The Objective View

January 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: January 7 7:30 pm

Night Sky Network
by Chad Moore and Greg Halac

Club Business with Elections at 7:15 pm

Fort Collins Museum, 200 Mathews St

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

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

NCAS Programs

Feb 4 TBA

NCAS Public Starwatch at Fossil Creek Reservoir

Jan 22 6:30 to 10 pm
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

Jan 15, 16 Keota site, ask FRAC

Other Events

Chamberlin Observatory Open House, 7 to 10 pm
Jan 23, Feb 20, Mar 20 303 871 5172
http://www.du.edu/~rstencel/Chamberlin/

Cheyenne Astronomical Society 7 pm Jan 22
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. Jan 15, 16 6:30 pm; Jan 28 7 pm. http://www.angelsabove.org/

Little Thompson Observatory, Berthoud High School open 7 pm Jan 15 Bryan White's Nitescapes 3-D at 7:30 pm
http://www.starkids.org

Longmont Astronomical Society 7 pm Jan 23 Banquet for Astro club members, please RSVP. Dr. Fran Bagenal
http://www.longmontastro.org/

Secretary's Corner, from Chad Moore

Over the past several years, the Astronomical Society of the Pacific has quietly taken the reins of astronomy education. The San Francisco based non-profit has long been a platform where amateur and professional astronomers can collaborate, and where the role of education is more than an afterthought to traditional research. They complement the Astronomy League and other groups well, picking up where they leave off. The organization has pulled in several NASA grants and has energetic staff. You probably know them best as the people who sponsor the Night Sky Network. The 2010 annual meeting will be held in Boulder, Colorado, giving those interested in astronomy education and public outreach a golden opportunity to attend this conference inexpensively. It will be held on the CU campus, August 2nd-4th. A set of weekend workshop will proceed the meeting for K-12 and informal educators. Further information will be posted soon at http://www.astrosociety.org
I plan to attend and will try to report back from the front lines.

December 3 Program: Remote Imaging on Two Hemispheres, by Dr. Jack Harvey

About 7 years ago Jack was looking at a National Geographic magazine and commented to his wife that getting into astronomy could be fun. She surprised him with about $1500 of telescope equipment. He found Jupiter and Saturn and was blown away with the view. A home observatory was next. He has progressed to an SBIG Parallax mount carrying an RCOS 14.5 inch Ritchey-Cretien, and is borrowing a Takahashi 150

from a colleague. His home in the foothills is pretty dark, but the seeing rates about 2.5 arcseconds on a good night, which is not great. He teamed with 3 other amateurs to rent telescope time on a 16 inch RCOS and 4 inch Tak at New Mexico Skies in Cloudcroft NM. The seeing there is often 1.5 or even 1 arcsecond. They push to the limits of the equipment and have imaged an example of gravitational lensing; and the extreme outer regions of planetary nebulae.. Their group had images published in National Geographic, the SETI journal, and on NASA's the Astronomy Picture of the Day. Jack showed images of Abell 2218, the Pleiades, M106, M27, and the Ghost of Jupiter. Dan Reichert at UNC Chapel Hill posted a query on the RCOS group. Jack answered and became a consultant on site at CTIO in Chile. The site is home to 4 meter and 2.5 meter scopes. Assistance was needed with 6 of the 16 inch RCOS scopes intended for rapid characterization of GRB afterglows. They respond to the SWIFT spacecraft. Jack's group has rented time at the site. Since pictures were needed for focus and autoguiding, Jack recommended they record LRGB data to allow images production for promotion of their work. The site has a relatively comfortable elevation, 7900 feet, and seeing is generally 0.5 to 0.7 arcsecond due to laminar flow. The Gemini telescope is 1 km away but takes 45 minutes to drive. Most of the telescopes are run from onsite. Jack's group asked to collaborate at the Calar Alto observatory in Southern Spain. It has 3.5 meter, 2 meter and 1.2 meter scopes. The software is archaic, a type of Linux, so the operator has to be up all night. New detectors on the older telescopes are yielding some of the best images to date of familiar planetary nebulae. Jack then gave a show including M97, M57, the core of M31, NGC 1313, M104 (which has the most globular clusters), and NGC 253 which was a recent Astronomy Picture of the Day. NGC 6357 is an intense star-forming region. Other targets were the Jewel Box, Lagoon Nebula, RCW 49 which is part of the Gum Nebula, and the Eta Carinae region. Jack is looking forward to more imaging in the coming months and will aim to give an imaging demonstration at a future NCAS meeting.

