june 2008

canopus

monthly newsletter of the johannesburg centre of assa

Old Republic Observatory, 18a Gill Street, Observatory, Johannesburg
PO Box 412 323, Craighall, 2024

Sharon Tait on the shiny new ladder that she suggested to help observers get on & off the platform. The ladder was acquired by SAASTA and modified by Rodney Hyman (left). Photo by Lerika Cross.

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notice of next meeting – assa johannesburg

The next monthly meeting of the Johannesburg Centre of the Astronomical Society of Southern Africa will be held at the Old Republic Observatory, 18a Gill Street, Observatory, Johannesburg on Wednesday, 14 May 2008 at 20h00. . Guest Speaker:

Michael Poll of ASSA Pretoria

"The Origin of the Zodiac"

assa johannesburg calendar

Date	Event	Details
11 June	Monthly Meeting	Observatory @ 20:00 - Michael Poll
26 June	"Essential Astronomy" Outreach Workshop – day 1	Observatory @ 08:30
27 June	"Essential Astronomy" Outreach Workshop – day 2	Observatory @ 09:30
05 July	Committee Meeting	War museum @ 14:00
09 July	ASSA Jhb AGM	Observatory @ 20:00 - AGM
26 July	ASSA National AGM	Observatory @ 16:00 - AGM

assa johannesburg committee members 2007/2008

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The ASSA Johannesburg Centre is delighted to host the ASSA (National) AGM on Saturday 26 July at 4pm at the Johannesburg Observatory.

After the AGM formal proceedings there will be refreshments and viewing through the Innes Telescope.

editorial

by Claire A. Lee

Even though winter seems well and truly on our doorsteps, we've been pretty lucky the past month or so with regards to load shedding. It appears that, against conventional wisdom, the probability of our being load shed bears no relation to the amount of power we are currently using for heaters, electric blankets and the like. While it seems that Eskom's 10% savings target is being met, it occurs to me to wonder where on earth from? I can say without doubt that our household's electricity consumption has increased in the past month as the colder months set in and daylight hours are fewer, and I have yet to see any change in the lights of office buildings and billboards in and around the city. But if whatever is happening is working to keep our electricity running, well, I'm certainly not going to be the one to complain.

Which brings me to my next point: that even though we're currently not being load shed, we still need to be aware of our electricity consumption. Being busy people, it's very easy to just push something to the back of our minds when it's not directly affecting us at the moment. Chris Stewart has proposed a new monthly section for Canopus called "Photon Wastrel of the Month", in which he encourages all you readers to nominate your favourite candidates of energy wastage, to "highlight inefficient energy usage that is damaging our environment, let alone denying us our dark sky heritage." We kick off this month with Chris's submission on page 14, which gets an 8/10 rating for blazing away uninhibited and uninhabited. So send in your submissions and see if you can do better – photos always help, and you'll get extra points for government buildings. (Email clairebear@wakesa.com)

While we're on the topic of environmental hazards - and you can decide for yourself which end of the scale this fits in - it turns out that, thanks to Toshiba, there may just be a way for you to become totally Eskom- and diesel-independent. Toshiba has developed a new class of Nuclear Reactors that are extremely small in size. They are designed to power individual apartment buildings and city blocks, and measure only about 6 by 2 meters.

The 200 kilowatt reactor that Toshiba designed is made to be completely fail-safe, automatic, and will never over-heat. The new micro reactors don't use control rods like normal nuclear reactors, but rather reservoirs of liquid lithium-6 (an isotope that is effective at absorbing neutrons) connected to a vertical tube that fits into the reactor core. The whole process electricity is self-sustaining and can last up to 40 years. Toshiba expects to install the first reactor in Japan this year, and to begin marketing the new system in Europe and America in 2009. It's unsure whether Toshiba has plans to sell these babies to the public, but if they do, imagine being the first on your block to have a micro nuclear reactor in your garage! ■

chairman's chat

by Robert Groess

Are scientific ideas the sole reserve of those who had conjured them up? Do they only really live in the minds of their "maker"? Or can they be passed on to others who will in turn make more of them than their founder ever could? Discovery of the secrets of the Universe requires a character not all that dissimilar to Sherlock Holmes. In fact, that may well be true more than ever. In an atmosphere where publish or perish is the name of the game, how would an Einstein or a Newton fare today? It has been my first hand experience that there are treasures in this universe which are there for the taking for those with patience and resolve. While the frenetic pace of discoveries and inventions does pose some merit – it is not these to which we look for the next Quantum-class paradigm shift. Some even think that physics and mathematics may not even be the substrate for this anticipated change in our view of the world.

