a little, the secondary stayed clear.

The Rigel Quikfinder took a bit longer than the secondary to frost over, but inevitably it did. The solution was fairly simple. My eyepiece case is foam-filled, and in cold conditions I always toss a couple of hand-warmer packets in there and keep it closed. So I just popped the finder off the telescope and put it window-side down on top of one of the packets in the EP case. In a couple of minutes it would be clear and ready to go.

But at one point, I was having a helluva time trying to locate M3. "What's the deal?" I thought, "I know where this puppy is!" After the fourth failed attempt, I realized that I hadn't properly seated the finder after its last warm-up. It was aiming me about 2° higher than I thought. No wonder I was having fits finding a big honkin' Messier! (I probably shouldn't tell that story, but hey, let he who is without SNAFUs cast the first abuse at me! J)

The real highlight of the night was Thor's Helmet (NGC 2359), pretty much on the meridian. From my notes:

· Nagler 13mm type 6, 122x: What a treat! There's a lot of nebulosity in this area, but once you find the Helmet, there's little doubt! (At least under these great skies!) It was easy to pick up both "horns"; they run eastward from the north & south ends of the "cap". The cap is mottled, not uniform, and it's easy to imagine the domed appearance. The south horn is much brighter and apparently shorter than the north horn, which is dimmer, thinner, and much longer to the eye. A UHC filter seems to make little difference with this object, and though I did use it for most of the observation, I think it would be a fine sight without it; that is, filtration optional. (YMMV). Not a hard find given a good chart, although it's in an area rather sparse with bright guide stars.

Otherwise I spent a lot of the night filling gaps in my log of Messiers. I believe I've observed them all, but I need to re-observe a bunch to get them properly logged. I also stopped by to visit some old friends in Cassiopeia (NGC 7789, NGC 457, and others). And I spent a little time on Mars after it got well up, but with the poor seeing it was rough sledding to snatch any detail.

Near the end of the evening, I dabbled a little in Coma; most especially, I looked up NGC 4565 as well as NGC 4631 (the Whale Galaxy), two of my personal favorites. I just can't get enough of those big bright galaxies that willingly show you their stuff. By then (4:15AM) I was ready to call it a night. The vehicle had an awful thick coat of frost, but in an out-of-character moment I had the foresight to lay a cover over the windshield shortly after I arrived, so I didn't have to scrape it before driving away!

From Max Moe: Surface Brightness

> Max,
> You sound like somebody who might be able to
> answer a question I've been wondering about. Many
> times the reported magnitudes of objects are
> absolutely useless for practical observing purposes.
> For example, if I'm looking for a star that has a
> magnitude of 5.5, I know that I'll be able to see it
> with my naked eyes in dark skies because it's a
> point source, but if a comet or a galaxy has the
> same magnitude I may or may not be able to see it
> depending on how spread out the object is. Is there
> a mathematical formula I can apply (using the
> reported magnitude and the surface area of the
> object) to find out what the magnitude of the object
> is per square arc second, and therefore have a
> realistic idea of whether an object is really
> visible to the naked eye? (If there is an answer,
> you'll have to dumb it down quite a bit. I can't add
> 2 + 2 without using my fingers!)
> Thanks,
> Andrew

Hi Andrew,

So I thought I would change the subject to surface brightness to be more general. Well the standard definition of surface brightness which you can find in many references like wikipedia is:

$S = m + 2.5*\log(A)$

where m is the integrated total visual magnitude and A is the angular area in square arcseconds so that S is in mag/arcsec^2. However, there are of course some caveats to this equation, which I will discuss later below:

i) the angular area A must be larger than the resolution of you eyes and optics
ii) the object must have well defined boundaries in order to define A
iii) S is only the MEAN surface brightness, and non-uniformities may exist

i) By definition, a point-source would have infinite surface brightness since A=0. However, you must consider the finite resolution of your eye which therefore makes the surface brightness finite. Mathematically, you want to convolve the resolution of your eye with the brightness distribution of your object. In practice, it is just easier to say that A = max(A_object, A_resolution), i.e. if you can resolve the object, use the area of the object when computing its surface brightness, otherwise use the angular resolution of your eye.

