

Sell it, Swap it, Bid on it, or Eat it!

November 20th, 2007

Doors open at 6:45 p.m.

Concord Police Association Facility 5060 Avila Road, Concord

The Mt. Diablo Astronomical Society will hold its sale, swap, auction, and bake sale on November 20th. This event only happens once every two years. Find a new finder. Eye a replacement eyepiece. Tell about your telescope. Buy some binoculars. Bid on a bundt cake.

Several telescopes have already been donated to the club for auction. We have also invited a representative of Scope City to bring items for sale.

Tables will be spread around the room for you to display and sell your treasures. Come early and grab a corner. What should you bring to sell? Telescopes, binoculars, eyepieces, mounts, mirrors, lenses, clock drives, books, camera equipment, star charts, finders, tubes, diagonals, photographs, videos, DVDs, magazines, toys, games ... anything astronomical. We suggest a 5% donation to MDAS for any monies you collect.

Something in your garage you no longer use may be just the thing for a new amateur astronomer or perfect for a colleague needing an eyepiece or better mount. You might even pick up a holiday gift or two to encourage family members to get involved with astronomy.

A special table will be reserved for the ever-popular pies, cakes, cookies, and other delectables. Prizes will be awarded to the most unique creations (Comet Cookies, Draco Drops, Polaris Pound Cake?), so get out your favorite recipes and start cookin'.



Tips for Success at the Auction:

Doors open at 6:30 p.m. Bring in any items you wish to submit for auction no later than 7:10 p.m. For items to be auctioned, we will ask you to complete a simple check-in sheet which includes your name, a description of the item (so we can better auction the item!) and your minimum acceptable price. A small paragraph about what your item is and any special features helps us to better describe it for the auction. Preparing this before you arrive at the meeting will speed things along.

We always have a lot of fun, variety, and delicious goodies, so don't miss this one!

IMPORTANT REMINDER:

The November and December meetings are held on the THIRD Tuesday of the month – make sure your calendar is marked!

Upcoming Programs:

December 18: Members Meeting **January 22:** Richard Crips, Polarization imaging

50th Anniversary



President's Corner Black Holes

By Nick Tsakoyias

The other day I took my kids to the movies for an afternoon matinee. When I reached into my wallet to pay for the tickets I noticed that I had just enough money to pay for those tickets.

How could this be?

I distinctly remembered that the night before I had put more than enough money to cover for the tickets, popcorn, and dinner for after the movies.

This was not the first time that this type of thing has happened. At

that point I started thinking, maybe I have a black hole in my wallet, where my money disappears, never to be seen again. I started to sweat and a great fear overtook me, that if indeed there was a black hole in my wallet that eventually it would suck me in never to be seen, and that I'd leave my wife a widow and my children orphans. Now I may not have the most scientific mind to be able to understand the science of astrophysics, but one thing that I do have is curiosity and armed with that, I decided that evening I would read up on black holes to see if there really was one in my wallet.

This is what I learned through my research.

The mystery of black holes has intrigued scientist for a long time, from Einstein to Stephen Hawking and others in between. Black holes have bizarre physics and gravitational fields so high that light is trapped. They are awesome matter vacuums, concentrating enormous amounts of stuff into the tiniest of places.

Massive black holes are thought to anchor most galaxies. Millions of times the sun's mass, they may co-evolve with their galaxy, one shaping the other. Black holes that are supermassive in their nature are 10 to 100 billion solar masses, and may lurk at the cores of active galaxies and power immense and fantastic outpourings of quasars.

Stellar-class black holes are light-weights of 3 to 14 times the sun's mass, and are the collapsed remains of large stars. There also has been some evidence to indicate of another type of black hole called "intermediate-mass black hole" but these seem to be not as common as massive and stellar black holes.

Anyone foolish enough to approach a black hole would first notice something called Einstein's rings, as the light from background stars is lensed by the increasing curvature of time space. The point of no return is the event horizon this is the boundary of the black hole. This is where light is pulled into an endlessly orbiting photosphere and all within is forever hidden.

