NEWSLETTER OF THE BUFFALO ASTRONOMICAL ASSOCIATION INC.

The Spectrum

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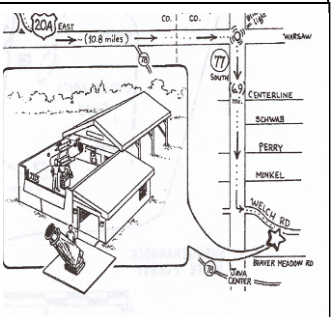

BAA Observatory (BMO)

Misleading Terms in Stellar Astronomy

Shaun Hardy

There is perhaps no branch of astronomy so filled with archaic and inaccurate vocabulary as that dealing with stellar classification and evolution. For example, twenty years ago our Sun was referred to as a "Dwarf'", along with all the other stars which constitute what we today more accurately call the "Main Sequence" (since 90% of all stars fall into this category of stellar classification). Even today's use of the term "Dwarf" can be misleading, for there is no connection what-so-ever between Red Dwarfs and White Dwarfs. Red "Dwarfs", are actually normal, Main Sequence stars of spectral class K and M, the coolest and least luminous of the main body of the stellar population. A typical Red Dwarf might be 1/10th the size of the Sun and 1/12th as massive; its surface temperature about 3000 C cooler than our Sun's. Red Dwarfs are by far the most common type of stars in space. White Dwarfs, on the other hand, are fairly rare and extremely curious objects. They represent one of the final stages in the process of stellar evolution; their material is "degenerate" (exceedingly dense) and they are so old that all internal production of energy has ceased. They glow only by radiating away the heat they have built-up over eons of life on the Main Sequence; somewhat akin to an electric burner continuing to glow even after it has been turned off. A typical White Dwarf would be only 1/100th the size of the Sun (no bigger than the Earth), yet very hot -- more than 12,000 C, or 6000 C hotter than the Sun.

Ambiguity likewise exists with the most massive stars -- Red Giants are the only "true" giants. They are very old stars , which have evolved off the Main Sequence after several billion years of Hydrogen-fusion. Red Giants thus represent a fairly advanced stage in stellar evolution, whereas the so-called "Blue Giants" are simply normal, very young Main Sequence stars of spectral class Band 0. They are typically of mass comparable to Red Giants, yet smaller by roughly a factor of 10 and tens of thousands of degrees hotter.

Finally, one still finds in modern astronomy books the terms "Early" and "Late" type stars. The Early spectral types are the hot, blue-white stars of classes 0, B, and A. The Late types are cooler yellow, orange and red stars with G, K, and M spectra. These terms are very archaic, as they refer to theories of stellar evolution discarded decades ago, in which evolutionary trajectories began at the high-temperature side of the Hertzsprung- Russell Diagram and progressed "down" the Main Sequence to the cool end.

Celestial Boulders

Carl Milazzo

Asteroids are basically small rocky worlds that orbit mainly between Mars and Jupiter. Studies indicate that half a million asteroids, larger than a mile, exist and those that are smaller run into the millions. Originally there should have been only one small planet between Mars and Jupiter, about the size of our Moon, but the gravitational forces of Jupiter and the Sun allowed only about three dozen 700 mile size asteroids to form; soon those forces changed their original circular orbits to elliptical ones. That resulted in most having collisions with each other, because their orbital paths intersected; many were then scattered through-out the solar system. Many asteroids, closer to the Sun than the orbit of Mars, are actually the remnants of dead comets. It should be noted that asteroids sometimes also go by the name of a minor planet or even planetoid.

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Future Catastrophic Asteroid Collisions with Earth

Gus Cenkner

Astronomers believe that, sometime in the future, a huge asteroid or comet will collide with the earth and produce untold devastation. Evidence shows that this has happened a number of times in the past and these collisions may actually be responsible for the destruction of some forms of life on earth.. Studies are underway to identify the best option for deflecting or destroying any celestial body that threatens earth in this way.

