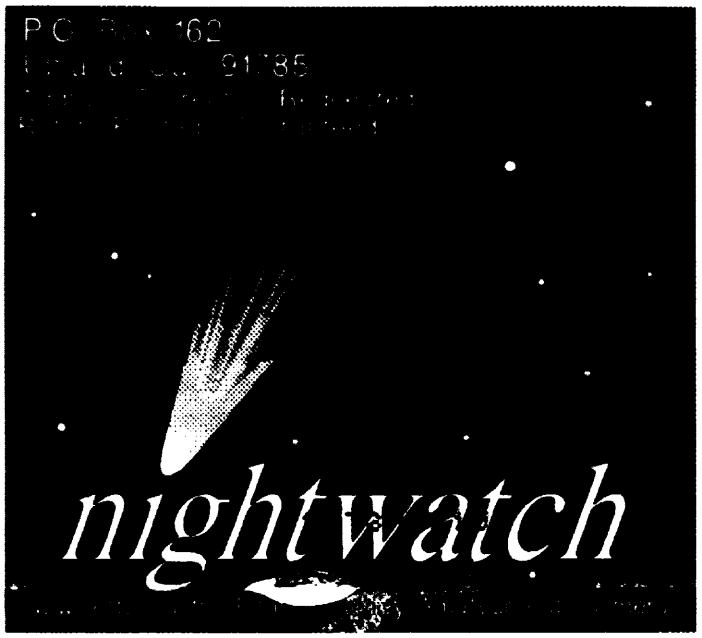

Amateur astronomers get better looking...

Janis Seaton

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President's Message

April was our first scheduled star party at our newly-chosen site, Owl Canyon Campground. We will be expecting feedback from the members at the general meeting of May 8th. How was it? Crowded? Noisy? Hard to find? Is the $6.00 per car charge too onerous? Or was it great! We anticipate your comments.

Our speaker for the May meeting will be Allan Zeike of UC Riverside, speaking on "Gamma Ray Astronomy". Surely, this will be a topic of great interest, since Gamma Ray Astronomy is the newest extension of the bandwidth of astronomical observations. Because Gamma Rays are also the most energetic form of radiation, observations in that field should surely reveal some exciting things about the universe. Come on down and find out about it!

At the last meeting, we welcomed back long-time member Ludd Trozpek, who also brought along a new member for us, Allan LeBoutheillier. Welcome to both of you! Ludd's action sets an example for the rest of us: bring someone along to get involved with astronomy!

RTMC is upon us! If you haven't yet made your plans, please do so, soon. Every astronomer should experience that show at least once. It will include the largest field of telescopes most of us will ever see, with a separate field for those competing for recognition as "The Best..." or "The Most..." telescope of whatever type. This is where I first saw a portable 36-inch telescope--that arrived in a sub-compact car! Many of us have found fabulous buys on that eyepiece...focuser...mirror cell, you name it, that we were looking for. Wend your way up to Camp Oaks in the San Bernardino mountains and enjoy! We'll provide "How to get there" at the general meeting.

Founding member David Chandler, who now lives and works in the foothill of the Sierra Nevada at Porterville, has invited us to enjoy a joint meeting with the club he started up there. Most exciting is that the meeting will take place on property owned by David and Billie Chandler! The Board hopes to have the details settled in time to announce at the May general meeting. Tentative plans are to have the Porterville meeting in June.

As we move into the warm (hot?) months of late spring and summer, we will be planning our usual hot-weather trips to Kennedy Meadows. A relatively-long drive. but the payoff is one of the few places still accessible in Southern California that offers a truly dark sky. Kennedy Meadows is the planned site for both July and August. Those who enjoy camping frequently stay two days (as we do for Death Valley in winter), to enjoy the sky and make the trip more worth while. Come out and join us! I'll never forget what a revelation it was when I first looked at that beautiful sky, with the Milky Way stretching clear across from horizon to horizon. It's worth the trip.

PVAA has big plans for the summer months, so stay in touch and join us. With warm weather and dry, clear skies,

PVAA Events Calendar

Month	Star Party	General Meeting	Board Meeting
May	23	8	1
June	20	12	5
July	25	10	3
August	22	14	7

the summer months offer great opportunities to enjoy astronomy. Let's take advantage of the opportunity.

