T R A N S I T

The Newsletter of

Cleveland & Darlington Astronomical Society

11th February, 2005. Julian Day 2453413

Two very different images of this month's galaxy but clearly the same object. This one has a special claim to fame, which you must also know to qualify as the smartest astronomer around.

I do receive a few responses to these tests of your knowledge each month. It is very encouraging to know that someone out there is reading Transit and possibly enjoying it? Readers' reactions are always very welcome – comment, suggestion or criticism.

Editorial

February meeting. This month, the second Friday falls on the 11th. The lecturer will be Rod Hine, of Bradford University and Bradford A.S.. His talk is entitled "Children of the Sun".

January meeting. Members' Night this year was one of the best I can remember. The contributions were varied and numerous, carrying on until 9pm. I am told that up to very near the meeting there were only two volunteers, then another five appeared out of the blue. The varied interests and range of talents of members in the Society was well displayed and a credit to everyone.

Front Page Picture. On January's front page we had The Pinwheel, or Triangulum Spiral, a type Sc. Its designation is M33, NGC598, absolute magnitude –18.9, distance 2900 light years and 52 light years across.

Back Page Puzzle. Last month, the Moon crater was Plato, with the Apennines running to the west. The small range to the south-east are the Tenerife Mountains.

Huygens Success. No doubt everyone did as I did after the January meeting and switched to the BBC2 programme on the descent of Huygens to the surface of Titan. Magnificent! Superb! Wonderful! I get this funny tingle at the back of the neck when I realise this is Homo Sapiens reaching out to another world – do you?

Comet Machholtz. Lots of members have had good views of the comet and there are a few reports in this edition. (Keith's image is small but gives you an idea of what it is like. Some wag suggested that Transit should come with a magnifying glass!! If you want an original, please let me know). Most said it was a fuzzy blob but maybe a few with good optics were able to see more detail? It is now fading fast and has crossed the Milky Way. Please send in your reports and I will include them in next month's edition.

Web Links. The other day, Ed Restall and I were compressing the pdf versions of Transit - the ones sent out to members on the Internet. Ed puts all the Transits on the Society website for anyone to read, so the smaller the file, the better. We noted that any weblinks in the pdf versions can be used directly to open the site. Has anyone tried it? You see how we look after your every need?

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Asteroid impact threat in 2029

A NASA News Release sent by Ray Worthy

A recently-rediscovered 400-meter Near-Earth Asteroid (NEA) is predicted to pass near the Earth on April13, 2029. The flyby distance is uncertain and an Earth impact cannot yet be ruled out. The odds of impact are unusual enough to merit special monitoring by astronomers, but should not be of public concern at this time. If it actually did strike the Earth, an asteroid this large would do a significant amount of damage. 2004 MN4 is now being tracked very carefully by many astronomers around the world, updating the risk analysis for this object.

First sighted on 19 June 2004 by Roy Tucker, David Tholen and Fabrizio Bernardi from Kitt Peak, Arizona, the object was rediscovered from Australia on December18 this year by Gordon Garradd of the Siding Spring Survey, another NASA-funded NEA program. Further observations from around the globe over the next several days allowed the Minor Planet Centre to confirm the connection to the June discovery, at which point the

possibility of impact in 2029 was realized by the automatic SENTRY system of NASA's Near-Earth Object Program Office. A similar automatic system at the University of Pisa and the University of Valladolid, Spain also detected the impact possibility and provided similar predictions.
The odds of an impact are likely to change on a day-to-day basis as new data are received. While meriting attention by astronomers, there is no cause for public attention or public concern as an actual collision is very unlikely at the time of writing.

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Here is another in the series "Essays written by members for distance learning courses". A lot of brain strain goes into these magnificent works and, by and large, only two people ever see them, the writer and the marker. The idea of this series is to give these authors a wider audience for their out-pourings.

Non-baryonic Dark Matter

By Alex Menarry

It's a dark, wet, winter's morning. I'm looking out of the window, gathering thoughts for an essay. Everything I see is made of stuff which is a negligible fraction of the matter in the universe and this is true of all the stars I wonder at and the galaxies visible in the biggest telescopes. The Copernican Principle has taken yet another lurch. Where will it all end?

