

December's Lunar Eclipse

But through some small breaks in the clouds we did get to see a few seconds of seeing the moon go from partial then into totality but never a clear view of this Lunar show. I had set up my homebuilt 8-inch telescope in our front yard and my Rebel Digital Camera attached for some still recordings.



It was nothing like the show we had back in 2007.



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CAMS first light

By Peter Jenniskens

Fremont Peak Observatory has beefed up its security. It's security against asteroid impacts, that is. Since October 2, 2010, the observatory is doing a surveillance of the night sky to identify which near-Earth objects are in fact dormant comets, betraying their identity by a stream of debris in their orbit, now causing meteor showers on Earth. The NASA funded project is called CAMS: the California All-sky Meteor Surveillance.

<http://cams.seti.org>

Twenty low-light video security cameras are filming the sky non-stop and record anything moving. The project aims to film meteors, not just from Fremont Peak, but also from Lick Observatory and Mountain View. By triangulation, we measure the trajectories of the meteoroids, and their orbit in space. The goal of the project: map the meteor showers in the sky and confirm some of the 300 unconfirmed meteor showers listed in the International Astronomical Union's Working List of Meteor Showers.

Over the summer, Loren Dynneson, Rick Morales, Mark Levine, and Chris Angelos worked with my students Kevin Newman, Erin Leidy and Steffi Valkov to place the box with video cameras at Fremont Peak Observatory. Doug Brown and Rick Morales negotiated the approvals. Mike Koop built the power unit interference filter to provide a clean video feed.

The cameras are monitored by security video servers provided by the company BCSI. Each server monitors four cameras. They run day and night: at night time to record the video, at daytime to find the meteor tracks in the video files. The five servers are located in the observatory lecture room, in a cabinet specially designed by Loren Dynneson for that purpose. A poster explains the project to visitors.

During the Perseids, one unit was tested and we found that the cameras were filming stars as faint as +5.4 magnitude, and were able to capture all +4 meteors and 25 percent of +5 meteors. The latter are about the faintest meteors you can see with the naked eye from Fremont Peak.

The final servers were delivered in late September. On October 2 was the first regular observing night for the Fremont Peak station.

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We celebrated with a cake shared with some 100 students of Hartnell College, who were there for a Astronomy night program.

Then it was a matter of waiting for the second and third station to be operational. The second station was installed in Mountain View at a temporary site (with lots of trees around sadly), doing its first observations on October 21.

This first data was used to test the data analysis software, designed by Pete Gural. Pete also designed the meteor detection algorithm. On November 7, Pete completed the first set of tools for data analysis. The first set of reduced data are now posted at our website. Fifteen meteors from the night of November 5.

The quality of the data is extraordinary. We can see the meteoroids slow down while they penetrate the atmosphere. That enables us to get an accurate pre-atmospheric entry speed and orbit in space. Until now, that was possible for particles of this size only from rare photographic observations.

The first 15 trajectories more than double the number of such precise trajectories known for the date of November 5 (from 11 to 26). And a first peek at the November 4 data shows some 50 good trajectories! That with only part of the cameras at Mountain View in operation for now.

Almost all recorded meteoroids seem to come from Jupiter Family comets (JFC), potentially identifying individual streams. Streams that may be linked to newly discovered dormant JFC's in the Near-Earth Object surveys, and in doing so identify when the comet broke and how the meteoroids are distributed in space in three dimensions.

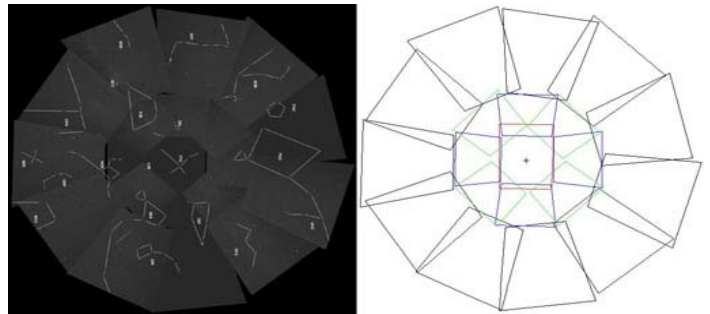
Now the work is really starting. Our goal is to get at least 100 good orbits for each night in the year. We are well on our way, but because of fog and clouds it will take at least three years to cover each night. During that time, the system will need to be monitored and a large amount of data reduced. I am visiting Fremont Peak Observatory for that purpose once every week or two. Other members are keeping an eye on the box-lid timer and keep the box-window clean. If you like to help, let us know.