To mount a effective defense against an approaching body, that will eventually threaten earth, a certain amount of lead time is required. This means that, years in advance, it has to be possible to identify which bodies will eventually threaten earth. In other words, the trajectories of these bodies must be accurately determined while they are still far away from earth – a very challenging proposition.

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BAA Web Site
www.buffaloastronomy.com

BAA Hot Line / Voice Mail Box
716-629-3098

Location /Time Of Meetings

BAA meetings are held on the ***2nd Friday of the month*** from ***September to June*** in the ***Science Building on Buffalo State College Campus***. Meetings start at ***7:30 P.M.,*** in the first floor auditorium near the entrance. See above web site for a map of the location. **Non-members are encouraged to attend**.

Spectrum Deadline

Articles for the next Spectrum will be due by: ***February 16, 2007***

Managers Of BAA Computer Sites

BAA Web Site
Mike O'Connor

YAHOO E-Mail Group*
Dennis Hohman
Mike O'Connor
* members only

President's Message

Peter Proulx

Happy New Year 2007, 2008, 2009... ...

Sitting here I am once again writing an article at the last minute. Probably the most difficult part of the "Job"; it gets put on my to-do list around the first of the month. But for many reasons, it always comes down to the last minute. This seems to be the case in other areas of my life too. This really got me thinking; it seemed that as early as ten years ago I would be able to accomplish so many more things in a day. Now, the older I get, time seems to just go whizzing by; this year has come and gone in absolutely no time.

This really got me thinking, does time go by faster the older we get? So onto research! Where's my computer? Google: time flies the older you get - Boom 2,450,000 hits! Refining your search we can get this down to about 333,000 hits. Sorting through the pseudo science babble you can find some interesting explanations. I found one WEB site that summed up all of the theories:

I. Proportional Time; The most common reason advanced is that time is perceived as a proportion of time lived. That is, to a five-year-old, a year is 20 percent of his entire existence. To a 60 year-year-old, one year is it only 1.67 percent of his/her life.
2. Complex Time: Another well-won theory is that as we get older, life gets busier and with more things to do, there is less downtime so life speeds by. This is a weaker argument as there are plenty of not-so-busy people who perceive time as moving faster than in youth.
3. Stupid Time; It's forgetfulness according to this theory. Memory weakens as the years pass and because we can't remember what we did yesterday, let alone last week or last month, time flies. Perhaps my mind has flown, but the logic of this one escapes me.
4. Routine Time; This argument postulates that as we age, our time is taken up with increasing numbers of practiced pleasures and predictable tasks that provide little intellectual stimulation. If, instead, we spent our time in new pursuits, this argument suggests that time would slow down.

Pick one. I personally feel like I fall into # 2 and I hate to admit it sometimes # 3! Now all of this is totally subjective and there are times that any and all of these "Theories" might apply. The more scientific minded among us might have an explanation that would involve Einstein's special theory of relativity, that's another article for another time. I do think that there is one aspect of time that we might all agree on "Time flies when you're having fun". How many nights have we been under a beautiful starlit night and we took up from the eyepiece to find out that hours have passed by like minutes? So, add # 5 to list and let's call it "Astronomy Time".

Clear Skies and a Happy New Year. Pete

PS. This will be the last Spectrum by our current Editor, Gus Cenkner. I would like to thank Gus for the wonderful job and dedication to the job. Gus THANK YOU! Rich Fusani will take over the duties as Editor.

Match the Punch Line to the Joke

I want to be an astronaut when I grow up.

What did the metric alien say ?

What do you call a robot that always takes the longest route round ?

Take me to your litre !
R2 detour !
What high hopes you have !

Upcoming BAA Meetings

Peter Proulx

January 12th -- Skywatchers of Ancient Mexico – Mark Percy, Director
Special meeting at the Williamsville Space Lab Planetarium, 1595 Hopkins Rd, Williamsville

For three thousand years, stretching from 1500 B.C. to 1521 A.D., the people of Mexico and Central America built awesome cities, developed hieroglyphic writing, performed sophisticated mathematics using the concept of zero, and made painstaking astronomical observations. Monuments carved from stone, a handful of surviving books, and the alignments of buildings are enabling archaeologists and astronomers to shed new light on these remarkable people.