I pull my eyes down to the keys, clicking words on to the screen. The instructions say write an essay, which is a literary exposition, not a formal, technical paper. It's difficult to discuss one of the listed subjects without involving several others and they are all fascinating. The title will have to be Non-Baryonic Dark Matter because it was a visit to Boulby Mine PPARC laboratory complex which trapped me into taking this course. In my view, non-baryonic matter is the major current topic which cosmology must solve. Since physics is an experimental adventure, the non-baryonic whatever-it-is must now be observed. "There is perhaps no beguilement more insidious and dangerous than an elaborate and elegant mathematical process built on unfortified premises" (Thomas Chamberlain, American geologist, 1899).

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In the 1930's it was found that the velocity distributions of galaxies in the Coma and Virgo clusters could not be explained by the observed, visible matter (Zwicky, 1933; Smith, 1936). Since then, larger telescopes and sophisticated space probes have confirmed that, wherever astronomers look, there is not enough visible matter to support the gravitational dynamics, within galaxies and clusters of galaxies. Latest figures indicate that the total baryonic matter, calculated from Big Bang nucleo-synthesis, confirmed by observation of the proportions of primaeval nuclei, can only be 5% of the mass density parameter required for a flat universe. The expectation of ¿ near to unity is established from Inflation Theory and other impeccable sources (q.v.). Further, of this 5%, a mere tenth (ie 0.5%) is visible (Course Notes, Section 7).

Only a decade ago the conclusion was that up to 95% of the matter in the universe was “missing” or dark, possibly Massive Compact Halo Objects, composed of baryonic matter which does not emit light - such as low-mass stars which failed to ignite, or other dark objects. However, a search using diverse techniques, including gravitational micro-lensing, has failed to find enough mass to fill the gap. A decade of detailed investigation has led to the conclusion that the missing matter must be non-baryonic. Observations suggest that there are “extended halos of dark matter” (course notes, page 7-8) around the visible, luminous discs of galaxies, thought to be non-baryonic dark matter, not emitting radiation.. In addition, the results from the astonishing satellites measuring the Cosmic Microwave Background Radiation, COBE and WMAP (see references under COBE and WMAP), have made it virtually certain that ¿ is very close to unity and, where M denotes all the gravitating matter, that $¿_M = 0.33$ (Turner, 2002).

Current density parameter arithmetic is

$$¿_T = ¿_M (0.33) + ¿_R \text{ (very small)} + ¿_? (0.67) = 1$$
$$¿_M = ¿_B (0.05) + ¿_{NB} (0.28) = 0.33$$
$$¿_B = ¿_D (0.045) + ¿_V (0.005) = 0.05$$

T = total, M = total matter, R = radiation, ? = unknown, B = baryonic matter
NB = non-baryonic matter, D = dark baryonic matter, V = visible baryonic matter

Which leads to a beautiful and fascinating example of the co-operation between cosmologists and particle physicists. The Standard Model of particle physics is acknowledged to be “incomplete” and points to the possible existence of very Weakly Interacting Massive Particles, able to fulfil the role of “non-baryonic dark matter” (NBDM) – the supersymmetric, or SUSY, sparticles (see SUSY references). In addition, comparisons between computer studies and observations of the large scale structure of the universe (references: Galaxy Surveys), lead to the conclusion that NBDM is necessary to explain the observed, stable structures. The argument is that there has not been enough time for the observed large scale structures to develop since recombination, 300,000 years ago. Some gravitational gathering, or seeding, was required before then. NBDM can fulfil that role, assuming it was not in thermal equilibrium with radiation before recombination, but neutrinos cannot (Kearns et al, 1999).

In which case, the postulated non-baryonic matter must be observed – it is now time to demonstrate that sparticles, the axions, neutralinos or WIMPS really do exist. Experimental evidence is urgently needed to “fortify the premises”. Laboratories, sheltering deep underground to escape cosmic ray interference, have been built in Yorkshire, the Gran Sasso of Italy, in France, the USA and Canada to detect NBDM (refs: Dark Matter Detectors and Laboratories).

