

The Objective View

Newsletter of the Northern Colorado Astronomical Society

March 2009

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Next Meeting: March 5 7:30 pm

**Astronomer on a Mission: UIT, Rosetta, and LRO by Joel Parker
Southwest Research Institute, Boulder**

Club Business at 7:15 pm

**Discovery Science Center
703 E Prospect Ave, Fort Collins**

<http://www.ncastro.org/Sites/DiscoveryCtr.htm>

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

NCAS Programs

April 2 Nitescapes 3-D at Fossil Ridge High School
Bryan White

Public Starwatch at Discovery Science Center, South Lot

Mar 6 6:30 pm

Apr 3 7:30 pm

May 1 8:00 pm

Dark Site Observing Dates

March 20, 21, 27, 28 Pawnee-RAC

Other Events

Little Thompson Observatory, Berthoud Public Star Night:
March 20 7:30 pm <http://www.starkids.org>

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

Cheyenne Astronomical Society Mar 20 7 pm
Cheyenne Botanic Garden.

<http://home.bresnan.net/~curranm/>

Chamberlin Observatory Open House, 7 to 10 pm

Mar 7, Apr 4, May 2, May 30, 303 871 5172

<http://www.du.edu/~rstencil/Chamberlin/>

Longmont Astronomical Society Mar 19 7 pm TBA

FRCC 2121 Miller Rd <http://www.longmontastro.org/>

Secretary's Corner, from Chad Moore

Tis the season to start marking your calendar for observing trips. While there is no substitute for observing with a few friends in a remote camp someplace, I've also enjoyed attending the major national star parties. We are lucky in Colorado to be a day's drive from quite a few good ones.

Billed as Colorado's Premier Star Party, the Rocky Mountain Star Stare will straddle the new moon and summer solstice, June 17-21 (<http://www.rmss.org/>). I've never been to this one, as I've run the Bryce Canyon Astronomy Festival that same period for the past 4 years. Perhaps there are some club members who have been to this nearby event and can recommend it.

Starting the days before the RMSS, the Grand Canyon Star Party stakes out its slot June 13th- 20th. The observing at the South Rim is more popular and features more visitors, but I have heard many positive reports from the North Rim- darker skies and a bit more laid back.

<http://www.tucsonastronomy.org/gcsp.html>,

On those light pollution maps of the USA, you will notice a dark patch sitting upon the Sand Hills of Nebraska. This is the realm of the Nebraska Star Party, held July 19-24. I'm hoping to go to this one, as the dark skies are often matched by good seeing, and it really isn't a far drive.

<http://www.nebraskastarparty.org/>

If you are willing to make a super long drive, the Texas Star Party is the granddaddy of astro nirvana. I attended two years ago and had a great time camping on site. Make sure to quickly make friends with someone with a shower, though, and bring Astroturf and stakes less you want to be observing with dust bunnies all week long. You can see the Centaurus A galaxy naked eye and the southern horizon will astound observers stuck up at 40 degrees latitude. The observing programs and guest speakers are an added bonus.

<http://www.texasstarparty.org/>

A few of my astro friends have grown tired of the 800 telescopes on the field at Fort Davis, Texas and have defected to the Okie-Tex star party, in the Oklahoma Panhandle. This is a great late season star party, and is held Sept 12-20 this year.

It's skies are about as dark as at TSP, the crowds are smaller, and it is a shorter drive. One of these years I'll make it to Okie-Tex. <http://www.okie-tex.com/>

All of these events require some sort of advance registration and reservations. I know from my experience at the NPS astronomy events that are outreach (not hobby) focused, that there are orientation classes, volunteer forms, and other requirements you need to pay attention to. The days of dragging your Dob out of the back of your truck and plopping down unannounced are mostly over.