This meeting at the Planetarium has become a tradition. BAA Member Mark Percy is the Director of the Planetarium and always puts on a spectacular show. We will start at our regular time so please be prompt. This meeting is open to the public and we encourage members to bring their scopes, clear skies permitting, for public viewing afterwards.

February 9th -- Hydrogen Dating Stellar Nurseries -- Cornell Astronomer Marko Krco
Marko works with the Arecibo Observatory for his research.

Astronomers have long known that stars are formed in large gaseous nebulae, however many fundamental questions on the nature of these stellar nurseries remain unanswered. We will confront some of these questions during the talk, and present a newly developed technique for finding the ages of these clouds.

March 10th -- Mars -- Once an Enigma, Now a Mysterious Puzzle! -- Dr. Kevin Williams
Annual Dinner Meeting ***Remember this meeting is on Saturday***
Where: Classic V, 2425 Niagara Falls Blvd., Amherst New York 14228
Classic's is conveniently located in the middle of the Amherst and Tonawanda communities at 2425 Niagara Falls Blvd, about 1 mile North on Route 62 off the Youngmann Hwy (I-290).
Menu: The menu will be mailed with the invitations.

Dr. Williams is the most recent member of the Earth Sciences & Earth Science Department at Buffalo State College. His Geology specialty is Geomorphology, the study of the processes that shape planetary surfaces. His undergraduate degree is in Astronomy & Physics, and he is an accomplished planetologist, with publications to his credit on the coronae land-forms on Venus and on the surface of Mercury. He is an active member of the NASA Site Selection Committee for future Mars landers.

April 21st -- Astronomy Day
We will be holding Astronomy Day at Beaver Meadow this year. Tom Bakowski and the committee are planning a full day of events. We will have complete details in the next Spectrum.

April\May\June – The speakers committee has yet to determine our meeting speakers for our final 3 meetings of the year. Stay tuned!

Astronomical News

Gus Cenkner

*Global Exploration Strategy and Lunar Architecture

MR. ACOSTA: Good afternoon, and welcome to Johnson Space Center here in Houston for today's exciting announcement for the Global Exploration Strategy and Lunar Architecture announcement. I am Dean Acosta, NASA Press Secretary. ……

In terms of what we are going to do, that portion of the Global Exploration Strategy, 180 objectives were defined, and those were put into 23 categories, including such things as **astronomy**, life support and habitat, power, communications, and in situ resource utilization, just to name a few. The Lunar Architecture Study is one in which the team gathered to develop a baseline architecture as well as concept of operations, and key decisions had to be made. And that includes, if you go to the next chart, whether we were going to engage in sorties or outpost, and it goes to the fundamental lunar approach. The Lunar Architecture Team concluded that the best approach would be to pursue an outpost, and that has been confirmed by Mike Griffin, our Administrator. This weaves into two of the themes that we have mentioned from the Global Exploration Strategy, extending sustained human presence on the surface of the moon as well as preparing for future exploration to Mars and other destinations. It also enables global partnerships, allows for maturation of in situ resource utilization, and result in a path that is much quicker in terms of future exploration. Also, many science objectives can be accomplished in terms of pursuing an outpost. The next logical question, after you have made a determination about an outpost, is location, and what we are looking at is polar locations, both the North Pole and the South Pole. Definitely, we seem to have a focus on the South Pole, but determinations will be made after results from the Lunar reconnaissance orbiter, which will be making detailed maps of the Moon. From the point of discussion in terms of polar location, it is safer. It is thermally much more moderate. It allows for initial use of solar power, and we can definitely move later into nuclear power, but that will be much easier in terms of operations in the beginning. From a resources perspective, the potential for hydrogen and oxygen as well as other volatiles, flexibility, including the need for just one communication asset and a backup, as well as the fact that it is exciting, we don't know as much about the polar regions, and from a scientific perspective, many scientists within the Science Mission Directorate are excited about the idea, particularly, of exploring the South Pole. ……

If we go to the next chart, an example of a location, Shana was mentioning polar regions. An example that we have studied, it is not to say this is the final choice or anything, but it is one that we probably know most about at this point until we fly a lunar robotic orbiter. There is an area on the edge of Shackleton crater the South Pole that is almost permanently sunlit a very high percentage of the time, 75 to 80 percent of the time, and it is adjacent to a permanently dark region in which there are potentially volatiles that we can extract and use.