So what is the angular resolution of your eye? Most references give 1-2 arcminutes, but I have no idea how this is calculated other than it being only a few times the diffraction limit of the eye. I know Tycho Brahe's naked eye catalog had errors on that order of 1-2', but he used special equipment to constrain angular separations better than what his eye could have done alone.
One of my favorite double stars is Albireo (gamma Cygni), with a separation of 34-35". I can barely discern a peanut with my 8x50 finder, and with 10x50 binoculars I can definitely tell it is a double star. Since I need 10x magnification to fully split a 35" double, my naked eye resolution at 1x magnification would be 10*35"= 350" ~ 6'. This is of course for two really bright point sources - I can easily split the 12' double Mizar and Alcor with my naked eye, the middle 'star' composing the handle of the big dipper. I believe angular resolution diminishes slightly with brightness (i.e. it is easier to split two 3rd mag stars than two 9th mag stars at the same separation).
So I will just round up to ~10' for the resolution of my naked eye for faint sources. I wonder if anyone has tried this for faint doubles? Of course, it is important for the angular separation of the double to be >5" so you are dominated only by the resolution capabilities of your eye and not affected by seeing/atmospheric turbulence and/or diffraction limit of your optics.

So does a naked eye angular resolution of ~10' for faint sources make sense? Well, at Fox Park the limiting visual magnitude is 7.1, so the faintest surface brightness I could detect with my naked eye is $S = 7.1 + 2.5*\log(\pi * (10*60)^2) = 22.2$ mag/arcsec^2, which is close to the background sky surface brightness there.

So, to sum up this point for naked eye observations, if the the object is larger than 10' in radius, use the dimensions of the object to get a surface brightness from the equation. Otherwise, use $S = m+ 2.5*\log(\pi*(10*60)^2) = m + 15.1$. Similar result for when using binoculars or a telescope, just divide your naked eye resolution by the magnification of your optics to get the angular resolution through your optics (as long as you do not become limited by seeing or diffraction). If the calculated surface brightness is

within ~2 magnitudes fainter than the surface brightness of the background sky, you have a good chance of seeing it.

ii-iii) Most galaxies, comets, and globular clusters have exponential gradients in their surface brightness profiles so that the angular area can easily be defined. Furthermore, the range in surface brightness between the center and quoted edge is usually only 2-3 magnitudes/arcsec^2, so that the mean surface brightness is fairly representative as to whether you can detect the object. For these kinds of objects, it is probably sufficient in using the reported dimensions to calculate the surface brightness, and comparing this mean surface brightness to your background to predict whether you can see it. Allow maybe a 1 mag/arcsec^2 error in this surface brightness calculation due to the non-uniformities in the object.

Diffuse and planetary nebulae are much more difficult in quantifying their surface brightnesses since the former have asymmetric shapes and the latter typically have regions of surface brightness up to 5 magnitudes/arcsec^2 greater than the mean. For example, I am an avid planetary nebula observer and
one of my favorites to observe with my 12" is Jones 1 which is not even listed in Sky Atlas 2000! It is around 12.1 mag and is about 5.6' across. The mean surface brightness is thus S = 12.1+2.5*log(pi*(60*2.8)^2)=24.5 mag/arcsec^2 -
way too faint to be seen with a 12" instrument if the surface brightness was uniform. But it is not - like many planetary nebulae this object is fairly annular / doughnut shape with a much brighter rim then center. Furthermore, there are two brightenings within the rim on opposite sides. The peak surface brightness is therefore ~20-21 mag/arcsec^2, discernible with a 12" scope and OIII filter under even moderate (Pawnee) skies and easily seen !
with direct vision under dark skies (Fox Park).

Ideally, I would like a catalog of peak surface brightness sampled over some angular size, say ~10". For example, if you took a 10" wide circular aperture and moved it over and around the object, what would be the maximum surface brightness within that circular area? I don't think a catalog like this exists that uses something different than the mean surface brightness, so we must use the old trial and error method. Albeit, the mean surface brightness is typically a better indicator than the magnitude alone, but certainly not the be all and end all.

Clear skies,

Max

From Bob Michael: Rigel Astronomy Vacations

Rigel Astronomy Vacations is now booking for 2010 with exciting new options including workshops. This would make a great outing for your astronomy club and a very special event for your members. In 2010, we are offering several options for astronomy groups that hopefully will be of interest to your organization.