Patrick Nicholson

Come to the Auction

The June General Meeting will include an in-club auction of items that are excess to club requirements--or items that individuals wish to dispose of. Principal club items are:

- Series of University Plossl eyepieces, 9 mm to 25mm, 1 1/4 inch size
- "Deep Sky" sky pollution filter, 1 1/4 inch size
- Box of older astronomy books (for nostaliga or history buffs)

Members are encouraged to bring in items they no longer need, and would wish to dispose of, such as unused eyepieces, filters, mirror cells, spider, other various telescope parts, or books, star atlases.

Please make sure that items submitted for sale are in good condition, or, if their condition is less than pristine, that they are marked with defects clearly noted.

April General Meeting

President Patrick Nicholson announced that Owl Canyon Campground is now considered our official star party site; our April star party will be there. Call for visitors/new members identified Allan LeBouthillier, who joined the club and hopes to attend the star party.

What's Up?

Roy Schmidt chose Coma Berenices as the center of attention for What's Up? The constellation is really not much more than a large open cluster, representing Berenice's Hair. The story is told by Robert Burnam: Berenice, being concerned for her husband, Ptolemy, who was off fighting a war, sacrificed her beautiful auburn locks on the altar of Aphrodite, to assure his safe return. When the locks mysteriously disappeared, the court astronomer Conon convinced the royal couple that the lost tresses had been transformed by the gods into a constellation, enshrined forever among the stars. Thus was born the Coma Berenices constellation, consisting of three dim stars and a large open cluster.

The coma cluster is best viewed with binoculars, since it is far too large for the field of view of a telescope. In a good pair of binox, it is indeed beautiful. with 30 or more bright stars cascading down, much like locks of hair. Alpha Comae is a double star, with 2 equally-bright stars, a bare 0.7 arc-second apart.

Coma, however, has its own galaxy cluster. Probably the best and brightest is M64, the black-eye galaxy, so-called because of a dark band in an arc partially around the bright core. You need at least a 13" scope to see it well. Also in Coma, just 1° to Northeast of Alpha comae, you find M53, a nice, well-condensed globular. Some stars will be easily resolved in a 0-inch scope. In turn, another 1° southeast, is NGC 5033, a smaller and fainter globular, so loose that it may be classified as either a globular or a dense open cluster.

Presentations

In the absence of an official speaker for the evening, both Roy Schmidt and Patrick Nicholson presented book reviews.

Roy Schmidt introduced *Hunting Down the Universe* by Michael Hawkins (note, not Stephen Hawking). Michael Hawkins investigates the "missing mass" problem--the fact

PVAA 24 HR. Hotline...

Get the latest news on the star party, club meetings, special events and astronomy happenings.

call 909/985-1684

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that the visible stars in galaxies do not appear to have enough mass to accommodate the rate of rotation of different parts of the galaxies. A similar problem has been observed with galaxy clusters.

Mr. Hawkins posits that the missing mass is in the form of primordial black holes: tiny black holes predicted by theory to have formed during the early stages of the Big Bang. Problem is, no evidence for said black holes has been found. (Recently-published evidence for the presence of black holes all applies only to very massive black holes, causing such things as enormous jets from galaxies such as M87 in Virgo),

The book's approach is illustrative of the "astronomer's dilemma". The usual empiricist approach to science is: gather the facts, first, then develop a theory to explain them. (This was the approach used by Kepler) However, in the case of modern astronomy, it is usually necessary to develope a theory first, then design and build equipment specifically to look for evidence for or against that theory. Example: neutrino detectors. Theory predicted that a Supernova would produce neutrinos. An enormous special detector did indeed find neutrinos (7 of them!) when Supernova 1987A exploded in the Large Megallanic Cloud.

Hunting Down the Universe is <u>not</u> an easy read. You have to have some scientific background to follow the arguments being presented. Hawkins, however, does present all the conflicting theories over how the universe developed. It may be worth the effort.