Dr. Jack Harvey was born and raised in Cheyenne WY. He attended high school at New Mexico Military Institute at his father's urging. There, and in college he was on the boxing team. He attended Sam Houston State University and received his BSc and MSc. He received his MD at UT San Antonio. He joined Orthopedic Center of the Rockies as a sports medicine physician. He was team physician for USA Wrestling, CSU, the Denver Broncos and the Coors Bicycle Classic. He created the rodeo sports medicine program at OCR. He enjoys hiking, kayaking, and good whiskey. He is a former rock climber and bull rider. For more details see:

http://www.pegasusastronomy.com/index.html

http://www.starshadows.com/

http://www.caha.es/calar-alto-observatory.html

Nov 21 2009 APOD
http://antwrp.gsfc.nasa.gov/apod/ap091121.html

December 3 Club Business

Vice President Dan Laszlo called the meeting to order. Events were reviewed. Deb Price provided desserts as a thank you for NCAS support of the City of Fort Collins Natural Area programs, and they were consumed with relish. Officer nominations were opened. Nominees for 2010 are Robert Michael, President; Dan Laszlo, Vice President; Secretary , Chad Moore, and Treasurer, John Caldwell. Nominations are open for a month. Treasurer John Caldwell reported on the club account Next outreach event is at Bobcat Ridge on Dec 27.

From Vern Raben: New Astro League Website for Young Astronomers

As many of you know, interest among has younger people in astronomy doesn't appear to be very high if you've glanced around the room at an astronomy club meeting lately. In effort to hopefully reverse the trend, the Astroleague president, Terry Mann, asked me to set up a website for younger astronomers and work with a few them to get it rolling. The site has been in place for about a week, see http://ya.astroleague.org

The idea is for younger folks interested in astronomy to submit content which hopefully will be more interesting to their own demographic. The site is not yet "official" (whatever that means). I suspect those of us on the astroleague webteam will need to do a lot of work this year just to keep up...

If you know any young folks who might be interested in astronomy, you might encourage them to visit the website.

From Andrea Schweitzer:
2010: THE YEAR OF THE BAFFLING ECLIPSE

As 2010 begins, the first phase of a puzzling astronomical transformation comes to an end.

In August 2009, amateur and professional astronomers reported that the bright star Epsilon Aurigae had begun to lose brightness for the first time in 27 years. It is believed that the dimming of the star's light is caused by an eclipsing object of an unknown nature.

The first phase of the eclipse involved a dramatic drop in brightness over the course of a few months beginning in August. Professional and amateur astronomers teamed up to monitor the eclipse and have announced that this critical phase just ended around New Year's Day 2010.

Under normal circumstances, the star is bright enough to be seen from even the brightest of cities with just the naked eye. During eclipse, it nearly disappears from the skies of a naked-eye urban astronomer. One needs to be in a darker suburb to easily see it without helpful equipment such as binoculars.

"We have increasing evidence that a dark disk of material has moved in front of our view of Epsilon Aurigae," said Dr. Robert Stencel, scientific advisor for the project. "But the exact shape and make up of the disk has been unknown, but will be better defined soon. To make things even more challenging for us, some think there are multiple stars in the system, and perhaps planets spiraling into one of the stars."

Even during the eclipse, the star is so bright that sensitive equipment in professional observatories can have trouble monitoring its brightness in the optical wavelengths. Furthermore, large telescopes cannot afford to monitor one star continuously. This is where amateurs and citizen scientists step in.