So what are the commonalities of people who have taught us much about the universe? Well the answer is that they are as distinctly human as we all are. And the only difference of importance is their penchant for questioning the "obvious" and honing in on areas where they feel a niche exists which has not been properly explained. So what are these qualities of "genius" and "brilliance"? Well, they lie more in an ability to view the world than any prowess used to explain or model it. And in that sense, it is this quality which does not feature in the least when it comes to incentives posed and/or credit received in the form of money and grants to continue with paradigm-shifting research.

In an initiative to provide conditions for the next "Einstein" to be cultivated and flourish, the African Institute of Mathematical Science (AIMS for short) has been conjured into existence by a team of very dedicated individuals, led by Professor Neil Turok. In the quiet surfing village of Muizenberg, lapped by the choppy waters of False Bay, Africa's candle has been given a chance to burn brightly, with the hope of cultivating the next Einstein. Whether this will be an individual or come in the form of a team, we cannot tell, but much enthusiasm the world over has been poured into this initiative, even from people known for their staunch opposition to such new ideas. Have a look at the dynamic new "Next Einstein" website and feel the sense of commitment for yourself: www.nexteinstein.org

And on that inspirational note, I wish you another fruitful and exciting month...

Robert ■

Astronomical Society of Southern Africa
ASSA

BIENNIAL SYMPOSIUM

7^{TH} to 9^{TH} AUGUST, 2008
DURBAN COUNTRY CLUB

THEME:
"Interaction between Astronomy and Cosmology"

WHERE?
Durban Country Club

WHEN?
Thursday 7^{th} and Friday 8^{th} August
Excursion on Saturday morning 9^{th} August.

WHO?
Jointly hosted by the Durban and Midlands ASSA Centres.

HOW?
The registration form may be downloaded from the Durban Website:
www.astronomydurban.co.za

COST?
Symposium fee R525 which covers lunches, dinners and teas on both days

ATTRACTIONS:
Over twenty astronomy and cosmology related scientific papers will be presented to a wide ranging audience drawn from both amateur and professional astronomers, cosmologists, astrophysicists, geologists and mathematicians.

The annual "Star Party" hosted as usual by Durban Botanical Gardens has been moved to Friday 8^{th} August from 19h00, to fit in with the Symposium Programme. this event is open to the public, and In addition to two or three well-illustrated presentations of Astronomical and Cosmological interest, several of the latest amateur telescopes will be set up to give everyone a peep into the wonders of the sky at night.

Who can resist visiting Durban in august?
All Professional and Amateur Astronomers are warmly invited to attend the symposium.

ScopeX auditorium report

by Robert Groess

The calibre of this year's speakers at ScopeX was nothing short of phenomenal. All sessions were very well attended and thanks to a generous time schedule, kept people attracted longer than the allotted time. If you were lucky enough to attend, you'll know what I mean. If you missed out, here's a little teaser on what you missed out on:

Case Rijsdijk – Fingerprinting the Universe

One of the key messengers that we have relied upon to tell us much of what we know about our universe, have been the faithful photons bridging the gap between the light-years from distant objects. Understanding the electromagnetic spectrum leads to a powerful way of fingerprinting the universe. Everything gives off some form of electromagnetic (EM) radiation of some kind. Even we give off radiation – mainly in the form of heat in the infrared part of the spectrum. Light is just another form of EM radiation. If you ever wanted to know how light is generated inside atoms, Case told us about it. And then the ever famous Bohr Model of the atom. We know it to be not entirely accurate – but it still provides a very useful representation of how atoms function. Case used some very illuminating interactive animations to illustrate many of these concepts. Absorption and emission spectra made for a fascinating discussion about how the rainbow is used to tell what stars and other objects in the universe are made of, without us actually having to go there. And not only what they are made of but what they are doing. Spectroscopic binaries are just one such example. By using Doppler techniques, these objects can be understood and it is this same principal which is used by traffic officials with laser speed trapping devices. Case wrapped up his presentation by bringing us up-to-date with recent headline research at SAAO about eclipsing binary stars and even a supernova (SN2008D) in the galaxy NGC2770, some 90 million light-years away. Case showed us a computer simulation on what is thought to go on inside a supernova which took a supercomputer 3 days to complete, and would take approximately 1000 years on your current PC to do the same. Case warned not to try this at home. The EM window has taught us much about what we know about astronomical objects, but there are detectors being built which are on the hunt for elusive gravitational waves. These waves are predicted to exist from Einstein's theory of relativity, but so elusive are they, that they have yet to be experimentally detected.