Patrick Nicholson reviewed a lighter publication: *Beyond Star Trek*, by Lawrence M. Krauss. Mr. Krauss reviewed what's possible and what's not in *The Physics of Star Trek*. This time, he's attacking a series of recent films and X-Files episodes about alien invasions. He lampoons the movie, *Independence Day* to start with. It seems the aliens have arrived in a Mother Ship so large it has 1/4 the mass of moon and has to be parked in geostationary orbit while smaller flying saucers (only 15 miles across!) sail down to take over the planet. Well! As Krauss points out, the aliens would find on arrival that takeover would be easy but the planet to be taken over is not in pristine shape.

An object in geostationary orbit is flying at 22,500 miles up, almost 1/10 the distance to the moon. So, if the object has a mass of 1/4 the mass of the moon, it would have a gravitational effect 25 times that of the moon! New York would be under water--probably many other major cities as well. And new volcanoes would appear all around the globe, due to this new-found stress. (Remember, that the force of gravity decreases as the square of the distance).

Those of us on high (and seismically-stable) ground (maybe Kansas?) would have other problems, according to Krauss. Those 15-mile saucers would do bad things as they cruise through the atmosphere. Assuming that they fly by aerodynamic principles, these saucers would "bear down" on the supporting air, creating an increase of pressure underneath themselves. We don't notice it, in a 747--but these things are huge! Well--sorry, Krauss, but if the saucers fly through the atmosphere, they'll never get back to their Mother Ship! Not much air at 22,500 miles up! Maybe Krauss, physics prof though he is, needs to have a scientific advisor to review his books. Or maybe he just needs to take time to think it through before he tries to profit from the success of recent sci-fi movies!

Patrick Nicholson

Gamma Rays: Astronomy's Latest Tool

Dr. Alan Zeike of UC Riverside unveiled the what, where, why and how of Gamma Ray Astronomy to an enthralled group of PVAA Members at the May General meeting. An early snafu involving double-booking for Gallileo Hall sent PVAA officers and Harvey Mudd personnel scurrying to find an available alternate room--ultimately settling us in the beautiful Beckman Hall.

In spite of the confused start, business and What's Up were completed in record time, clearing the stage for Dr. Zeike's presentation. Like the fine college professor that he is, Dr. Zeike started by explaining what gamma rays are, and how they are generated. In sum, gamma rays are the most energetic known radiation, created by temperatures of billions of degrees. There are only four known processes for their creation:

- Nuclear decay
- Inverse Compton (caused by relativistic electrons striking photons)
- Relativistic electrons running into a fixed object (Same process at lower energies creates X-rays
- Mutual annihilation of matter & anti-matter parti cles.

Interference from dust and molecules in the atmosphere prevents us from observing gamma rays from outer space directly from earth. For that reason, early work on Gamma Ray Astronomy started at UCR in 1970, using balloons. Most spectacular results of this work came from observations of Supernova 1987A in the Large Megallanic cloud. observed from balloons launched near Alice Springs, Australia--in the far outback. They observed particles with energies of 1.238 MeV (Million electron-volts), which represents Cobalt 56, which decays into Fe 56 (normal iron).

Other early work in gamma rays was done by the defense department, looking for evidence of nuclear explosions in the USSR. They were able to directly observe radiation from the "Bear Reactor" used on Soviet space craft.

The next great step forward occurred in 1991 with the launch of the Compton Gamma Ray Observatory (GRO)--the largest payload ever launched, up to that time, at 38,000 pounds. It was launched by the Space Shuttle--fortunately, since the high-gain antenna stuck, and had to be hit a couple of times by an astronaut, before it would deploy. The

Compton GRO is the second Great Observatory in space (after Hubble). The GRO carries several different detectors, with detection capabilities at different energies.

Raw data from the Compton GRO is archived by NASA for a year, and then made available to all comers. UCR works on the data as released, doing various kinds of analyses. Through this work, they found the "Antimatter Fountain" near the galactic center--a high rate of annihilation radiation. Each collision of matter/antimatter results in 2 gamma rays at 511 KeV. We are not sure where the positrons come from that are being annihilated. (The Compton GRO has only 5 degrees of angular resolution).