About Our March 5 Speaker, Joel Parker

Joel grew up in San Leandro, California. Undergrad was at U. California, Berkeley (1986 in Physics & Astronomy) Grad school was at U. Colorado, Boulder (1992, Astrophysics) - primary area of research is massive stars in the Magellanic Clouds, primarily using ground-based photometry and spectroscopy. He worked at NASA Goddard (1992-1996) as a National Research Council postdoc studying stellar evolution and later on the UIT project doing UV photometry of O and B type stars. Moved back to Boulder to work at Southwest Research Institute 1996-present, slowly changing focus to solar system objects (Kuiper belt objects, comets, asteroids). He still does some observing, ground- and space-based, but most time is now spent doing project management of space missions (New Horizons, Rosetta, and Lunar Reconnaissance Orbiter). He is the Assistant Executive Director at SwRI in Boulder The headquarters is in San Antonio, with about 3000 employees, and the Boulder office has about 60 scientists and engineers. He produces and hosts the show "How on Earth" on Tuesday mornings on KGNU radio, has been involved in theatre and film (acting, stage combat) for nearly 30 years, most recently doing Richard III with the Shakespeare Oratorio Society.

February 5 Program: Active Galaxies By Max Moe

Our Milky Way galaxy is a normal galaxy. It has 10^{11} stars and its luminosity is about 10^{43} to 10^{44} ergs/second. The Sun's luminosity is 1.4×10^{33} ergs/second. Most of the galaxy's light comes from the spiral arms. Young stars are found there. Distance to normal galaxies is redshift $Z = 0.0$ to 0.6 . They are not bright enough to see farther out. There is a 4×10^6 solar mass black hole at the center of the Milky Way. Max showed an animation of stars orbiting the central mass from ESO VLT which requires a black hole to explain the extreme mass in a nonluminous object. How did it form? Active galaxies are the Seyferts and Markarians. They are seen at $Z = 0.0$ to 1.5 . They are 10 to 100x the luminosity of the Milky Way, $L = 10^{45}$ to 10^{46} ergs/sec. They have a central black hole with 10^7 to 10^8 solar masses. The accretion disk around the supermassive black hole powers the galaxy. Seyfert I galaxies have broad emission lines from permitted transitions. Seyfert II galaxies have narrow lines from forbidden (on Earth)

transitions. Our viewing angle governs the type. A dusty torus hides the broad lines when the galaxies are tipped edge-on. Quasars were discovered as bright star-like images associated with radio emission. It turns out only 10% are bright radio sources. They have $L = 1$ billion Suns. $Z = 0.2$ to 7.0 . Most represent a state when the Universe was much younger. Their central black hole is 1 to 10 billion Suns. An example is Markarian 205, NGC4319. Active Galactic Nuclei are powered by galaxy mergers. Max showed a video of the upcoming merger of the Milky Way with the Andromeda Galaxy. The Milky Way has star formation in its spiral arms that was boosted 5 billion years ago. In a collision, the stars are too dispersed to merge, but gas interacts. The Bullet Cluster image of the aftermath of a collision of galaxy clusters illustrates the interaction of intergalactic gas. Dark matter distribution coincides with the galaxies visible in the clusters. The Antennae galaxies are an example of starburst galaxies. Colliding gas incites intense star formation, 10 to 100x the rate in the Milky Way. Supernovae enrich the metallicity of the interstellar medium. Max showed an animation of multiple supernovae, and a Chandra xray image of a starburst galaxy. A nearby quasar is 3C 273. At $Z = 0.1$ to 0.2 . There are no quasars now. Expansion of the Universe has reduced the rate of galaxy mergers. Most galaxies are now past the AGN stage. Galaxies are composed of only 10-15% dust. The rest is in stars and degenerate objects like black holes. Active Galactic Nuclei have jets. The spinning accretion disk has a magnetic field that launches jets. The flow can reach a speed about 99% of the speed of light. Max showed a movie from www.cosmovision.com.mx. The jets are extreme velocity but very low density plasma. The M87 jet is depositing energy into the interstellar medium. The mass is too little to affect the growth of the galaxy. In BL-Lacertae objects we are seeing down into the jet. They can change magnitude in the space of a day or weeks. The accretion disk is at 10x to 50x the Schwarzschild radius. The supernova bubbles can enrich the interstellar medium. Jets can heat the intracluster environment. Something more powerful is needed to regulate the growth of galaxies and quench star formation. The power of the outflow must be about 5% of the luminosity of the AGN. Radiation pressure from the accretion disk is not sufficient. Max screened 50,000 galaxies to find quasar spectra that could help quantitate the outflow associated with AGN. He focused on elements which had 2 ionization levels. In high density gas, collisions bump electrons to higher energy states. If a state is long lived, a photon has a good chance of bumping it higher. He found about 100 with the excited metastable states that would permit an estimate of the outflow. Fifty of these were bright enough to yield a bright enough spectrum. Better data were needed to constrain the extent of the outflow absorber across the continuum source. Max illustrated how different absorber models were predicted to affect the spectrum. He showed VLT data from Arav et al. 2008 on QSO 2359-1241. The spectrum took 4 hours with the Magellan 6.5 meter telescope. Because telescope time was limited with larger scopes, Max pursued his question at the 3.5 meter Apache Point Telescope at Sunspot NM. He applied for 12 nights to get a spectrum on 5 targets. It took 24.5 nights to get good data. SDSS J 0838 + 2955 was recorded 7 hours. He was able