Mark Comninos – The CHEETAH-1 Commercial Satellite Launch Vehicle

How can a third-world country like South Africa ever enter the space race? What good could ever possibly come from it? Well, Mark Comninos, MD of MARCOM Aeronautics & Space (Pty) Ltd., inspired by Space Shuttle Columbia's maiden voyage, showed us how easily this can be done. And also the lucrative US$ 2 billion per annum market which South Africa is well suited to tapping into. The science behind rocket science is not all that complicated. In fact, from what I gathered from Mark's presentation, I would argue that it is more challenging to produce an excellent South African wine than to launch a small commercial payload into low Earth orbit. 95% of the materials and technology required to launch a two stage-to-orbit vehicle can be sourced directly from South Africa. The vision which MARCOM is pushing forward is to have a two-stage liquid fuel rocket to be flight ready within 3 years. The launch site will be Denel's Overberg Test Range Facility in the Western Cape which, in the world of spaceflight, is a geographic gem. Orbital inclinations from 34 to 117 degrees can be directly serviced from this site! Of the three classes of launch vehicle, the light payload (~1,000kg), medium payload (~5,000kg) and heavy payload (~20,000kg), MARCOM is set to carve out a niche in the light payload category with an estimated 1 – 4 launches planned per year. In terms of the flight dynamics of such a launch vehicle, Mark has written a very comprehensive and realistic flight control simulator, which demonstrates the capability South Africa has to be fully competent in spaceflight. Mark ended off by saying each of the 5 onboard computers on Columbia's maiden flight was nothing more than a Commodore 64. Your cell phone today has more computing power than these pioneering spaceflights ever had.

Dr. Pierre Cilliers – Polar Space Weather and International Polar Year

Why would anyone go to Antarctica to study space weather and the Sun? Wouldn't the tropics be much better suited to something like that? Well the Earth's magnetic field lines are perpendicular to the Earth's surface at the poles. And what that means is the electrically charged particles which are channelled along the Earth's magnetic field lines are directed towards the ground in the Arctic and Antarctic regions. In effect, it allows us to study some aspects of the space environment without actually going into space. All of this and much more is studied from the South African base, SANAE-IV.

Space weather research has become an increasingly important activity, since, as Dr. Cilliers puts it, when the Sun sneezes the Earth catches a cold. The solar wind comprises electrically charged particles which travel at speeds of between 600 – 1000 km/s. When a solar flare is ejected in our direction, we have anything from 1 to 3 days' warning before the flux of particles interacts with our Earth's magnetic field. The effects can be quite expensive to electrical power lines and switchgear which act as conduits of currents set up by this solar weather and leads to transformer burnouts and general power disruptions. While ESKOM cannot blame space weather for the recent load shedding campaign, there are documented cases of transformers overheating and the most likely cause was induced low frequency currents from solar particles.

Dr. Cilliers also discussed the extremely rapid decline of the Earth's magnetic field strength as measured from the Hermanus Magnetic Observatory. Here the magnetic field has decreased by an astonishing 20% in the last 60 years. The South Atlantic Anomaly, a region east of Brazil in South America, boasts the weakest magnetic field strength of any place on Earth. Here the field has been in decline by an incredible 10% in the last 20 years. There is evidence which leads to the suggestion that the Earth may be in the process of a Magnetic Field reversal. Geological records show that such field reversals happen of periods of time which are miniscule in geological time frames – of the order of 1000 years or so. Dr. Cilliers ended off by telling us what life is like at SANAE-IV and also showed a positively gripping DVD about Antarctica and South Africa's presence there.

Keynote Speaker: Professor David L. Block – Shrouds of the Night

The Universe is replete with masks. Masks of galaxies. Masks of space. Masks of time. The enigma of time continues to defy simple definition. All attempts at grabbing a handle on time have so far either resorted to mathematical manipulations or have met with an undeniable sense of je-ne-sais-quoi. Professor Block looks to the Garoka Mudmen of the Papua New Guinean highlands to understand their concept of space and time and how differences in their thinking with that of western culture, could lead to nuggets of insight which may be seminal in tackling this riddle. The Papuan's base their priorities more in spatial terms than temporal ones. When we make an appointment with someone, it is the time and date which is of greater importance to us than where we meet. However, for the Papuans, they choose where to meet and time flows by until all parties have arrived. Another interesting analogy would be by looking at images of erupting volcanoes, such as Popocatepetl in Mexico. Snapshots of the eruption lead to a very definitive sense of causality. First the volcano reveals but a puff of smoke. Next a stronger plume is evident. Then a bellowing cloud of ash. And so on until the full extent of the eruption is visible. It is blatantly clear to anyone with causal intuition in which order the snapshots should be placed. Even pre-school children are up to the task. And so the mask of time requires further interrogation in order to reveal the subtle nature of that dimension we know so little about.

Professor Block’s book, *Shrouds of the Night*, co-authored by Professor Ken Freeman of Mount Stromlo Observatories, will be on sale from around September 2008. Written with the lay-person in mind, *Shrouds of the Night* promises to be the much awaited sequel to Professor Block’s book, *Starwatch*, which is now out of print.