Also from the galactic center, they have found a bright spot created by 1.8 MeV emissions--the signature of the decay of aluminum 26. This isotope has a half-life of about a million years, so its origin is relatively recent, as astronomical events go. It is also unexplained.

Other data from the EGRET detector sees energetic gamma rays in the order of 100 MeV. These rays are caused by annihilation of an electron-positron pair. The detector shows the angle of incidence of the rays, allowing scientists to plot the origins. This shows a bright path in the plane of the galaxy--no dark spots. Making an all-sky survey, they find about 100 point sources, about half of which are identified sources: pulsars and "Blazers" (active galactic nuclei). Subtracting out the known sources reveals a "halo" around the galaxy at GeV (Gigavolt--billion electron volt) energies. Origin is unknown, but may be caused by theoretical dark matter elements MACHOS (Jupiter-sized objects too cool to shine) or WIMPS (Weakly interacting objects). This is all pure theory.

Most intense gamma ray bursts come from outer space--outside our galaxy. First detections occurred in 1973 at Los Alamos, using data from spy satellites. Using data from two or more spacecraft, they could plot the origins, which were random in time and location. In January 1993, they observed a "Superbowl Event"--an intense spike, just a few seconds long, indicating a tiny source.

The first gamma ray burst identified to a visible source came on February 1997, using the Italian Beppo-Saxe spacecraft. This spacecraft has both gamma ray and X-ray capability, which allowed good enough directionality for the Hubble to use. Hubble then saw the cooling source at infrared wavelength, showing GRB 970228 at the edge of a very distant galaxy.

Finally--the big event! The burst of December 14, 1997, had the highest redshift of any object observed at optical or infrared wavelengths--a redshift (Z) of 3.4. That redshift is equivalent to 12 billion light years away--and at the same redshift, the universe is only 14 billion years old. Thus, the event occurred very early, and is more distant even than most quasars. A supernova releases energy of 10^{52} ergs; this object, whatever it is, is 1,000 times brighter!

The only mechanism capable of generating that much energy would require the merging of 2 massive black holes. There is no theory to explain the mechanism of such an event. Thus, as is so often the case with science, new forms of measurement answer some questions while generating many more questions in the process. What an exciting time to be alive!

Patrick Ncholson

Coming Soon: Joint Star Party

The PVAA has accepted an invitation from the Tule River Amateur Astronomers to attend a joint star party in Springville (near Porterville) on June 20, 1998. The Tule River Amateur Astronomers (TRAA) was formed by Billie and Dave Chandler after they moved up north. Both the PVAA and the TRAA are invited to Billie and Dave's house on Saturday afternoon for pre-star party socializing and a potluck barbecue. They have also issued an invitation to anyone who wants to stay overnight before returning home. Following are directions to the Chandlers home:

Take I-5 over the grapevine to Hwy. 99. Take Hwy. 99 through Bakersfield to Hwy 65. Take Hwy. 65 for 45 miles north to Porterville. Exit at Hwy. 190 in Porterville and head east toward Springville. At the first stop light on Hwy. 190, observe your odometer. Continue past this point 12.5 miles to Globe Drive. Major landmarks along the way include Porterville College (where Dave teaches), Success Lake, River Island housing tract/golf course, ranger station. Turn right on Globe Drive. Continue about ½ mile until you dip down and cross the Tule River. Turn left on Pleasant Oak Drive, which is the first intersection past the Tule River. At the top of the hill, bear right. The name changes to Tule Oak. Look for 33251 Tule Oak Drive, which is the second property on the right. After turning in the driveway, fork left up to the parking area by the house.

Directions to the Star Party Site:

From the Chandlers' house, retrace steps out to the corner of Globe and Hwy. 190. If going to the star party directly, stay on Hwy. 190 past Globe Drive. Continue eastward on Hwy. 190 through Springville (slowing to 30 mph through Springville as posted). After passing through Springville, look for "The Barn" on the left, where the road forks. Take the left fork (Balch Park Road). Continue 6 miles to Yokhl Valley Road. Turn left and enter the second driveway on the left, about 0.3 miles after the turn. Park near the barn or on the loop above the barn.

If you get lost, the Chandlers' telephone number is (209) 539-0900. Hope to see lots of PVAA members there.

Janis Seaton