There are two major types of detectors. The cryogenic instruments operate at temperatures of milli-Kelvins and look for the heat generated by the extremely rare collision of a non-baryon with a nucleus. Another type looks for a scintillation produced by the collision. A third type of detector is the DRIFT instrument at Boulby, which records ionisation tracks. This uses direction-sensitivity to distinguish between the particles being looked for and other, spurious detections. Pictures are available from the PPARC website, showing the general arrangement of typical instruments at Boulby and a cross section one of the liquid xenon instruments, among other things.

Will the underground detectors find the non-baryonic particles first or the CERN Large Hadron Collider, being commissioned in 2007?

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Assuming that non-baryonic matter is observed and the expected amount confirmed, there is still the missing 67% for ¿ = 1 . The experimental proof of current theories that there is "dark energy", an accelerating force from the quantum virtual particles in space, must then be addressed and "fortified". What a challenge! Will I be writing an essay on that subject in the future? I hope so.

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The CaDAS Interview – Eric Kendall

Eric lives in Hurworth, which isn't far from Darlington. He came over to my house for our conversation. Parking in this part of the world is not at all easy, with the Sixth Form College and the Technical College both very near. All teenagers seem to go to school in motor cars nowadays, driving themselves with maybe one friend in the car. Eric had to use a pay car park quite a step away. He didn't ask for expenses.

Have you lived in Hurworth long? For 19 years. I am a Northeasterner now, although the family moved from York when I was 6. I was brought up in County Durham and have a younger brother. My father worked at Thomas Cook Scientific Instruments in York before we moved to Billingham. I married in the northeast and my wife, Jean, is from Hartlepool. My brother still lives quite near, not far from Wynyard Hall

You have a family? Yes, we have four children, scattered all over the place. Alison, the youngest, is 40. One daughter lives in France, working as a translator at the Council of Europe in Strasbourg. Helen works for the government in pharmacy in Newcastle, living in Durham. Peter is an archaeologist with English Heritage, living in Tunbridge Wells and travelling all over the place as an inspector of ancient buildings.

And you manage to keep in touch? Well, this year is the first time we didn't get together at our house for Christmas. We normally keep in close touch and visit a lot. Jean and I have had a few trips out to Strasbourg. You can fly from Teesside to Strasbourg but it was very expensive this Christmas time.

How long have you been in the Society? I joined about three years ago and have been very pleased to have found such a good one. I saw something about John McCue and the planetarium and from there I discovered there was an astronomy society. I have enjoyed being a member, especially the lectures. They are very good. *Anything you would change about the society?* Not really changing the society. I would like to visit the observatory more and use the facilities and the big telescope. I suppose it is my fault for not asking about it and how I could join an observing group.

Where do you do your observing? I have a bedroom with a very open aspect to the east, so I can set up in the house and keep warm. I point my telescope out of the window and have a field of view of nearly 180 degrees. Its proved to be very enjoyable. I enjoy looking at the planets and the Moon. I have Patrick Moore's Atlas of the Universe and use the Moon maps in there. I saw Titan for the first time only last week and realised there was a probe landing at that very spot. It was very exciting to imagine Huygens going down through the atmosphere. Another of the advantages of being in the Society is to have so many experts, talking about their astronomy, like Keith Johnson and Jack Youdale.

What has been your most satisfying astronomical experience? I think going to Greenwich in 1999 and seeing Harrison's clocks. It was amazing to see those clocks actually working. They are beautiful. Did you know a man called Kendall (no relation!)

was the chap who was commissioned by the navy to produce large numbers of Harrison's final, successful design? I remember one was priced at £500 and an inferior one at £100, even in those days - 1774. The total eclipse was due in 1999 and that sparked my interest and I kitted up to do some Solar observing, sunspots and all that. It got me going on astronomy in general. I enjoyed watching the transit of Mercury; the conditions were ideal. It was disappointing not seeing much of the transit of Venus.