The final auditorium event of ScopeX 2008 was the screening of the DVD about Antarctica and South Africa’s involvement there – which retained a capacity crowd until the end, after a really delightful interaction with Dr. Cilliers about life in Antarctica. A very special word of thanks to all our guest speakers and to you, the ScopeX supports, for making the day what it was! ■

antarctic dreams – part 2

by Prof. Francis Halzen (http://icecube.wisc.edu/~halzen/)

Part 2 of the article on the AMANDA neutrino telescope situated at the South Pole, built to detect neutrinos from far-off cosmic events such as gamma ray bursts and black holes. Francis Halzen's team is currently working on a project called IceCube, a kilometre-scale successor to AMANDA.

As I write, it is ten degrees below zero Fahrenheit outside my office in Madison, and I am dressed just warmly enough to be slightly cold. In most places, I think, people have made an art of underdressing in winter. But not in Antarctica. Faced with temperatures that regularly dip to negative fifty degrees Fahrenheit, even on a summer's day, our drillers and engineers wear outfits akin to the space suits worn by astronauts on the moon. They live in a comfortable base camp with a wonderful professional chef, and the few times they expose themselves to the elements are when they relax themselves in the pools of hot water created by the AMANDA drills.

In the heroic early days of AMANDA, before a heated, portable hut was built for each drilling site, there were some tough stretches. Teams of ten people sometimes worked up to twenty-four hours without a break—often without gloves when assembling delicate components. But on the whole, the work has been astonishingly unadventurous.

The true challenges have been technical and logistical. Typically we fly 100,000 pounds of cargo and forty people from Christchurch, New Zealand, to the South Pole each summer—enough to fill twenty Hercules C-130 transport planes. It is a massive undertaking, but one accomplished with the utmost efficiency: where Antarctic research is concerned, there is no margin for excess baggage of any kind—be it fibre-optic cable, canisters of fuel or theorists with no real business on the ice.

Once in Antarctica, the operation is orchestrated by Bruce R. Koci, our mechanical engineer and drillmeister. Much of the project is entirely novel, making improvisation the rule, and Koci is a genius at it. Early on, for instance, we found that our hot-water drill was inadequate: it needed eleven days to drill to a depth of 800 meters. So Koci and his colleagues designed a new one. As sleek as a rocket, it dives into the ice gushing 190-degree water from its nose. In its first incarnation, it traveled a thousand meters in four days. These days it goes twice that fast. Mapping AMANDA's geometry is like manufacturing an optical telescope in a dark room. Yet Koci's drill, guided by gravity alone, deviates from the vertical by less than a meter over a depth of two kilometers.

© Per Olof Hulth

At a depth of about 160 m, the walls become glossy and the water is clearer.

© Per Olof Hulth
At 240 meters, a single lamp from the module illuminates the hole.

As the drill descends, it leaves a hole about fifty centimeters in diameter, filled with hot water. (Because the hot water is continuously circulated in the hole, and because the ice around it acts like a giant thermos bottle, the water remains liquid for a few days.) Once the drill is removed, the AMANDA crew, often assisted by drillers and volunteers from other scientific missions, attaches a 600-pound weight to a fiber-optic master cable and then drops it into the hole. For the next ten to twenty hours, photomultipliers are attached to the sinking cable with carabiners of the kind used by rock climbers and plugged in at predetermined positions like beads on a rosary. Pressure and temperature meters, lasers, radio receivers, pulsing or steady light-emitting devices and other devices are also attached. (On one occasion a pair of television cameras was sent into the hole; their images can be viewed on our home page at amanda.berkeley.edu)

Then the waiting begins. It takes three to four days for the hole to refreeze completely. Just before the ice turns solid, the pressure spikes dramatically - at a depth of a kilometer, for instance, it rises suddenly from 100 to more than 500 atmospheres. So far, the crib death rate, when the holes refreeze, has hovered around 2 percent. The survivors, encased within their half-inch-thick glass spheres, should live forever - or at least until I die.

As one of the superfluous theorists mentioned above, I have never been invited to Antarctica. But even now, on the nights when drilling goes on there, I can never sleep. To have your career on the line half a world away is hard enough. But to know that you have embroiled so many others in the same improbable adventure, that your funders and colleagues expect results, and that you are totally powerless to affect the outcome, is a form of exquisite torture. And so I keep a laptop at my bedside and check it all through the night for E-mail dispatches.