For complete briefing (49 pages), visit: www.jpl.nasa.gov

* NASA Office of Public Affairs – (Abbreviated) Press Briefing

Editor: "Will a permanent lunar observatory become a major resource in earth's defense against asteroid collisions? If it prevents only one major collision, it will be worth the money!"

Hot News from the Cold Depths

Steve Kramer

You may have noticed some minor buzz in the news recently such as the "An Ancient Computer Surprises Scientists", NY Times, Nov. 29. The ancient (astronomical) computer is the Antikythera Mechanism of Greek origin, made around 100 B.C. and salvaged from the Mediterranean in 1900. The surprised scientists refer to the first ever conference held for the artifact, in Athens, Nov. 30 and Dec. 1.

After the discovery of the ancient Roman freighter off the small island of Antikythera, most interest was focused on the art works and other artifacts. The encrusted, corroded piece of debris looking material dried out and broke apart while waiting to be noticed. When it was, little serious attention was given to it. In the 1950's Arthur Clarke encouraged Derek Price at Yale to pursue this object. The result was a 1959 article in Scientific American based on visual observation. Then around 1970 x-ray technology had developed such that the object, or rather the several parts, could be imaged for more detailed study. The result was the famous "Gears from the Greeks" in 1974, published by the American Philosophical Society (founded by Benjamin Franklin). This proposed a reconstruction, about 2/3 complete, of the mechanism and was the real seed, which slowly grew, spreading its tentacles through the years to ensnare the unwary.

At first, "GfG" made a small splash and the waters of academe flowed their usual way. Some publication activity started in the mid 1980's and picked up during the 1990's. These generally concentrated on the gearing and ignored the dial rings. Probably most famous were Alan Bromley of Australia (now deceased) and Michael Wright of England, whom you may have seen on a history of science hour program, which circulates on the Discovery and the History channels.

I had become involved in 1980, and older members will remember that Bob Mayer and I made the first complete model of the mechanism in 1982. Twelve dial rings remained to be designed to finish the work – no easy task to catch up with the Babylonians and Greeks. Fortunately computers became affordable and I could churn out one of many 500 line, multi-column spreadsheets of syzygy (new & full moons) variables in a few hours. I was seeking a unified set of dial rings and finished just in time for a 1994 eclipse over Buffalo.

Now if your interest is piqued, go to: http://www.antikythera-mechanism.gr/index.php?lang=en

Since the conference, the site is being actively updated. Explore the links in the site, especially the innocuous "Read more" on the home page. These lead to some visually stunning examples of this interactive, current imaging, and how it was done. Hewlett Packard of this country and X-Tek of England seemed to spare no expense or effort here.

And you can download and see the work that Bob Mayer and I did here and my subsequent design of the dial rings -- it turns out that the two sets of four were spirals instead. And thanks to Rowland Rupp for a couple critical questions along the way.
http://www.astrogears.org/Antikythera-M2b.zip

If that isn't enough, just Google "Antikythera", and you can get a sense of development leading up to the present.

So the mystery continues, branching into two quite different versions. If nothing else, the AM is a kernel or a pod of ancient technology, presenting a challenge from the ancients.

Spectrum Editor Resigns

Gus Cenkner

For the last three years, I have had the pleasure of serving as a writer for, and the editor of, the BAA Spectrum – in addition to serving on the Board of Directors. With so many advances being made in the astronomical area, and so many BAA activities, it proved to be a very exciting time. However, my fondest memories are of being able to mingle with so many people who are so enthused about astronomy and so willing to share their enthusiasm and experience with the rest of us.