"Amateurs are the ideal astronomers for this project. Either with their naked eyes or with digital cameras, they have proven that they can record professional quality data. They are also distributed around the world, which helps eliminate problems such as bad weather and equipment breakdowns," said Dr. Arne Henden, director of the American Association of Variable Star Observers (AAVSO) and principal investigator of the project.

"Just looking at the coverage in the visual data alone, I can already see interesting changes in the star that have never been seen so clearly before," Stencel said. Dr. Bob, as the amateur astronomical community knows him, studied the last event in 1982-84 while working at NASA.

If past eclipses are any guide, then this dark stage will last nearly 18 months, followed by a rapid return to its normal brightness in the first half of 2011. However, the star's brightness will continue to vary a bit during this dark stage, so amateur and professional astronomers are needed to continue vigilant monitoring.

Supported by a three-year Informal Science Education grant from the National Science Foundation, Citizen Sky is recruiting, training, and coordinating public participation in this project. What makes this project different from previous citizen-science projects is its emphasis on participation in the full scientific method. Participants are not being asked simply to collect data. They will also be trained to analyze data, create and test their own hypotheses, and to write papers for publication in professional astronomy journals.

"Since our launch in September 2009, over 2,000 participants have joined the project. Over 120 observers from 19 countries have submitted over 1,500 data points. However, most participants are participating in other ways. We have teams developing data-analysis software, using robotic telescopes, and even creating illustrations and diagrams to describe different models of the system," Henden said.

Early results of the project are being presented this week at the 215th meeting of the American Astronomical Society in Washington, DC.

Citizen Sky is a collaboration of the AAVSO, Denver University, Adler Planetarium and Astronomy Museum, Johns Hopkins University, and the California Academy of Sciences. The AAVSO (www.aavso.org) is one of the oldest citizen-science organizations in the world. It has been continuously training and coordinating amateur astronomers since 1911.

Figure 1:
http://www.citizensky.org/sites/default/files/epsaurside-nico.png
Caption:
An artistic representation of one model of the Epsilon Aurigae system as seen at high inclination.
Credit: www.citizensky.org / Nico Camargo

Figure 2:
http://www.aavso.org/tmp3/epsAur_aasStill.1.png
Caption:
Still from planetarium trailer video about Epsilon Aurigae.
Credit: California Academy of Sciences Visualization Studio / Citizen Sky (www.citizensky.org)

Figure 3:
http://www.aavso.org/tmp3/alson_wong-photo.jpg
Caption:
A photograph of Epsilon Aurigae. The dark void to the lower right is Lynds Dark Nebula 1477, an absorption nebula unrelated to Epsilon Aurigae. Photograph was taken with a Vixen 102-ED telescope and an STL-11000M CCD camera.
Credit:
Citizen Sky (www.citizensky.org) / Alson Wong (www.alsonwongastro.com)

CASSINI HOLIDAY MOVIES SHOWCASE DANCE OF SATURN'S MOONS

Like sugar plum fairies in The Nutcracker, the moons of Saturn performed a celestial ballet before the eyes of NASA's Cassini spacecraft. New movies frame the moons' silent dance against the majestic sweep of the planet's rings and show as many as four moons gliding around one another.

The new movies can be found at
* http://ciclops.org
* http://saturn.jpl.nasa.gov
* http://www.nasa.gov/cassini

To celebrate the holidays, the Cassini imaging team has created a video collection of ÿÿmutual events,ÿÿ which occur when one moon passes in front of another, as seen from the spacecraft. Imaging scientists use mutual event observations to refine their understanding of the dynamics of Saturn's moons. Digital image processing has enabled scientists to turn these routine observations into breathtaking displays of celestial motion. The original images were captured between Aug. 27 and Nov. 8, 2009.

In one scene that synthesizes 12 images taken over the span of 19 minutes, Rhea skates in front of Janus, as Mimas and

Pandora slide across the screen in the opposite direction. While the dance appears leisurely on screen, Rhea actually orbits Saturn at a speed of about 8 kilometers per second (18,000 mph). The other moons are hurtling around the planet even faster. Mimas averages about 14 kilometers per second (31,000 mph), and Janus and Pandora travel at about 16 kilometers per second (36,000 mph).