In the future, we also envision that other members can participate in CAMS by running your own camera

from your back yard. Pete has plans to design a tool that captures the video and produce the same files as are generated by CAMS.

I like to thank all involved for getting us this far. It is very exciting to see the first results. Keep tuned for more data as CAMS gradually comes together.

Dr. Peter Jenniskens



2010, August 29 - During the Perseids, Kevin Newman collected video from each of the 20 cameras at Fremont Peak Observatory. Now, Peter Gural calibrated each of the field of views and constructed this mosaic of the whole assembly in a gnomonic projection. Five cameras were run at lower brightness level (cameras 1,5,9,13,17), so they are still missing the background and most stars. This has since been corrected. The overlap of the cameras is shown in the diagram to the right. Small imperfections in placing the camera stands created small gaps between some camera fields, but those are not expected to lower the detection efficiency for meteors much.

2010, August 23 - After ten days of operation, the system at Fremont Peak Observatory is holding up well. Only 15 percent of disc space is occupied, with each camera generating about 250-350 MByte of data per night in the current settings. The system was behind in processing files, having completed only 5 out of 9 nights. One of the cameras generated a larger number of files due to a wrong brightness setting. This was successfully corrected. The box lid appears to open and close on time, but could do with a layer of white paint to block more of the sunlight (next week's task). It was a warm day today, and the temperature inside the box reached 53 deg celcius. The timer was off by only about 40 minutes, presumably due to power outages.

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CAMS First Light

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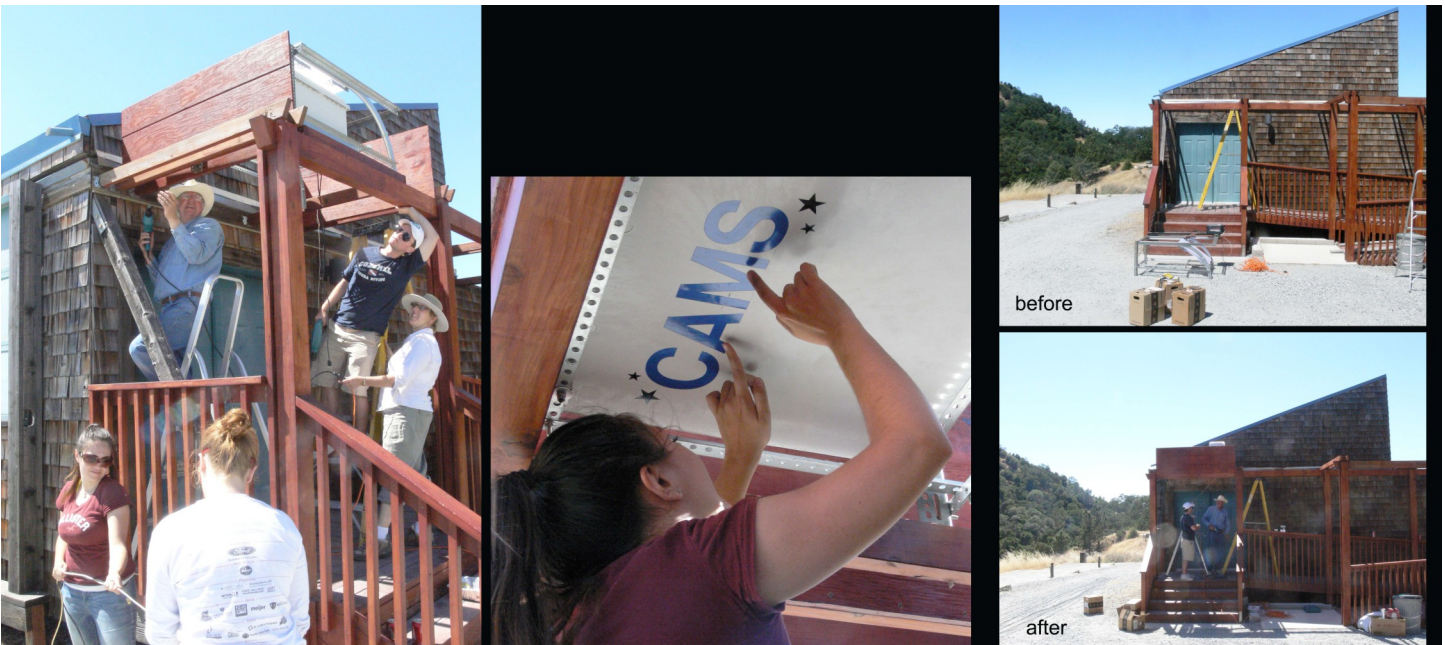