Unfortunately, increased demands on my time, for personal reasons, make it impossible for me to continue in this role. Earlier, I submitted my resignation to the Board of Directors, so this newsletter will be my last.

I will continue to be a member of the BAA and I will contribute to the BAA in other ways, when time permits.

All future Spectrum communication should go to Rich Fusani: 685-9387 rfusani@upa.chob.edu

(Celestial Boulders --- continued from page 1)

When an asteroid is first discovered, it is given a temporary identification indicating the year found, a letter code for which half of the month it was spotted, and how many were sighted. If it does not become lost, it is given a permanent catalogue number and the discoverer can give it a name. On January 1, 1801, Giuseppe Piazzi discovered the first asteroid -- the largest and second brightest -- and it was named 1 Ceres. Today they are being found at the rate of 100 per year, and presently 2,400 have well known orbits , while an additional 5,000 have been lost. With so many, they have been named just about anything. Here are a few examples: 60 Echo, 216 Cleopatra, 747 Winchester, 1000 Piazzia, 1537 Transylvania, 1620 Geograohos, 1815 Beethoven, 2001 Einstein, and 2104 Toronto.

The asteroid belt is a region between the orbits of Mars and Jupiter and is where 95% of the asteroids are located, but since they are so numerous, that still leaves many outside of the region. Three are known to be as far out as beyond the orbit of Saturn; they are: 944 Hidalgo, 197JSC2, and 2060 Chiron. A group, that oscillates around the LaGrange points L-4 and L-5 of Jupiter, are called the Trojans; over 200 are currently known. Those located between Earth and Mars are of the Armor group and over one hundred are cataloged. Finally the Apollo group between the Earth and Sun, of which about 30 have been discovered so far.

The orbit of an asteroid can be more circular than Venus ' or more elliptical than some comets. Eccentricity is a numerical relation defining the shape of an ellipse. A circle is zero and the nearer it approaches 1.0000, the more elongated the ellipse is. The range is 0.0068 for 1177 Gonnessia to 1566 Icarus with 0.83. The average orbit is tilted by 15 degrees but the range goes from as little as 0.009 for 1383 Limburgia to as steep as 67 degrees for 1973NA. The closest approach to the Sun is 17 million miles by 1566 Icarus to the most distant 2060 Chiron at 1.8 billion miles out. The shortest orbital period is 277 days for 2100 Ra-Shalorn to 51 years for 2060 Chiron.

Large asteroids are fairly round in shape because they have enough gravity to slowly squeeze themselves into a sphere. If such an asteroid had its wide surface pointed face on toward Earth, it would look five times brighter than when its long end is pointed toward us as it spins around. The largest, 1 Ceres, is 635 miles in diameter and has a very small apparent disk of 1.3 seconds of arc; it can be resolved with a large amateur telescope when the Earth's atmosphere is steady. The smallest known asteroid is 1976uA and is 1000 feet across -- which is smaller than the Rock of Gibraltar. A day on the asteroid 128 Nemesis is 39 hours long do to its slow spin, while 1566 Icarus whirls around in just 2.3 hours.

Some asteroids reflect as much as 45% of the light that shines on its surface, as does 44 Nysa, which is more reflective than natural chalk. On the other extreme is 313 Chaldaea, with 1.4%; it is darker than a slate black-board. Only one asteroid is bright enough to be seen with the unaided eye and that is 4 Vesta at magnitude +5.6 and can be seen in dark country skies. It is the brightest because it is both large (300 miles) and highly reflective (23%); not being too faraway helps also.

The color of an asteroid is either reddish or gray; its soil is shallow because it is quite easy for lose material to escape due to its weak surface gravity. Most asteroids are carbonaceous, which is the oldest type of rock in the solar system; it didn't form on either the Earth or the Moon. Most asteroids, that are made of this type of rock, are nearly all located in the outer regions of the solar system. The main components of this rock is silicates, free metals, carbon, nitrogen, and, amazingly, as much as 21% water. Though common, this is only one type out of over 30 others. Asteroids consist of at least 50 minerals, 60 elements, and a few minerals that are found no where else but in asteroids. Some are even known to contain small diamonds; 2143 Jimarnold is high in platinum and gold.