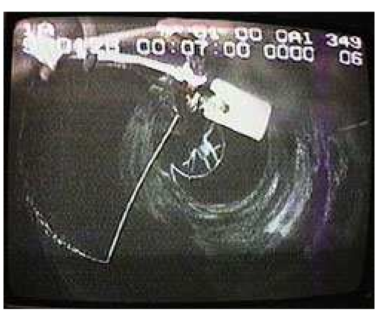
At 10:30 P.M. on December 24, 1993, when the first of four strings of photomultipliers was deployed and ready for testing, I was at my family’s house in Tienen, Belgium, sitting down to a late Christmas Eve dinner. As usual in a Belgian home, the spread was magnificent, but I hardly paid attention. When the news finally arrived, dessert was being served and my laptop was propped on my knees. "First string deployed," the E-mail message read. The sender was too tired to write anything more.

It would have been easy to build a more conventional neutrino telescope than AMANDA. We would have covered a square kilometer with spark chambers, shielding them from cosmic radiation with lead plates a few inches thick. The end result would have detected neutrinos beautifully and cost about $10 billion - a thousand times as much as we could afford. Instead, we resigned ourselves to using the simplest instruments possible to detect neutrinos across the greatest possible volume of water at the least possible cost. We would build a telescope that barely works.

Unfortunately, such a design depends, to some extent, on nature's cooperation. So it was that our initial euphoria, on Christmas Eve, turned quickly to perplexity. We knew that some downward-traveling muons, created by cosmic-ray events at the surface, would reach our photomultipliers - even 800 to 1,000 meters beneath the surface. But we detected a hundred times as many as we expected. And though we had expected that bubbles, at that depth, would scatter the Cherenkov light to some degree, what we saw instead was a nearly meaningless blur.

Everything glaciologists had told us about Antarctic ice, it seemed, was wrong. To begin with, the ice down there was far more transparent than anyone had expected. Condensed from snow that fell 10,000 years ago, at the end of the last ice age, it could transmit a streak of blue light as far as one hundred meters, not just the eight meters that had been predicted. (The discrepancy seemed to arise from the fact that glaciologists carried out their tests with distilled water, which was much less pure than Antarctic ice.) In fact, because our photomultipliers operate at wavelengths where neither atomic nor molecular excitations absorb photons, the ice was almost infinitely transparent. That implied we could detect a few more upward-traveling muons than we had hoped, but it also explained the excess downward-traveling muons.

The bubbles were the real problem, however. A kilometer beneath the surface, we had been told, there would be just a few bubbles, and those would be no more than a micron in diameter. Instead, bubbles were everywhere, and they were fifty times larger than predicted. (We later found a paper on bubbles in ice cores that corroborated our results. But I suspect that some glaciologists still do not believe us.) After a good deal of data analysis and modelling, we predicted that the bubbles would disappear below 1,400 meters. But though we were eventually proved right, we had lost a year by then and still had to go back to drill some new holes.



© Per Olof Hulth
Eighteen hours after the deployment began, the camera is at 2360 meters. The walls begin to close in on the module as the water in the column refreezes.

This past summer, the second phase of AMANDA was finally calibrated and the third phase was begun. Our telescope is now made up of 420 photomultipliers on thirteen separate strands, sunk between 1,500 and 2,000 meters beneath the Antarctic ice. The photomultipliers are working without a hitch, the telemetry data from the drill and in situ laser measurements agree on their architecture, and the telescope is detecting neutrinos. If the project as a whole has been a roller-coaster ride - one so exciting that we often failed to notice when we were hitting bottom - we are now, undeniably, at a peak. After years of being consumed by engineering problems, we can now at least concentrate on physics. Within days of calibrating the telescope, the intercontinental E-mails that buzz between us changed topics from scattering angle and photomultiplier noise to dark matter, gamma-ray bursts and neutrino oscillations.

Four days after deployment, ice has formed around the module, and a crack appears in the wall.

Although we have yet to mine three-quarters of our data, we have already begun to follow some veins of interesting science. Theorists have speculated for a decade or so, for instance, that the dark matter in the universe is made up of supersymmetric particles known as neutralinos. According to that theory, most neutralinos are trapped at the centres of stars and planets, where standard instruments cannot detect them. When neutralinos collide at the centre of the earth, however, they ought to generate high-energy neutrinos, which AMANDA can detect.

Early on, an investigator in our Stockholm group noted that a muon had skittered up one of AMANDA's strings, illuminating the photomultipliers in sequence like a string of Christmas lights. Of all the neutrinos that had streamed through AMANDA from known cosmic sources, we calculated that only three neutrinos should have aligned randomly with the centre of the earth. Yet when we looked at our data, we tentatively identified nine such events. Unfortunately, when we went back over the numbers, the discrepancy between the number of predicted and observed events largely evaporated.