2010, June 30 - Summer students Kevin E. Newman (NASA Ames Exploration Academy), Steffi Valkov and Erin Leidy (SETI Institute REU program), from left to right, met with Fremont Peak Observatory Association members Chris Angelos, Mike Koop, and Rick Morales to discuss setting up CAMS at Fremont Peak Observatory over the summer. In the following field test just after twilight, several meteors were spotted that seemed to radiate from an unknown shower. Three were captured and were found not to diverge from one radiant.



2010, July 21 - Loren Dynneson today installed the box lid assembly at Fremont Peak Observatory, as well as the cable conduit. The work will be continued on Saturday to install the wind shield and pull the video cables.

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2010, July 24 - Today, at Fremont Peak Observatory the camera box was installed, followed by the wind shield. RUE student Steffi Valkov provided the finishing touch. The twenty video cables are now also in place.



2010, July 31 - Loren Dynneson, Rick Morales and Mark Levine installed the cabinet at Fremont Peak Observatory that will house the video surveillance system. Mike Koop created a filter to improve the camera power supply and installed the new system in the camera box. In the evening, the system was tested in its new housing.

2010, October 2 - The station at Fremont Peak Observatory is now fully operational (photo, right). The occasion was celebrated with 100 students of Hartnell College, who visited Fremont Peak Observatory as part of the astronomy curriculum. Peter Jenniskens gave three lectures that explained the goals of the CAMS project. A large cake was shared with the students, decorated with meteors shooting from the CAMS



Here, Loren Dynneson and Peter Jenniskens are doing the honors, while Ron Dammann, Chris Angelos, and Mike Koop supervise.

President's Column *from Page 1*

The **StarBQue** will be held June 25. **Member Appreciation night** will be July 23. The date for our Spring work party at the observatory will likely be April 23. The schedule of FPOA board meetings was set. Our next Board meeting will be March 26.

Respectfully yours,
Rick Morales

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Of interest was my neighbor's friend, Beatrice Lee, from Taiwan and here in America to attend schools in New York City. She came by a few days before the eclipse to see if she could join us for the evening event. I always enjoy visitors joining me in my astronomy endeavors.



We were also joined by our neighbors, Max, Jenny, Benjamin and Alliesia Yang. During the eclipse, young Benjamin was reciting his knowledge of historic people and their accomplishments, like Galileo and Copernicus. That was entertaining while

waiting for the moon to show again thru the cloud cover.

It was about 12:15 am when I decided to give up and put the telescope and camera equipment away for the night. But when I looked out to see if the eclipsed moon was still around at 12:45 am, the sky was clear and the copper colored moon was there in all of it's glory. I was just too tired to reset my equipment back up and went to bed.

But wait till the year 2014 when two Total Lunar Eclipses occur in our part of the world on April 18 and again on October 8. Hopefully I'll be out in front with telescope watching it. Come join me.

EMAIL DELIVERY OF THE OBSERVER

Dear FPOA Members,
We have been delivering the Observer via email for the past several issues. This obviously saves the Association postal expenses, and assures the quickest delivery to you. However, several of you no longer have valid email addresses, due to ISP changes, moves, etc. If you would like to continue to receive, or begin to receive, notification of the Observer via email, please send your current email address to schedule@fpoa.net

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