to determine the upper limit on the distance of the outflow to 1 parsec. He was able to trace changes to changes in the outflow. He was able to apply photoionization modeling to determine the number of ionizing photons. He concluded that the distance of the outflow was 4 kpc from the AGN. The mass was 1.8×10^8 solar masses. He derived the mass flux and kinetic luminosity. The parameters indicate that quasar outflows can serve as a major contributor to AGN feedback mechanisms with their host environment. He concluded with a galaxy cycle, regular galaxies colliding, the merger funneling gas to a central supermassive black hole, collision forming a quasar, the quasar dissipating via its outflow, and restoration of regular galaxies with quiet nucleus. Max recommends: Astrophysics of Gaseous Nebulae and Active Galactic Nuclei, Osterbrock and Ferland.

<http://www.uscibooks.com/ost2.htm>

Max is a member of NCAS and former club officer. He received the National Young Astronomer Award from the Astronomical League. He is completing his undergraduate work at CU in Boulder and will be headed off to graduate school this summer.

February 5 NCAS Business Meeting

Club President Bob Michael called the meeting to order. He recommended the space music concert by the Greeley Philharmonic on Feb 6. He brought the Fort Collins Now issue with the light pollution article which featured work by NCAS Secretary Chad Moore. Upcoming volunteer requests are Feb 12 at Garfield Elementary, Feb 26 at Traut Elementary, Feb 27 at Edmonson Elementary. The NASA event on Feb 21 at Discovery Center also needs a few volunteers. John Caldwell presented the treasurer's report, and the club funds total \$424.89. Tom Teters has looked at the latest Google Earth v 5, which has added the oceans. It has Mars mapping including some 1 meter resolution. Canyon flyovers can be simulated.

Observing at Jackson Lake State Park, from Leonard Sitongia

We spent the night last night and enjoyed a great evening. Clear sky and no wind. I was joined by Randy from Astro Systems and Mike from Denver. Randy brought an Astro Systems 16" and Mike brought his 10" Dobsonian. We were very thankful to have the light at Northview turned off, it really adds a lot to being able to star gaze there. There was one other camper there, a family, who joined us to enjoy views of the night sky.

We observed Saturn and comet Lulin, M42 and a number star clusters, planetaries and galaxies.

I started emailing the administrative staff there, and they were very helpful. They offered to install a breaker for the light in the Northview campground. In return, I offered to do a star party for their campers. It turned out that they could not have a breaker installed, so instead offered to bring the rural electric

company out to turn the light off each time I want to use the site, even if I'm alone.

