



AU AstroNews

The Newsletter of the Astronomical Unit

September 2017

Sponsored by the Santa Barbara Museum of Natural History



“Darn that bird!” Photo credit: Tom Totton.

THE SEPTEMBER GENERAL MEETING

Our September General Meeting will feature Dr. Bonnie Buratti who will cover the Cassini Spacecraft Mission. The title of her talk is “From Weird Enceladus to Mysterious Titan to Odd Iapetus: The Grand Finale of the Cassini Spacecraft.”

OUTREACH SUMMARY

Since the last newsletter, AU volunteers Iair Arcavi, Dave Brehl, Mike Chibnik, Tim Crawford, Mike Dilley, Joe Doyle, John Edkins, Mike Farris, Ruben Gutierrez, Art Harris, Jürgen Hilmer, Ken Kihlstrom, Chris Larson, Adrian Lopez, Pat & Chuck McPartlin, Janet & Martin Meza, Bonnie & Bruce Murdock, Max Neufeldt, Edgar Ocampo, Peggy O’Rork, Javier Rivera, Dianne & Russell Ruiz, David Salvia, Toby Schmidt, Tom Totton, Tom Whittemore, Jerry Wilson, and Linda & Harold Yarbrough showed sky goodies at outreaches to 1087 visitors.

A big thank you to all the SBAU outreaches, particularly Janet & Martin and Tom Totton, who kept outreach activities running smoothly while Pat & Chuck were on vacation.

OUTREACH FOR SEPTEMBER

Here are the events scheduled so far for the month. Our big event this month will be the annual AstroVaganza celebration at SBMNH, all day Saturday, September 9. Come help out if you can!

Outreach events are subject to change or cancellation, so to get the latest information on schedules, or directions, just contact Chuck at 964 8201 or macpuzl@west.net

The Telescope Workshop meets on Tuesday evenings at 7:30 PM at the Broder Building at SBMNH. Contact Tim Crawford at tcrawf3@cox.net for information. Listen to the AU on the radio at KZSB 1290 AM at 9 AM on the second and fourth Monday of each month.

FRIDAY, SEPTEMBER 1, 7 PM

Monthly AU meeting in Farrand Hall at SBMNH. See a quick planetarium show, then hear about the Cassini mission to Saturn.

SATURDAY, SEPTEMBER 2, SETUP 8 PM

Slide show and telescopes for campers at Cachuma Lake Campground. We set up on the open field at Dakota Plains.

TUESDAY, SEPTEMBER 5, SETUP 7 PM

Telescope Tuesday at the Camino Real Marketplace. We set up in the plaza next to the theater.

WEDNESDAY, SEPTEMBER 6, SETUP 8 PM

Slide show and scopes for Carpinteria State Beach. We set up on the sidewalk toward the ocean from the entry kiosk.

FRIDAY, SEPTEMBER 8, SETUP 7 PM

Telescopes for Refugio Beach State Campground, in the day use parking lot, southwest corner.

SATURDAY, SEPTEMBER 9, SETUP 9 AM

AstroVaganza! all day at SBMNH. Solar scopes and astronomy activities during the day (10:00-3:30), and a star party in the evening (7-10).

FRIDAY, SEPTEMBER 15, SETUP 7 PM

Monthly Public Telescope Night at Westmont College, at the observatory, adjacent to the baseball field.

SATURDAY, SEPTEMBER 16, SETUP 7 PM

Telescopes for Refugio Beach State Campground, in the day use parking lot, southwest corner.

FRIDAY, SEPTEMBER 29, SETUP 6 PM

Astronomy night for the residents of the Encina Meadows apartment complex, which covers several blocks just north of (behind) the Calle Real shopping mall. We'll be set up in part of their central parking lot. The approximate address is 5743 Encina Road.

Into the Darkness...

Tom Whittemore

“Oh, my God!” These words rang out in a parking lot behind Saint Anthony’s Church in Greenville, South Carolina, as the moon completely swallowed the sun. Now, for a bit over two minutes we could look directly at where the sun had been. The solar corona glowed eerily as the group prepared to launch their Chinese lanterns. This afternoon the congregation was going to cast out the darkness. They were going to offer light!