If you are unfamiliar with our offerings, let me give you an introduction. We offer astronomy themed packages in southern New Mexico. We base out of Alamogordo which is located adjacent to White Sands Missile Test Range in the heart of America's birthplace of rocketry. We offer tours of all the major museums and facilities in the area including two major observatories (Apache Point and Sunspot), lectures on astronomy (including a lecture with Dr. Alan Hale), visits to local attractions (White Sands National Monument and Carlsbad Caverns) as well as stargazing at a 7300' elevation dark sky site. Details are on our web site (www.tedcookproductions.com). There is a downloadable full brochure near the bottom of the Rigel page that includes more information.

Our stock packages run seven days. But for groups and organizations we offer customized packages, designed just for your group's interests, budget and time frame. Also, new for 2010, we are offering short three day workshops devoted entirely to astronomy and space.

There is plenty to see and do in this unique area of the county. Natural beauty, history and culture abound. There is something for everyone, so even non-astronomers will enjoy their time here. We will work with you to taylor a package devoted entirely to your group, so members can travel with their spouses for a most memorable vacation.

If your group would rather attend a workshop, we are excited this year to offer to groups a three day workshop intended for amateur astronomers of all levels, including students. We include a tour and lectures at the New Mexico Museum of Space History, a lecture at Sunspot Solar Observatory on the latest studies and findings in the world of solar sciences, tours of Sunspot and Apache Point observatories, a lecture with Dr. Alan Hale (astronomer and co-discoverer of comet Hale-Bopp) and an evening of stargazing with Dr. Hale at a 7300' elevation dark sky site.

We believe this is a wonderful opportunity for astronomy groups just as yours to put together a fantastic group outing to an incredible place. From workshops to customized packages, there is something for everyone. Contact us for more information and to start planning a truly unforgettable group event. Vacations and workshops run in spring and fall.

Sincerely,

Ted Cook
Ted Cook Productions LLC
Rigel Astronomy Vacations New Mexico
Visit our web site at: Ted Cook Productions

From Andrea Schweitzer: The Known Universe Video

Explanation: What would it look like to travel across the known universe? To help humanity visualize this, the American Museum of Natural History has produced a modern movie featuring many visual highlights of such a trip. The video starts in Earth's Himalayan Mountains and then dramatically zooms out, showing the orbits of Earth's satellites, the Sun, the Solar System, the extent of humanities first radio signals, the Milky Way Galaxy, galaxies nearby, distant galaxies, and quasars. As the distant surface of the microwave background is finally reached, radiation is depicted that was emitted billions of light years away and less than one million years after the Big Bang. Frequently using the Digital Universe Atlas, every object in the video has been rendered to scale given the best scientific research in 2009, when the video was produced. The film has similarities to the famous Powers of Ten video that has been a favorite of many space enthusiasts for a generation.

APOD for 20 January 2010
http://antwrp.gsfc.nasa.gov/apod/ap100120.html

also posted on YouTube at:The Known Universe by AMNH (American Museum on Natural History)
http://www.youtube.com/watch?v=17jymDn0W6U

PUBLIC INVITED TO PICK PIXELS ON MARS:
SCIENTISTS TAKING SUGGESTIONS ON WHERE TO IMAGE THE RED PLANET USING NASA SATELLITE

The most powerful camera aboard a NASA spacecraft orbiting Mars will soon be taking photo suggestions from the public.

Since arriving at Mars in 2006, the High Resolution Imaging Science Experiment, or HiRISE, camera on NASA's Mars Reconnaissance Orbiter has recorded nearly 13,000 observations of the Red Planet's terrain. Each image covers dozens of square miles and reveal details as small as a desk. Now, anyone can nominate sites for pictures.

The HiRISE team is pleased to give the public this opportunity to propose imaging targets and share the excitement of seeing your favorite spot on Mars at people-scale resolution, said Alfred McEwen, principal investigator for the camera and a researcher at the University of Arizona.

The idea to take suggestions from the public follows through on the original concept of the HiRISE instrument, when its planners nicknamed it "the people's camera " The team anticipates that more people will become interested in exploring the Red Planet while their suggestions for imaging targets will increase the camera's already bountiful science return. Despite the thousands of pictures already taken, less than 1 percent of the Martian surface has been imaged.