Neutrino oscillation should prove an equally intriguing and elusive quarry. If neutrinos, contrary to current assumptions, are relatively massive - say, between ten and fourteen electron volts - they should oscillate fairly quickly. In that case, even short-range tests, such as the 450-mile neutrino beam that investigators at Fermi National Accelerator Laboratory in Batavia, Illinois, are planning to aim at a neutrino detector in Minnesota, should confirm oscillations. (As it happens, the Fermilab beam passes right under my office in Madison.) If neutrinos have almost no mass, it may take a detector as large as ours, observing neutrinos that come from as far as 10 billion light-years away, to see oscillations. Some of us have even been dreaming about sending a beam from Fermilab to the South Pole: a 6,000-mile trip that may be just long enough to reveal oscillations, if neutrinos have the mass that the Super-K data suggest.

In the next five years we plan to sink seventy more strings of photomultipliers, enabling the telescope to keep watch over a full cubic kilometer of ice. Even then, in some ways, our telescope will be a pretty crude instrument. Compared to a standard optical telescope, its resolution is a joke: as of this writing, it is accurate only to within two degrees of arc—

roughly four times the diameter of the full moon - though we hope to cut that margin in half. AMANDA'S size alone will give it tremendous power, of course, enabling it to detect gamma-ray bursts and super-massive black holes several times a year. And yet, spectacular though they are, such cosmic light shows should prove no more than opening acts for the main event - whatever that may be.

In the past, every time astronomers have set their sights on a new wavelength, they have discovered more than they expected. Ricardo Giacconi built an X-ray detector to study solar X-rays reflected by the moon, and found neutron and binary stars instead. Karl G. Jansky built an antenna to study short-wave radio interference and discovered radio galaxies. Arno A. Penzias and Robert W. Wilson focused on microwaves and stumbled on the cosmic background radiation, confirming the existence of the big bang. In each case, nature was more imaginative than the people who probed it. If, after nearly twenty years of working on AMANDA, we only discover what we have set out to discover, it will be, in many ways, the most disappointing result imaginable. As Edward W. "Rocky" Kolb, an astrophysicist at Fermilab put it: "With neutrino astronomy, the real surprise would be that there were no surprises." ■

photon wastrel of the month

by Chris Stewart

Wesbank/FNB who has erected an architectural monstrosity just off Beyers Naude by the N1 freeway: it is boasted as being an energy efficient environmentally friendly building, but is blazing away every night despite being as yet uninhabited. Including a field of parking bays with individual lights.

My pet hate: driving home on the freeway after a grueling day at work, with IN-security lights dazzling me, passing billboards lit up with just the edges of multi-kilowatt lamp arrays (the bulk of the light beams going straight into space) and seeing multi-searchlight beacons sweeping the sky to advertise some inane rave party, only to get home and be denied supper and a shower because of load shedding.

Photon Wastrel Rating: 8/10 ■

local news: Stephen Hawking meets Nelson Mandela

press release, 15 May 2008. Photo by Dr Robert Groess

The world's most famous scientist, Professor Stephen Hawking, today met with former President Nelson Mandela for the first time.

Professor Hawking is in South Africa to launch the Next Einstein initiative, to discover and nurture maths and science talent all over Africa. The initiative builds on the success of the African Institute for Mathematical Sciences, AIMS, a pan-African centre for postgraduate training and research, based in Muizenberg, Cape Town. AIMS has so far graduated 160 young scientists from 30 African countries and an additional 53 students, including 20 women, are currently completing the programme.

The Next Einstein plan is to create many AIMS centres, all over Africa. The second AIMS centre opens in Abuja, Nigeria, in July and additional centres are planned in Ghana, Uganda, Madagascar, Ethiopia, Botswana, Rwanda and Sudan.

Accompanying Professor Hawking were David Block, Professor of Applied Mathematics at the Witwatersrand University, Pik Botha, former cabinet Minister in the government led by President Mandela, and Neil Turok, founder of the AIMS institute and Professor of Mathematical Physics at the University of Cambridge.

Upon meeting Mr Mandela, Professor Hawking said, "I am very pleased to meet you. I admire how you managed to find a peaceful solution to a situation that seemed doomed to disaster. It was one of the great achievements of the twentieth century. If only the Israelis and the Palestinians could do the same."

Mr Mandela responded by welcoming Professor Hawking and the other visitors, expressing a great interest in AIMS and a desire to visit the centre. The meeting was hosted by the Nelson Mandela Foundation, in Houghton, Johannesburg. At the end of the meeting, Professor Hawking said "It was wonderful to meet you." ■

focus on: NGC 1931 – a confusing nebula

by Magda Streicher, photo © Ewell Observatory

Telescope observation can sometimes produce unprecedented surprises. It may sometimes happen that an object in the eyepiece looks like a new discovery and then we all but suffer cardiac arrest! I wonder how many comet hunters have come across a deep sky object and then firmly believed they've discovered a new comet.