Now, it turns out that there's a more distant light, in the next campground to the south, which would be nice to have turned off. I haven't approached them about that. It is a much larger campground, and I worry that they'll feel a need to keep a more complex place like that lit so that campers can find the restrooms.

The lights are large, bright globes. Need to approach them about having less light-polluting lighting installed, too.

Northview is up on a slight hill. If the Fox Hills light projected down, it might not be disruptive to the views in Northview.

We were in the Northview campground of Jackson Lake State Park. Here's their website:

<http://parks.state.co.us/parks/jacksonlake>

They have a PDF of the campground: [Northview, Fox Hills, and Sandpiper Campgrounds](#)

We were in campsite 233. All the Northview campsites have electrical power.

Comet Lulin Observation from Mike Prochoda

I spotted Comet Lulin just to the West of Porrima (Gamma Virginis) at 2:00 AM this morning (2/20/09) from my backyard in Estes Park. It was bright and greenish in color and sported a half-degree tail pointing to the SouthEast (along the ecliptic) in my 16 x 63 Pentax binoculars. Once I knew exactly where to look, I was able to spot it naked-eye as a faint hazy spot near Porrima. It was definite with averted vision, and I could occasionally glimpse it with direct vision. It did not help that we were having 40 mph wind gusts with a temperature of 20 degrees F. at 2 AM (which made my eyes water almost constantly during my observations). Nevertheless, Lulin is now a faint naked-eye object and should brighten further over the next few days until it's closest approach to Earth next week. This Saturday night promises to be clear and moonless (per the Clear Sky Chart), so get out and observe this rare visitor to the inner solar system. It won't return for another millenium!

- Clear Skies

- Mike Prochoda

(Estes Park)

Comet Lulin Observation from Paul Robinson

Last night I got out to the country (5mi east of Hudson, CO which is at Jct. hwy 52 and I-76) just before the cirrus clouds wasted the sky, and was able to see Comet Lulin with the naked eye surprisingly easily (mag 5ish). In my 25x100 binoculars it was very odd. It had 2 obvious tails going in opposite directions. And the brightest of the two was the anti-solar tail! I think for me this is a unique type of observation. I have seen anti tails before, but not that were the dominant one. I saw no hint of color though.

I first saw the comet at the CU observatory (Sommers Bausch Observatory) in Boulder, just after the BASS meeting. In the mounted binoculars and then Will Thornburg's nice 6" refractor using the Ethos eyepiece(!) we could see it as a somewhat condensed fuzzball. But that did it no justice as my country observation indicates.

So, if you have not ventured out to see it yet, do so as soon as possible. It will be brightest tomorrow and Tues. nights. A moderately dark sky shows the tails in binoculars, and a very dark sky lets you see it naked eye, as long as you know where to look.

Looking for Calipso, from Greg Hendry

The best source for the laser ground track is from the web site mentioned (<http://www-calipso.larc.nasa.gov/tools/overpass/coords>). It usually, but not always contains up to date information.

I have found the most up-to-date 1 second files by highlighting the "10 Second Products" tab and scanning down to the "1-SIXTEEN-DAY-FILE" section. The first file in the list is the most current. The latest 16 day file is however out of date today (2/27) but the latest 1-minute file is current. Hopefully the 1 second files will be updated when normal operations resume.

For the last year or so the laser has been pointed 3 degrees ahead of the satellite's nadir which results in a laser ground track about 2000 meters east of the sub-satellite ground track.

For plotting the satellite ground track I use an old copy of STK running on XP but it is easiest to rely on the NASA web site.

Whatever software is used to generate the satellite's position make sure the output is in geodetic coordinates and not geocentric coordinates as it makes a difference of over 3 miles at mid-latitudes.

> 2. I see mentions of "orbit raise" and "drag make-up maneuver". What is the difference? Is it safe to assume they only affect timing by a few seconds and not the ground track?

I think "orbit raise" and "drag make-up" are referring to the same operation. The ground track of the laser is not significantly changed from 2000 meters east of the sub-satellite track due to the maneuver but the sub-satellite ground track moves around over time by plus or minus 3 miles or more.