Students, researchers and others can view Mars maps using a new online tool to see where images have been taken, check which targets already have been suggested and make new suggestions.

"The process is fairly simple," said Guy McArthur, systems programmer on the HiRISE team at the University of Arizona. "With the tool, you can place your rectangle on Mars where you'd like."

McArthur developed the online tool, called "HiWish," with Ross Beyer, principal investigator and research scientist at NASA's Ames Research Center in Moffett Field, Calif., and the SETI Institute in Mountain View, Calif.

In addition to identifying the location on a map, anyone nominating a target will be asked to give the observation a title, explain the potential scientific benefit of photographing the site and put the suggestion into one of the camera team's 18 science themes. The themes include categories such as impact processes, seasonal processes and volcanic processes.

The HiRISE science team will evaluate suggestions and put high-priority ones into a queue. Thousands of pending targets from scientists and the public will be imaged when the orbiter's track and other conditions are right.

HiRISE is one of six instruments on the Mars Reconnaissance Orbiter. Launched in August 2005, the orbiter reached Mars the following year to begin a two-year primary science mission. The spacecraft has found that Mars has had diverse wet environments at many locations for differing durations in the planets history, and Martian climate-change cycles persist into the present era. Mars Reconnaissance Orbiter is in an extended science phase and will continue to take several thousand images a year. The mission has returned more data about Mars than all other spacecraft combined.

"This opportunity opens up a new path to students and others to participate in ongoing exploration of Mars." said the mission's project scientist, Rich Zurek of NASA's Jet Propulsion Laboratory in Pasadena, Calif.

# # #

The University of Arizona Lunar and Planetary Laboratory operates the HiRISE camera, which was built by Ball Aerospace & Technologies Corp.
The Mars Reconnaissance Orbiter is managed by JPL for NASA's Science Mission Directorate in Washington. Lockheed Martin Space Systems is the prime contractor for the project and built the spacecraft.

To make camera suggestions, visit:
http://uahirise.org/suggest/

For more information about the MRO mission, visit:
http://www.nasa.gov/mro

Best Looks

Moon By Saturn Feb 2; by Antares Feb 7;
by Mercury Feb 12; by Venus and Jupiter Feb 14
By Pleiades Feb 21; by Mars Feb 26
Mercury First week, low in SE
Venus On horizon in W at sunset; by Jupiter Feb 14 to16
Mars High in S late evening. By M44 Feb 4

Jupiter In W in dusk early in month
Saturn In S middle of night
Uranus In SSE in Pisces; by Moon Feb 16

International Space Station Passes for Loveland – Fort Collins February 2009

Check times after STS-130 launch planned for Feb 7

Date	Mag	Starts			Max. altitude			Ends		
		Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.
3 Feb	-1.0	06:14:29	10	SSW	06:16:58	26	SE	06:19:29	10	ENE
4 Feb	-3.4	06:37:08	10	SW	06:40:00	85	WNW	06:42:56	10	NE
5 Feb	-1.3	05:26:44	17	S	05:28:10	26	SE	05:30:42	10	ENE
6 Feb	-3.4	05:49:50	28	SW	05:51:14	86	N	05:54:07	10	NE
7 Feb	0.1	04:41:14	14	E	04:41:14	14	E	04:41:49	10	ENE
7 Feb	-2.3	06:12:39	16	W	06:14:24	30	NNW	06:17:01	10	NE
8 Feb	-1.2	05:03:50	25	NE	05:03:50	25	NE	05:05:12	10	NE
8 Feb	-1.3	06:35:52	10	WNW	06:37:46	16	NNW	06:39:41	10	NNE
9 Feb	-1.7	05:26:16	25	N	05:26:16	25	N	05:28:04	10	NE
10 Feb	-1.3	05:48:34	16	NNW	05:48:46	16	NNW	05:50:40	10	NNE
11 Feb	-0.7	06:11:21	10	NNW	06:12:13	11	N	06:13:05	10	N

ISS predictions from:
http://www.heavens-above.com/main.aspx?lat=40.4997&lng=-105.05736&loc=Fort+Collins+CO+USA&alt=0&tz=MST