To those outside, the traveler seems to slow to a stop at the horizon's edge,

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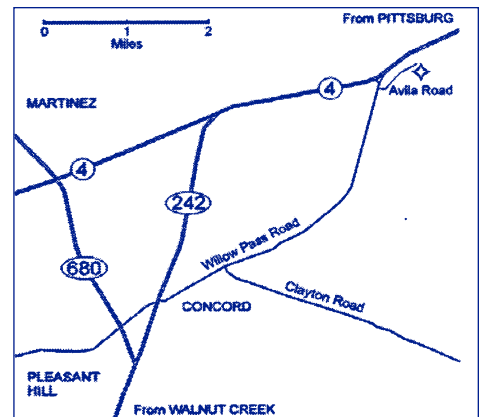
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MDAS meetings are held on the fourth Tuesday every month, except on the third Tuesday in November and December. Refreshments and conversation are at 6:45 p.m. What's Up? at 7:15 p.m. Speaker at 8:00 p.m. The Concord Police Association Facility at 5060 Avila Road is at the top of the hill east of Willow Pass Road, just south of Highway 4. Everyone is invited.

Please consider receiving *the Diablo Moonwatch* by email instead of the Postal Service. Saving in printing and postage is more than \$5.00 per member. You will receive your issue sooner, view it in color, and if you wish can be printed as well on your own printer. Please send a request by email to inquiries@mdas.net.

frozen in time, redshifting, and fading. The next thing that happens is called "spaghettification", I must confess when I first read the word I thought it meant something that happens to someone

Black Holes *continued from page 2*

who repeatedly watched Clint Eastwood spaghetti westerns, but like I said before my scientific knowledge is a little bit on the weak side.

Spaghettification is when gravity's gradient can become so steep that the unwary will be stretched and their head will be stretched miles from their toes.

Inside a black hole, time warps into a spatial dimension, space-time compressing to an infinitely dense, inescapable singularity. Singularity is a point in space-time at which the space-time curvature becomes infinite. Ripping the fabric of

the universe, producing wormholes where they may funnel through to other universes. After a massive radiation

burst at the wormhole's mouth, a white hole might come as relief.

Well after having read up on black holes and coming to some kind of understanding of what they may be, I figured that I had none in my wallet and I was able to relax somewhat. Knowing that in no time soon or ever would I be sucked into my back pocket where I keep my wallet. Later that evening my wife came to me handing me two hundred dollars, she said she borrowed it from my wallet before I had left with the kids to go to the movies. It seems we needed groceries and my wife needed gas for her car.

There are two things I did learn through all this. One is that there is no black hole in my wallet and two the only place that a black hole can exist is in space above. Though my wife might argue that at times there might be a black hole in my head, but that is for another time. Till next month.



50th Anniversary



Solar System Notebook

Comet Holmes Brightens 630,000 times! What's That About?

By Jim Scala

In 1882, its discovery year, Comet Holmes flared from magnitude 14 to magnitude 5 in a day. Since magnitude is an unusual logarithmic scale, that was a brightness change of about 3,000 times; spectacular by any standard. However, on October 24th it flared from magnitude 14.5 to magnitude 2.5. That's a brightness change of 630,000 times! Sometimes the lower magnitude designations for comets are somewhat less accurate, so it might have been magnitude 12 or 13 before flaring to 2.5. Nevertheless, even at that lesser change, it was a 40,000X increase in brightness! A comparison is in order here. If a magnitude 5 star brightened to magnitude -5, it would be visible in full sunlight and outshine Venus at its brightest. If the star jumped to -7, it would hurt your eyes to view at night, would cast clear shadows, and be easily visible in full sunlight.



Comet Holmes captured by Bob Minor (MDAS imager) from Berkeley with a 5-inch F/6 Maksutov-Newtonian telescope with a Cannon Camera.