> 3. Since the beam width on ground is only 70 meters, how do I fine tune or verify position? How would I generate coordinates for use with GPS?

I fine tune my position using the LIDAR ground track files from the web site mentioned above by plotting the 1 second points as a route on mapping software. I use the National Geographic TOPO! software. I then find a suitable location on the map and record the coordinates in a GPS receiver.

Plotting the points on GoogleEarth also works well to plan an observation.

Hopefully this helps,
Gregg Hendry

Hubble Has a Winner in IYA 2009 Contest From Andrea Schweiter

HUBBLE HAS A WINNER!

The public has voted on where they want to aim their favorite space observatory, the Hubble Space Telescope.

And the winner is -- drum roll, please -- a pair of close-knit galaxies that look like they are shaking hands -- or rather spiral arms. Out of a total of 139,944 votes cast online by the public since the "Hubble, You Decide" contest opened on January 28, nearly 50 percent favored the interacting pair of spiral galaxies called Arp 274 (from the Arp Atlas of Peculiar Galaxies) over five other celestial candidates.

Hubble has shown that interacting galaxies are very photogenic because, under the relentless pull of gravity, they weave elegant twisted lanes of dust and stars, and brilliant blue clusters of newborn stars. The new picture of Arp 274 promises to reveal intriguing never-before-seen details in the galactic grand slam. The Hubble observations will be taken during the International Year of Astronomy's "100 Hours of Astronomy," taking place from April 2-5. The full-color galaxy image will be released publicly during that time.

For more information, visit:

<http://YouDecide.Hubblesite.org>

Dark Sky Observing Site by Keota CO From Dan LaFaive

I've recently been looking for darker sky sites a bit further away from the front range, down highway 14 past Crow Valley. I've found a location just south of Keota, that's about 20 miles closer to Fort Collins than the Raymer site I was using, and it tends to be less windy (although it is colder because it's in a shallow valley). It's on public land in the Pawnee Grasslands

I'm going to go there tonight, anyone who wants is welcome to join.

Directions:

Take hwy 14 to the east from Fort Collins. From I-25, drive about 50 miles east on hwy 14 to CR 105. Take a left onto CR

105. Go about 2.8 miles down hwy 105 until you come to a point where the power lines split on the left and go across the road. At that point, you'll see a trail on the left that leads up to CR 105. Take a left onto that trail (Forest Road 96). Go down that trail about 1/2 mile, I'll be setup on the left side of the road.

GPS coordinates:

40 degrees 41' 2" N or 40.68388888889 N
104 degrees 4' 34" W or 104.07611111111 W

Google maps:

http://maps.google.com/maps?f=q&source=s_q&hl=en&geocode=&q=40.68388888889+N+104.07611111111+W&ssl=40.633757,-104.47998&sspn=0.859785,1.253815&ie=UTF8&t=h&z=17&iwloc=addr

Dark Sky Observing Sites Around the Western US From Dan LaFaive

Hey Everyone,

Over the past year, I've spent a lot of time away working in other locations. When I haven't been working, I've visited some dark sky sites across the western US and I've wanted to send out some updates to the group about various places a person could try if you're traveling.

Last spring, I went to South-western New Mexico to the extremely dark skies of the Apache National Forest area. The GPS location is:

33 degrees 59' 41" N
108 degrees 41' 13" W

It's a pull off on Forest Road 23, off of hwy 32 about 30 miles from Quemado, NM. It's at about 7600 feet in elevation. Really nice, clear, dark skies with minimal light domes from Quemado, Reserve, and some of the other small communities in the area. It's about as dark and transparent as Fox Park. There's a lot of areas within Apache National Forest that one could stargaze. Be aware that the temperatures there are about as cold as the Colorado plains, so you won't get warmer observing from that location.