"As yet another year in Saturn orbit draws to a close, these wondrous movies of an alien place clear across the solar system remind us how fortunate we are to be engaged in this magnificent exploratory expedition," said Carolyn Porco, Cassini imaging team leader at the Space Science Institute in Boulder, Colo. "It is reason enough for celebration. So, from all of us on the Cassini Imaging Team to all of you, Happy Holidays!"

From Bill Possel: New CU/LASP Projects

LASP recently won two proposals - one to build a student-led "Cubesat" project that will study space weather and the other to send a lander to Venus.

http://www.colorado.edu/news/r/faf67de03a65a7d767b1f8e5a15c44a4.html

http://www.colorado.edu/news/r/e8d70dd6a33ec62c048d324c42a84172.html

Happy New Year! Bill

From Tom Teters: Fort Collins In-Situ Light Pollution Hemisphere

If you compare the previous domes to this one, it will be very obvious, the change that needs to be implemented.
This is slightly different from the former three hemispheres. The diameter of the hemisphere is 50 miles and allows easier implementation of rotation & translation. Also, the closest side of this hemisphere appears to be transparent as you rotate. When you travel inside the dome, image is visible to the zenith (use Ctrl-Up Arrow).

http://bbs.keyhole.com/ubb/ubbthreads.php?ubb=showthreaded&Number=1289032&#Post1289032

From Max Moe: Angular Size of the Andromeda Galaxy

Hi all,

Well, I just completed my galaxies course during my first semester as a grad student at Harvard, and we had a homework question dealing with something similar to this.

So I think the most important thing in determining the apparent angular size of any galaxy is actually the surface brightness of the background sky, similar to what Mike said. The surface brightness of an urban sky is ~17 mag/arcsec^2 (8 mag/arcmin^2) while the darkest sites have a surface brightness of ~22 mag/arcsec^2 (13 mag/arcmin^2). A difference of 5 magnitudes is of course a factor of 100 in intensity between the urban and rural skies. To convert mag/arcsec^2 to mag/arcmin^2, just subtract .5*log(3600)=8.9 mag. Note that these magnitudes correspond to visual magnitudes.

Now the naked eye is pretty good at detecting even a 10% increase in brightness contrast beyond the background, so if you are at a location with a 20 mag/arcsec^2 background, you can see 10%, or 2.5 magnitudes, fainter to 22.5 mag/arcsec^2. So the question is at what angular distance does the surface brightness of the Andromeda Galaxy fall off to 22.5 mag/arcsec^2.

We could of course measure directly the surface brightness profile of M31, but let's assume a standard profile. The surface brightness of the DISK alone is given by an exponential according to Freeman (1970):

$I(r) = I_0 \exp(-r/r_s)$

where I_0 is the central surface brightness (in intensity units - not mag) and r_s is the scale radius. Now there are much more complicated profiles for bulges (De Vaucoulers, Sersic, King, Hubble, etc.), but we want to see how far out we can see the disk of M31. Now for an SAb galaxy like M31, I_0 corresponds to ~20 mag/arcsec^2 (in V) and r_s ~ 5 kpc. You can convince yourself that for self-similar galaxies, the surface brightness is independent of distance (although brightness falls off as the inverse square law with distance, so does angular surface area, so that surface brightness is conserved).

Therefore, you can see 22.5-20=2.5 mag/arcsec^2 fainter than the central surface brightness. A difference of 2.5 mag corresponds to a factor in intensity of 10. So $r = -r_s * \ln(1/10) = r_s * \ln(10) = 11.5$ kpc. Since M31 is 780 kpc away, the distance of 11.5 kpc away from the center of M31 corresponds to an angle on the sky of: 11.5 kpc / 780 kpc * 180 deg / pi radian * 60' / 1 deg = 50.7'. So the major axis would be ~101', or 1.7 deg.

How about fainter skies like Foxpark where the background surface brightness is ~22 mag/arcsec^2 and can therefore see down to 24.5 mag/arcsec^2. Well, doing the same math, I get a major axis of 183' = 3.0 deg.