What was your job? I'm a chemist. I was at Billingham secondary modern then went on to Stockton Secondary School. I got a scholarship to Constantine College and did chemistry as first subject, with physics as secondary. The degree was an external degree from London University. After a period in the forces doing national service, I came back to ICI. I was with them, commissioning petrochemical plant, until 1981. Mostly it was in Wilton except for a period in Bristol; from 1960 to 1964. *So you saw the first Severn Bridge under construction?* Yes, it was wonderful to watch such a huge project progressing. We lived in Thornbury. *Oh, I know Thornbury very well. When I was at Oldbury power station, a lot of my friends and colleagues lived in Thornbury. We lived in Chipping Sodbury.*

Did you enjoy your education? Oh, yes. I was very disappointed when the school was closed down for a time in the war. There was no air-raid shelter, and we spent 1 day a week at school. My brother was taught in peoples houses until a shelter was built. Looking back, they were dangerous times, with air raids and all that. But I enjoyed school and University; I enjoy learning generally. Do you happen to know if Jack Youdale was at that school when I was there? I think we are contemporaries and I seem to remember him, at school. *I will introduce you to Jack and you can ask him.*

Do you like travelling? We go to Europe a few times a year. We had a very enjoyable eleven-day cruise from Barcelona, along the Mediterranean and round Italy. The boat was the "Constellation" and it was excellent. We couldn't fault any of the arrangements. We used to have family holidays in various parts of Scotland. I am a fisherman and travel to all the good places. Galway, Connemara, Inverness.

Any other parts of the World you like going to? For our 40th wedding anniversary, we went to California. One thing which struck us was the enormous areas covered by wind generators. Square miles of them. San Francisco was wonderful but Los Angeles was not so wonderful. Just sprawling and impersonal. Nobody walks anywhere, it's too dangerous. Trips out to Death Valley, Bryce Canyon, Grand Canyon were very memorable. I would recommend everyone to go to these places. In 1987 I went to Boston and New York with my son. I like the USA very much and would go anytime. It is such a huge and varied place, there is something for everyone and so many fascinating places.

Do you still fish? Oh, yes. The environment and the camaraderie is very enjoyable. There was a memorable character called Charlie Newton, who fished 5 or 6 times a week, lived in Darlington and caught far more fish than anyone else. He was there when you arrived and he was there when you left. I am out most weeks and meet people from

Leeds and Newcastle, at Leighton Reservoir. There is an annual contest. It is mostly rainbow trout, fishing with flies. I make my own flies. One memorable occasion was when I was fishing with my brother in Boat of Garten in Scotland. My brother hooked a salmon but lost it. Along came two Germans with the river bailiff, who asked us if we would mind them fishing here, too. I said no. Within five minutes they had landed a gorgeous eighteen-pound salmon.. My brother was livid. He blamed me for "letting them have my salmon"!!

Any more hobbies? One regular outing is a weekly lunch with friends in various places. Almost a hobby, I think; very entertaining, anyway. Of the eight of us, three were pilots in the war. One flew Lancasters and another a Swordfish. He crashed five times and was never injured! I collected stamps until very recently but suddenly lost interest and sold my collection. The attraction was making up complete sets and finding out about the places the stamps came from. After a while you can recognise the actual plats the stamps were made from, noticing the slight differences. Many of them are lovely works of art on a small scale. My children weren't interested, so I auctioned it off.

Do you dance or play a musical instrument? My wife and I used to do a lot of ballroom dancing but we haven't done any for a while. *There is plenty in this part of the world, if you want to start again.*

What sort of films do you like? The last ones I remember are the Lord of the Rings series and Harry Potter. The action, the scenery and the effects are sensational. Seeing the North Yorks Moors railway was interesting, as well.

What books do you enjoy reading? Mostly factual and technical subjects. I rarely read novels or poetry. I used to like reading Robert Ludlum. One I really enjoyed was "When the Clock Struck Zero" by John Taylor. Stephen Hawking's "The Universe in a Nutshell" was a good, if difficult, read. The one that has me gripped at the moment is "Light Years" by Brian Clegg. It's in Darlington Library. An easy read but very absorbing and fascinating. My family have got the message about Christmas presents - books! There are more books by Penrose I haven't even started yet.