Earlier in the afternoon, we passed out a bunch of pinhole cameras that we made the day before so the crowd could safely see how the moon would eat at the sun, in one slow and continuous nibble. For most of us, this was our first solar eclipse, and for the locals, it was their luck that Greenville lay on the shadow-path. And no clouds were on that shadow-path.

It was hot in Greenville that afternoon. At the beginning of the eclipse it was ninety-three degrees, so the priests opened the doors to a cool auditorium. They read from scriptures with themes about light

and darkness. Genesis played a prominent role. The congregation sang, belting out gospel tunes. The sense of togetherness was overwhelming. Here you could not enjoy this eclipse alone. You were an integral part of this intimate community.

“O.K. It’s all right to remove your eclipse glasses!” I told the crowd. For two minutes and ten seconds we stood there with our mouths wide open. We were very quiet as the corona glowed and Venus stood out to the right of where the sun used to be. “What’s that bright star in the opposite direction?” someone asked me. I had to think for a bit and said “Jupiter!” Then the diamond ring popped out as the moon began to lose its grip on the sun. And, after that brief moment, it was no longer safe to view the spectacle with the unaided eye.

This was my first total solar eclipse. And there is, I admit, some thirst to see a second. Maybe the one coming up in 2024 - especially since the shadow crosses the town where I was born: Indianapolis. But, how could this experience with all these wonderful people ever be duplicated? I was transfixed by this group of folks. And I will never forget them.



Total eclipse viewers release their Chinese lanterns to ward off the darkness in Greenville, S.C. Photo credit: Tom Whittemore

From the President...

Jerry Wilson

CCD cameras versus CMOS

The two types of cameras in common use for amateur astroimaging are CMOS and CCD types. CMOS stands for complementary Metal Oxide Semiconductor and CCD for Charge Coupled

Device. Both use Silicon as the light-absorbing medium but differ primarily how we get the charge out and convert it to an output voltage.

When a camera lens focuses a photon or telescope onto silicon chip the process of detection is a three step process.

1. The photon enters the silicon and if it has enough energy it creates an electron hole pair. This pair is loosely bound since the pair is oppositely charged and experiences a weak attractive force. After the mean lifetime of the pair has expired the pair recombines and nobody outside the piece of silicon knows anything happened.

2. To make this silicon into a detector we must embed an electric field in the silicon so when the electron hole pair encounters the field, the pair is broken with the electron going one way and hole the other. Now the two charges created by the photon have to go through an external circuit in order to recombine. That's when we can tell a photon was absorbed.

3. The type of charge conversion circuit is the third stage and the chief difference between the two types.

In a CCD the charge collected in each detector is passed to the next detector sequentially down to the end of the row. There the charge packet is input to a circuit that outputs a voltage. This is a slow process and not conducive to taking frames in rapid succession as needed in a video. But when you can tolerate a few seconds between frames it's fine. This technique has lower noise and does well for long exposure times and is used in scientific or data collecting cameras.

In a CMOS the collected charge for each detector is converted to a voltage in the unit cell and the output voltages are multiplexed to the signal processing electronics. This is a faster process and is used in all commercial cameras. Once considered too noisy for good astro images, their noise levels have improved significantly over the last decade. CMOS architectures also require lower power and are cheaper to produce.

So, how do we get an electric field into the silicon to achieve step 2 and separate the electron from the

hole? There are several ways, but they all depend on forming a depletion region in the silicon. We basically make a junction between an n-type and a p-type layer or a half junction by making an MOS capacitor and putting a specific charge on the metal plate.

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September 2017

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|--------|--|--|--|----------|-------------------------------------|--|
| | | | | | 1 GENERAL MEETING 7PM | 2 CACHUMA LAKE 8PM |
| 3 | 4 | 5 CAMINO REAL MARKETPLACE 7PM | 6 CARPINTERIA STATE BEACH 8PM | 7 | 8 REFUGIO STATE BEACH 7PM | 9 ASTRO VAGANZA 9AM (10-3:30&7-10) |
| 10 | 11 TECH TALK KZSB (AM 1290) 9-10AM | 12 | 13 | 14 | 15 WESTMONT COLLEGE 7:30PM | 16 REFUGIO STATE BEACH 7PM |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 TECH TALK KZSB (AM 1290) 9-10AM | 26 | 27 | 28 | 29 ENCINA MEADOWS 6PM | 30 |

The Astronomical Unit

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