During the day, I stayed at a hotel in Quemado, NM. It's been a while since I went, so I can't remember the hotel name for sure, I think it was the Largo or it might have been the Allison. In any event, it was a nice, cheap motel for under \$40 a night. Pretty basic hotel. They had Wi-Fi, a restaurant next door, and were very accommodating to my needs such as letting me check out late.

I will definitely consider going back to this place again.

During the 4th of July, I went to the area around Great Basin National Park on the Nevada/Utah border.

The locations I observed were in the Sevier Lake, UT area off of Hwy 50 on the way to GBNP. There are some gravel roads that branch off of hwy 50 that a person can go down and setup off the side of the road in the hard desert dirt floor. Very dark skies, very desolate. I stayed in a hotel in the town of Delta.

GPS Location:

39 degrees 9' 56" N - 39.165556 N
113 degrees 1' 0" W - 113.016667 W

The other location I visited was in the Fergusen Desert, UT off of a gravel road off of hwy 50. Another very dark sky place with minimal light pollution from the nearby communities. This location is near the UT/NV border. On hwy 50 at the border is a hotel one can stay at. It's a pretty basic hotel. Doesn't have Wi-Fi, but it part of a restaurant and gas station. This site is about 8 miles from that hotel. A few miles west of the border is Great Basin National Park which is a nice set of mountains that one can visit and hike. Very scenic area. They also have a system of caves that the park operates with tours. It's nice stuff to do during the day. The various small communities in the area go together and put on a really nice 4th of July celebration and fireworks display.

Fergusen desert GPS Location:

39 degrees 2' 8" N - 39.035556 N
113 degrees 53' 23" W - 113.889722 W

I didn't find GBNP itself a good place to observe because the views were obscured and it was very windy.

There is occasional wind on the desert floor, but it's also very nice and warm during the summer with very clear dark skies (even with smoke coming in from California fires). It was nice to observe in shorts and a t-shirt. Only problem was that there are a lot of bugs in the area, that can get a bit annoying. Didn't see any scorpions, however :)

This past Christmas I went down to Mills Canyon, NM and then went on to Alpine, TX which is near the site of the Texas Star Party. I stayed in a hotel in Alpine, Texas and setup

about 25 miles out of town on Hovey Rd. off of hwy 67, which is a paved road off of the highway. I setup on the shoulder of the road. There's no traffic at all on this road. Really nice dark skies there with just a few small light domes from Alpine and some of the local communities. Not as dark at the TSP location. A person can also stay at the Prude Ranch and can observe at the ranch or go up to the McDonald observatory and setup in the parking lot (you must let them know you are going to do that ahead of time, however). I didn't do that because I didn't have time to change locations and get some good observing in. It was nice to get away from the cold weather happening in Colorado at the time, however.

GPS Location:

30 degrees 34' 8" N - 30.568889 N
103 degrees 22' 0" W - 103.366667 W

So there's a few places to think about if you're ever traveling and need to find some dark sky places to get some view in.

Don't Miss Venus Around Inferior Conjunction March 27

Best Looks

Moon By Saturn Mar 8; by Antares Mar 17
By Jupiter Mar 22; by Mars Mar 24
By Pleiades Mar 29
Mercury In SE dawn first week. By Mars Mar 1
Venus In SW in evening first 3 weeks
Inferior conjunction Mar 27 8 deg N of Sun
Mars Difficult in SE predawn
Jupiter In SE in morning
Saturn High in S middle of night. Rings very thin

International Space Station Passes for Loveland – Fort Collins March 2009

Beware of ISS Boost Due After March 5 2009

Date	Mag	Starts			Max. altitude			Ends		
		Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.
3 Mar	0.5	04:54:11	12	N	04:55:03	13	NNE	04:56:28	10	NE
4 Mar	-0.1	05:20:32	10	NNW	05:22:51	22	NNE	05:25:12	10	ENE
5 Mar	0.9	04:15:17	13	NNE	04:15:17	13	NNE	04:16:05	10	NE
5 Mar	-1.8	05:47:31	10	NW	05:50:24	57	NE	05:53:16	10	ESE

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