NGC 1931, which is situated in the Auriga constellation, is a nebula that truly imitates a comet in all its glory. This nebula was discovered in 1793 by William Herschel with an 18.7-inch f/13 speculum telescope. He called it "vB, iR, vgbM, 5' diameter. Seems to have 1 or 2 stars in the middle, or an irregular nucleus; the chevelure diminishes very gradually."

Hartung notes in his own words; that "this curious object, appears as a bright round nebulous haze about 1' across with indefinite edges; near the centre is a close triplet, the northwest star much the faintest, which 15cm will show."

In 1876 Burnham looked at this with the 6-inch and found the nebula faint with that aperture but the three stars were easily seen. With the 18.5-inch in 1878 he noted several other stars in the group, just outside of the nebula. The 36-inch telescope now shows that one of the stars of the triangle is double, having an exceedingly faint attendant at a distance of a little more than 2". This is a difficult pair under ordinary conditions with this telescope, and probably could not be seen at all in any other telescope with which this object has been observed."

This is what the amateur Robert Kepple had to say: "This is a small, fairly conspicuous nebula elongated 1.5'x1' NE-SW with an 11th magnitude central star having four companions."

My notes reveal the following: The nucleus of the nebula is outstandingly bright and can be observed with even a smaller telescope. Soft wimps of nebulosity on the SW bank, suspended from the bright nucleus, truly give the nebula the appearance of a comet. The four warm young stars within this nebula let it shine with ultraviolet light that causes the nearby gas to glow. Fainter stars accompanying these four warm stars extend somewhat further SW into the nebulosity. I have found that a 0111 nebula filter does not significantly highlight the object against the star field. The answer is a dark night sky and the use of a deep sky filter that improves the appearance of the nebula. NGC 1931 can be seen less than 1 degree east of Phi Aurigae and around 1 degree west of the open cluster Messier 36.

Why not create a list of objects which really have the character and appearance of a comet. But not just any objects - these must be objects that really can be confused with comets. And not just any deep sky objects - ones that really give the impression of being a comet, just like this impression of the object NGC 1931.■

Object	Name	Object	RA	DEC	MAG	SIZE
NGC 1931	Comet Nebula	Reflection and Emission	05.31.4	+34° 15	3.8	4'

canopus classifieds

Home built 6" reflector scope with 2 Plossl eyepieces for sale. The scope is in a hardened cardboard tube, the optics, mirrors etc are in excellent condition and I mounted the telescope on a tripod with an equatorial mount.

Contact: Vincent Le Roux
(011) 575 3853
Vincent.LeRoux@is.co.za

the sky this month

site location: lat. **26.0 deg S** long. **28.0 deg E** local time = UT **+2.0 hrs**.