I didn't get a copy of the sheet you were handing out at the last meeting – it was from "Light Years" wasn't it? *Oh, that! I was trying to be a bit provocative and get people talking and thinking. If you read the book, you will come across the ideas about the speed of light and all that.*
I take my hat off to Pat Duggan, making that plastic umbrella with the stars on it. I thought it was extremely good and very difficult to make. I made a small planetarium when I started in astronomy, so I appreciate the problems. It was, is, a brilliant idea. I hope she will bring it again sometime and spend a bit more time explaining how she did it. I considered doing it with a giant goldfish bowl but a plastic umbrella is even better.

Would you call yourself computer literate?
Yes, I think so. My wife uses it a lot, too, for emails and writing. She has a cousin in Australia, so the emails are flashing to and fro on a regular basis. Jean also wrote a book

called “The Women in my Life” for the charity she supports, the Macmillan Nurses. She tells the stories of her childhood and upbringing as a miner’s daughter in Sacriston.

You are an enthusiast, yes? Well, I get very enthusiastic about things and then tend to drop them and move on to other things. *Well, I guess we all do that!!* One thing I am enthusiastic about is Nuclear Energy. I wish we would convert, like the French, and stop fiddling about with wind power, which is not the answer.

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Neil Haggath sent me this some time ago. Now that his website is up and running, I thought it worthwhile to give you an example of the sort of thing he discusses and examines.

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More on Morons

From Neil Haggath

I got an email from Jim McDade not long ago. It turns out that he and Bart Sibrel actually came face to face on some American TV programme. Jim *did* challenge Sibrel to explain the hammer and feather experiment (done by Dave Scott on Apollo 15). Sibrel's response was that the feather was a fake one made of metal, and that the film was slowed down to make the objects appear to fall under lunar gravity!
Er, now let's see; it doesn't take a great amount of brains to see the flaws in that one, does it?
1. How exactly could the film of the objects falling be slowed down, while at the same time, Scott's speech, and the his movements, were still played at normal speed? I don't doubt that such a thing could be done with today's film technology, but not in 1971!
2. If you were to make a "feather" out of metal, and make it look anything like realistic, then the metal would have to be extremely thin, like a piece of aluminium foil - which means that, if dropped in air, it would still fall pretty much like a real feather!

Neil Haggath

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First Telescopes and Later Ones

From John Crowther

No, I’m not going to write about Galileo’s telescope, although on reflection it would be interesting to build a replica to see how difficult it was for him to observe Jupiter, Saturn and the Moon. With its strange mount and negative lens, Galileo’s telescope had an extremely narrow field of view at 30x magnification.

In fact, I’m writing about my telescopes. If other Society members would write similar articles, I’m sure it would make interesting reading in “Transit”. Some of us “longer in the tooth” members will remember “Vim”. This was (*but see footnote, Ed*) a scouring powder for old-fashioned pot sinks. It was sold in card tubes with metal ends,

one of which had holes in it to shake the powder out. Long card tubes were difficult to obtain in those days.

So, as a boy, I got empty Vim containers from my mother, joined them together and then sent away for a non-achromatic lens . It had to be stopped down in order to eliminate some of the false colour, which was present even in a lens of long focal length. It all worked quite well, although with the long tube I experienced Galileo's problem of finding a chosen object. I also had my grandfather's telescope. He had been a Master Mariner in the Merchant Navy. Unfortunately, the threads joining the brass tubes were worn and despite stiffening with tape it was flexible.

Later, during my motor-cycling days, I rode to North Shields to buy a refractor, a 2 inch Moonscope. The bikes went on the ferry and my friends and I were shown around the factory when I ordered my Moonscope. It was a day of torrential rain and we arrived home in Whitby absolutely soaked.

My first reflector was a mail order "Orion" from London. It had to be assembled and had an open tube and an altazimuth mount, which was held with wing nuts. After assembly, the wood was sanded down. Later, I added a tube, which the local tinsmith made for me.