So how can some people claim to see a major axis out to 3.5-4.0 deg. Either they have darker skies than 22 mag/arcsec^2 and/or they have the contrast capability to discern less than 10% increase in the sky background, say only a few percent.

Finally, when you look up on-line that the dimensions of M31 are 190'x60', what does this mean since the disk is a gradual exponential fall-off? Well, most people use the standard 25.0 mag/arcsec^2 isophote, i.e. the dimensions where the surface

brightness reaches 25.0 mag/arcsec^2. Trying to measure surface brightnesses fainter than this is very difficult.

In fact, there is still a long standing problem as to the general population and number densities of galaxies with central surface brightnesses <~25 mag/arcsec^2. If these undetectable, low surface brightness galaxies dominate the total mass of the universe compared to the larger surface brightness galaxies, then there is no need for dark matter! There are other arguments for dark matter, however, and so the debate continues . . .

Best Looks

Moon By Mars Jan 3 and 30; by Saturn Jan 6
By Antares Jan 11; by Jupiter Jan 18
Mercury End of month, low in SE in dawn
Venus Low in SW
Mars Near overhead, middle of night
Jupiter In SW in dusk
Saturn In SE predawn
Uranus In SSW in Pisces
Neptune In SW at dusk in Capricornus

International Space Station Passes for Loveland – Fort Collins January 2010

Date	Mag	Starts			Max. altitude			Ends		
		Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.
6 Jan	-3.4	18:04:35	10	SW	18:07:24	67	SE	18:08:16	39	ENE
7 Jan	-2.3	18:26:22	10	WSW	18:29:04	38	NNW	18:29:18	37	NNW
8 Jan	-3.2	17:12:51	10	SW	17:15:39	60	SE	17:18:28	10	ENE
8 Jan	-0.8	18:48:48	10	WNW	18:50:16	17	NW	18:50:16	17	NW
9 Jan	-2.4	17:34:32	10	WSW	17:37:15	41	NNW	17:39:51	11	NE
10 Jan	-1.3	17:56:52	10	WNW	17:59:02	19	NNW	18:00:40	13	NNE
11 Jan	-0.7	18:19:44	10	NW	18:20:57	12	NNW	18:21:27	12	N
12 Jan	-1.4	17:04:53	10	WNW	17:07:06	20	NNW	17:09:18	10	NNE
13 Jan	-0.8	17:27:39	10	NW	17:28:58	12	NNW	17:30:16	10	NNE
16 Jan	-0.6	18:33:27	10	NNW	18:33:45	11	N	18:33:45	11	N
17 Jan	-0.4	18:54:20	10	NNW	18:54:32	11	NNW	18:54:32	11	NNW
18 Jan	-1.0	17:41:19	10	NNW	17:42:38	12	NNE	17:43:55	10	NE
19 Jan	-1.7	18:02:10	10	NNW	18:04:22	20	NNE	18:05:01	18	NE
20 Jan	-3.0	18:23:11	10	NW	18:25:56	43	NNE	18:26:07	43	NE
21 Jan	-2.8	18:44:29	10	WNW	18:47:16	55	SW	18:47:25	54	SSW
22 Jan	-2.9	17:30:53	10	NW	17:33:36	40	NNE	17:36:18	10	ESE
22 Jan	-0.5	19:06:27	10	W	19:08:23	17	SW	19:09:01	16	SSW
23 Jan	-2.9	17:52:06	10	WNW	17:54:55	62	SW	17:57:42	10	SE
24 Jan	-0.4	18:13:55	10	W	18:16:01	19	SW	18:18:04	10	S
26 Jan	-0.3	17:21:21	10	W	17:23:33	20	SW	17:25:45	10	S
1 Feb	-0.1	06:46:33	10	S	06:48:34	18	SE	06:50:35	10	E
3 Feb	-0.2	05:53:59	10	S	05:55:49	16	SE	05:57:39	10	E
4 Feb	-2.5	06:13:53	10	SW	06:16:39	50	SE	06:19:26	10	ENE

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