june 2008

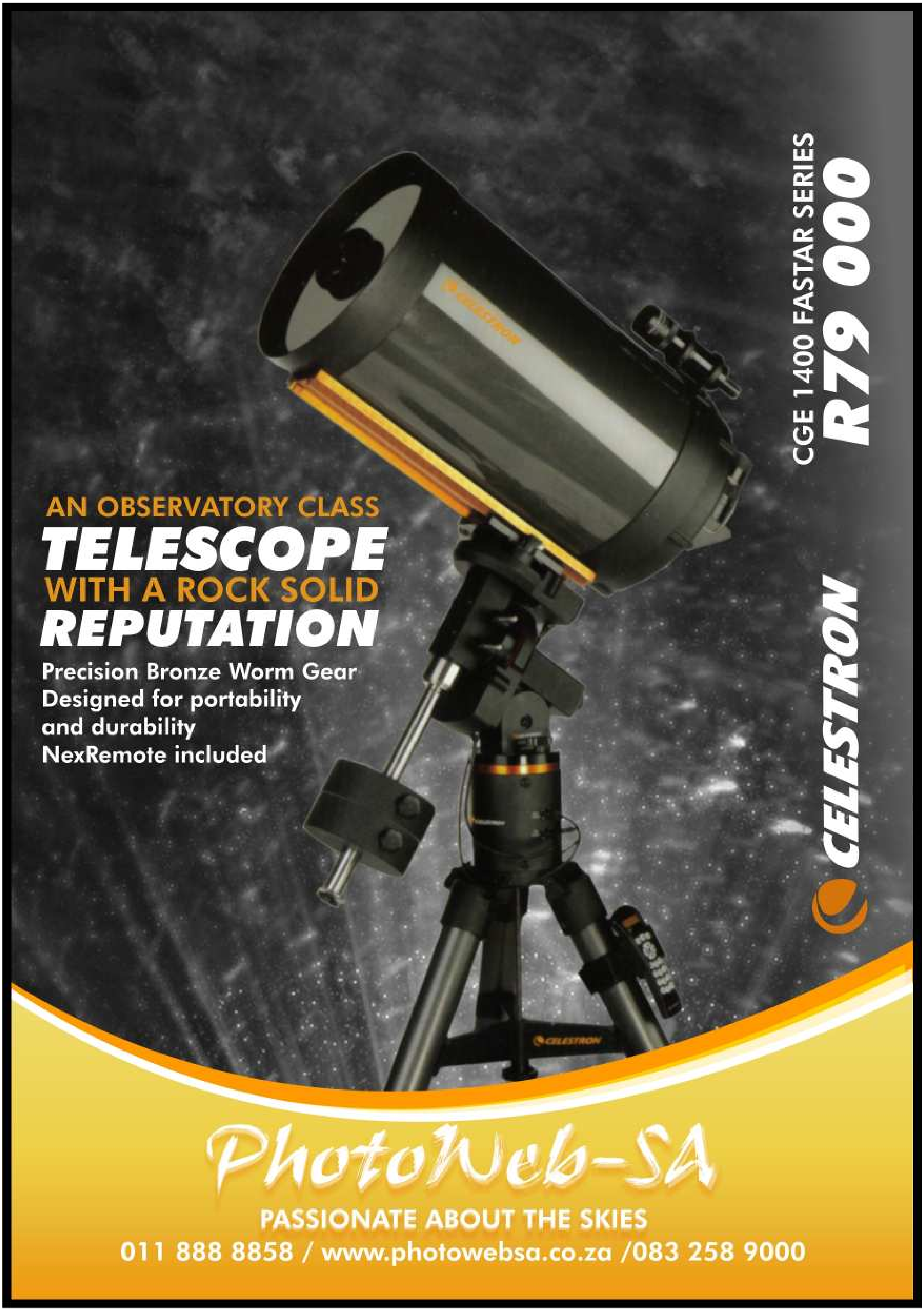
dd hh		dd hh	
2 01 Venus 5.2N of Aldebaran		13 09 Spica 2.5N of Moon	
3 13 Moon at perigee		16 20 Moon at apogee	
3 17 Venus 4.8S of Moon		17 06 Antares 0.2N of Moon	Occn
3 20 NEW MOON		18 18 FULL MOON	
6 11 Pollux 4.3N of Moon		19 14 Mercury stationary	
7 16 Mercury inferior conjunction		20 14 Jupiter 2.4N of Moon	
7 21 Mercury 2.9S of Venus		20 20 Pluto at opposition	
8 02 Mars 0.9N of Moon	Occn	21 00 Solstice	
9 02 Regulus 1.2N of Moon		23 09 Neptune 0.7S of Moon	Occn
9 05 Venus superior conjunction		25 14 Uranus 3.6S of Moon	
9 08 Saturn 2.8N of Moon		26 13 LAST QUARTER	
10 15 FIRST QUARTER		27 08 Uranus stationary	

july 2008

dd hh		dd hh	
1 15 Mars 0.7N of Regulus		10 16 Spica 2.7N of Moon	
1 19 Mercury greatest elong W(22)		10 19 Mars 0.6S of Saturn	
1 21 Moon at perigee		14 08 Moon at apogee	
3 03 NEW MOON		14 12 Antares 0.3N of Moon	Occn
3 15 Venus 1.7S of Moon		17 13 Jupiter 2.6N of Moon	
3 22 Pollux 4.4N of Moon		18 08 FULL MOON	
4 18 Earth at aphelion		20 13 Neptune 0.7S of Moon	Occn
6 12 Regulus 1.4N of Moon		22 19 Uranus 3.7S of Moon	
6 17 Mars 2.3N of Moon		23 08 Mercury 5.6S of Pollux	
6 21 Saturn 3.1N of Moon		25 19 LAST QUARTER	
7 09 Venus 5.6S of Pollux		29 21 Mercury superior conjunction	
9 08 Jupiter at opposition		30 00 Moon at perigee	
10 05 FIRST QUARTER		31 08 Pollux 4.5N of Moon	

local times of rise and set for the sun & major planets

Date	Sun		Mercury		Venus		Mars		Jupiter		Saturn	
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
Jun 09	07.08	16.58	06.50	17.01	07.09	16.57	10.59	21.25	19.15	9.37	11.47	22.44
Jun 19	07.11	16.59	05.51	16.12	07.26	17.08	10.36	21.15	18.31	8.54	11.09	22.08
Jun 29	07.13	17.02	05.29	15.43	07.39	17.23	10.13	21.04	17.46	8.10	10.32	21.33
Jul 09	07.11	17.06	05.44	15.41	07.48	17.42	09.49	20.54	17.00	7.25	09.54	20.58
Jul 19	07.07	17.13	06.24	16.12	07.52	18.02	09.26	20.44	16.14	6.41	09.18	20.23
Jul 29	07.01	17.20	07.06	17.10	07.51	18.23	09.02	20.34	15.29	5.57	08.41	19.49



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