Did Comet Holmes experience two flares?

Image two, a stacked 7-image composite, shows a barely discernable gap in front of the well-defined comet nucleus. Could it be that Comet Holmes was simply brightening like any average comet



In this color image, bringing out the subtle beige of the coma, the scope was guided on the nucleus which moved against the stars. Notice the well-defined nucleus and the very subtle gap near the front of the coma. Does this mean there were two flares?

and then had a monumental flare-up? If so, it's consistent with the 1882 visit and gives us something to think about. Will the remainder of its solar passage be uneventful, or will this comet put on a great show for us?

Where's Comet Holmes' tail?

We are looking almost head on at Comet Holmes, so if there's a tail, it's spread out behind the bright coma. As the days pass our respective positions will shift so we'll be watching more from the side and if a good tail becomes established, we should be able to see it.

What's a comet's coma all about anyhow?

Comets always have a coma and at least two tails. While comets are in the outer solar system (I'll tell you where in a moment) there's no tail. The nucleus, which will generate the coma (head of the comet), is a frozen, "dirty" snowball

made up of dust, rocks, and dirt; this icy conglomerate ranges in size from under one kilometer to over 20km and possibly larger. For example, comet Halley's nucleus is 16 X 8km. When a comet comes inside Jupiter's orbit (5 AU), the nucleus warms up and depending on its composition, its coma takes shape and it has usually brightened fully by the time it crosses Mars' orbit (1.6 AU).

A coma is usually from 10 to 100 thousand times the size of the nucleus; for example, comet Halley's coma was about 1,000,000 km in diameter. The coma's size reflects the composition of the

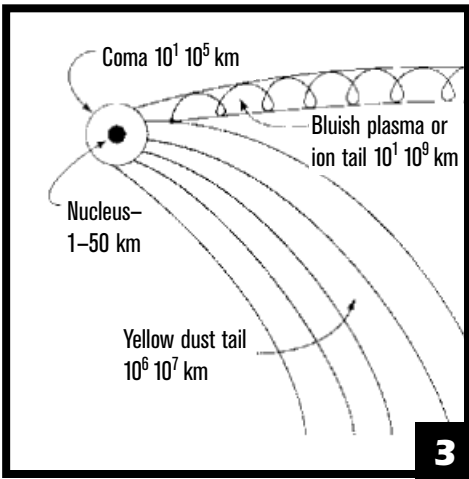
nucleus. For instance, the nucleus composition can range from mostly ice and very little dust and dirt to somewhat equal quantities of both. If that's not enough, the nucleus can range from one fairly large body to a rubble pile of dirty snowballs mixed with rocks. Indeed, a satellite proved that at least some comets actually have craters on their nucleus. However, the coma is mostly water ice particles and the dust is released to form the dust tail.

Two things are necessary for comet Holmes to brighten so dramatically. First, the coma swelled with gas (probably water vapor and ice) to about half the size of Jupiter (over 25 arc seconds) and secondly, it must be composed of a lot of ice to become so bright. If you look carefully at Bob's image you'll notice it contains a central point somewhat off center and is then diffuse as it goes outward. The "off center" illustrates that we are looking at it from a slight angle and there's still a large frozen nucleus that's spewing out dust and ice particles. No matter what, there's still a lot of ice in that central nucleus.

(continued on page 5)

Where do comets come from?

Most comets originated in the Ort cloud, an enormous spherical comet cloud surrounding the solar system at distances ranging from about 30,000 to 100,000 AU. This cloud consists of the original cloud which formed our solar system and it was far enough from the sun that it remained frozen; hence it's got lots of ice. Ort cloud comets number over ten trillion and if their orbit is suffi-



A schematic anatomy of Comet West (1976 VII). This drawing shows the nucleus, coma, ion tail and the dust tail.

ciently eccentric, they can come within 10 AU of the Sun. When that close, they are sometimes perturbed by the giant planets and then become part of the Kuiper belt of comets.