The death of an asteroid can happen a number of ways. The small ones, within the orbit of Mercury, have a very short lifetime. It is because of the dragging affect that the solar wind, and light pressure,, has on any low mass object. This will eventually cause such objects to spiral towards the Sun until it vaporizes. Others are destroyed when they collide with some other object such as a planet, moon, comet or by another asteroid and are smashed to smithereens. Approximately 10% of these events will result in the formation of an asteroid moon, orbiting a now very jagged capture asteroid, while the smaller fragments become meteoroids. 65 million years ago a three mile asteroid collided with the Earth which resulted in the extinction of 75% of the species of life, including dinosaurs. The most recent close call came in 1917 when Hermes missed our planet by less than half a million miles. In 19721 a huge meteoroid, some 20 feet in diameter, passed as close as 34 miles fronm the Rocky Mountains before skipping back into space .

(Future Catastrophic Asteroid Collisions with Earth – continued from page 1)

The Planetary Society – a private organization – has taken the initiative to determine if a potentially hazardous asteroid has a trajectory that will eventually bring it close enough to earth to actually threaten it. They have selected Apophis, a 400 meter object, that will come closer to earth, in 2029, than some of the current earth satellites; it could impact earth in the year 2036.

The Planetary Society is currently offering $50,000 in prize money to the winners of an asteroid tagging design competition – first prize will be at least $25,000. The design must provide some method of tagging the selected asteroid, so that its trajectory can be accurately determined and the actual threat to earth can be accurately assessed.

Anyone who is interested in submitting a proposal has to submit a Notice to Propose by March 1, 2007; the proposal deadline is August 31, 2007.

The results of the competition will be given to all the major space agencies and it will be presented in various scientific publications.

More detailed information can be obtained from: The Planetary Society

65 N. Catalina Avenue
Pasadena, CA 91106-2301 USA
Web: www.planetary.org
Voice: (626) 793-5100
Fax: (626) 793-5528
Email: tps@planetary.org

Buffalo Astronomical Association Members Astronomy Websites

Tom Bakowski

Tom Bakowski -- www.tomseyeonthesky.com
-- Wide Angle images of the sky thru the seasons, from dark skies of PA, using a dslr camera and lens.

Thom Bemus -- www.upstateastro.org/stars/index.html
-- Astronomy resource site.

Anthony Davoli -- www.astro.premcom.com/ADM/index.htm -- www.admaccessories.com
-- Images of deep sky objects using a Takahashi FSQ-106 and a dslr camera.

Tristan Dilapo and Mike O'Connor -- www.orbitjetobservatory.com
-- Images of deep sky objects and transient events.
-- Tristan uses a fully robotic Meade 12" LX200 and CCD.
-- Mike uses a fully robotic Celestron 9.25", Takahashi TOA-130 and CCD.

Alan Friedman -- www.avertedimagination.com
-- Highest resolution images of the solar system using a Astro-Physics10"- 6,5,4" refractors.

Mike Israel -- http://users.adelphia.net/-armis/
-- Images of deep sky objects using a TeleVue101 and dslr camera.

Dr. Jack Mack -- http://facstaff.buffalostate.edu/mackje/
-- Astronomy resource page.

Mark Percy -- www.williamsvillek12.org/planetarium
-- Williamsville Planetarium schedule.

Peter Proulx -- www.gotastronomy.com -- www.ip4ap.com
-- Images of deep sky objects using a Meade 10" RCX and CCD camera.

If you're a BAA member, and not on the club's message board, then you're missing out on communication and current events. This message archive, started in 1999, has 134 members and had over 12,130 messages!
-- http://*groups*.yahoo.com/group/buffalo_astro_assoc/
-- buffalo_astro_assoc-subscribe@yahoogroups.com

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