Over a billion comets make up most of the Kuiper belt family which extends from 35 to 1000 AU from the sun. The Kuiper belt, in contrast to the Ort cloud, is not spherical but is a genuine belt lying mostly in the solar system's equatorial plane. Several events can fling Kuiper belt comets into the inner solar system, but it is most likely the relative close passage by a giant planet or

Membership Demographic Adjustment Section.

To all members: If you have any questions or comments regarding your membership status, badges, addresses, and/or magazine subscriptions, please contact Tom Harris through www.mdas.net and/or email: memberinfo@mdas.net. *Thank you!*

when the solar system comes in close proximity to another star.

Our sun was formed in what we would consider an open, albeit not very dense star cluster, and the early bombardment, as shown by the Moon's surface, probably ended around 4 to 4.2 billion years ago. The bombardment which came about 300 million years after the Moon formed might have been caused by one of the stars that had formed from the same dust cloud and passed by. However, one remote but unsettled possibility is that a brown dwarf was also formed with our sun; it's now dark but still orbits our sun and rarely perturbs the Ort cloud. The original search for this "Nemesis Star" was unsuccessful; however, the search assumed it was a visible red dwarf and not a burned out brown dwarf.

Why does every comet have two tails?

As the comet nucleus heats up and forms a coma, several things are produced and this leads to at least two tails. Some chemicals, such as water and carbon dioxide, become ionized and form a tail that points less than 5° away from the sun. This 5° or less angle results from the comet's orbital velocity and is difficult to see visually. However, it consists of ions (it's a plasma) derived from water, hydroxyl ions, carbon dioxide, sulfur compounds, nitrogen compounds and several, common, organic molecules. These ions demonstrate the general abundance of water and other organic materials that were present in the cloud from which our solar system was formed.

In addition to its ion (plasma) tail that is closely opposite the sun, every comet forms a dust tail which consists mostly of dust particles that are released as the nuclear ice sublimates. In contrast to the ion tail, the dust tail's particles which have significant mass, albeit small,

follow Kepler's laws of planetary orbits and they string out behind the comet in a fan like structure as the different size particles take on orbits appropriate to their size and mass.

Was the Tunguska even a comet? Did it affect humans?

In 1908 something exploded in the upper atmosphere over remote Siberia with a force equal to a nuclear device. The area was so remote that almost a decade passed before it was investigated by scientists. Experts still debate whether it was a small comet or a stony meteor that exploded about five miles up. Debris has never been found to settle the issue, partly because the area is so remote and so covered by swamps that any significant chunks would have sunk. However, it destroyed a very large forest and we are fortunate the explosion didn't occur over a large city. The few eye witness accounts were sufficiently confusing that they really didn't help

The Tunguska even put so much dust in the atmosphere that for many weeks afterwards the northern hemisphere experienced bright nights and pictures taken at midnight appear as if in broad daylight; but the most spectacular were the beautiful sunsets that occurred in the northern hemisphere. Confirming the spectacular nature of these sunsets, the birth rate of northern countries showed a blip nine- to ten-months after the event. Living at a time when we concern ourselves with the possible collision with an asteroid or comet, who would have ever thought of an increase in the birthrate.

Does it prove something about romance?

2007 Society Nights

Month	Date	Month	Date
November	10	December	1
		December	8

IMPORTANT REMINDER

Just a reminder to all MDAS members, when driving up or down Mt. Diablo State park for a Public Astronomy Event or a Society Night please obey the speed limit on the mountain which is 25 MPH. Not only will you get a speeding ticket if caught by the rangers it is also unsafe to exceed that limit, being that the mountain has a very winding road and exceeding that speed may cause a serious accident to yourself and others including wildlife. Thank you, Nicholas Tsakoyias, MDAS President

50th Anniversary



Diablo Moonwatch

November 2007

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