My interest in astronomy had started when I was at Whitby Grammar School in the late 1940's and early 1950's. The school had a refractor which was weight driven and which, with a sidereal clock and a transit telescope, was housed in a brick-built observatory with a conical roof. This observatory had been donated to the school in the early 1900's by a Mr Bruce. It had been taken to pieces and moved across a deep railway cutting to be rebuilt in the school grounds. We had a lecture some years ago on old observatories and one of the brochures had a picture and details advertising the identical one. The observatory is now almost surrounded by modern buildings but it is still quite visible on the left as one drives into Whitby from the Guisborough Moor road. Both telescope and observatory are now used by the Whitby Astronomical Society.

My most efficient telescope was a 4½inch reflector, built with much help from John Morley. In those days his workshop and observatory were just off the square in Eston. A group of us ground our mirrors at our homes that winter and it was cold work in our garage. Laziness pays in mirror grinding, as when your curve is shallow you get a longer focal length and a bigger magnification with any particular eye-piece.

John, who worked at British Steel, provided to each member of the group strong equatorial mounts, a square section metal tube and even an eyepiece - all for £10. The mounts were fastened to 2 inch square posts, set in circular concrete bases. Unwisely, I sank my base under a lawn and over the years the post rotted and the mount seized up. The late Ron Shaw, a past member of our Society, had built a telescope, as had his son, and he gave me one of their mounts to replace my rusted one. Now the instrument is at our Martin's in Canterbury, where the sky is darker and the two young grandchildren may well become budding astronomers.

To close, I still have a 60mm refractor, which I bought from Neil some years ago. I fitted a finder, rebalanced it and painted it with dark blue cellulose, which was left over from painting my bike. To my surprise, the paint on the original shiny white tube formed beautiful patterns.

Guess what I got for Christmas? A small, Chinese 76mm reflector, bought at our local Audi supermarket for £40.

John Crowther.
*<u>footnote</u>: *we can still get Vim here in Darlington, John.*

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Here are a couple of articles on another hot astronomy topic – exoplanets. Anything on this rapidly-developing subject attracts attention because of the possibility of discovering Earth-like objects. Rob Peeling discusses the possibility of habitable exoplanets. The other is a press release on further discoveries.

<u>Are Any of The Exoplanets So Far Discovered Habitable?</u>

From Rob Peeling

By the 1st July 2004, 122 planets had been discovered around a total of 107 main sequence i.e. roughly sun-like stars. So could any of these newly discovered planetary systems be possible oases of life elsewhere in our galaxy? Professional astronomers say not, but why do they think this?

So far we have only to be able to detect large, Jupiter sized planets which have thick hydrogen atmospheres, no distinct solid surface and enormous interior temperatures and pressures. Even the smallest detected planet is at least 38 times more massive than the Earth. So straightaway we see that none of the planets actually detected is a likely place for life. So could there be any earth-like planets in the systems we have discovered?

Most of the planets so far found were discovered using the radial velocity method which measured how fast a star wobbles towards and away from the earth. The method is biased towards discovering large (Jupiter-like) planets very close to their stars because this arrangement gives the biggest (and quickest) wobble making it easier to pick up with the limited observing time any professional observer can get on the big telescopes around the world.

39 of our 122 new Jupiter-sized worlds lie closer to their stars than Mercury does to our Sun. These are called “hot Jupiters”. The problem with these so far as life is concerned is that the only theory for the formation of these planets requires them to form much further from the star and migrate inwards which would lead to an abrupt end for any Earth sized planet trying to form at the same sort of distance from its star as our world.

In fact virtually all the discovered planets are closer to their respective stars than Jupiter is to the Sun. This makes it difficult to imagine that an earth-sized planet is likely to exist in an orbit by itself at the right distance from the star. After all, look at the effect Jupiter has had on the solar system within the bounds of its orbit. Firstly, there is the asteroid belt where planet formation didn’t succeed and then compare the stunted size of Mars to Earth and Venus.

So all we are left with now is the possibility of a habitable world orbiting one of the Jupiter-like planets as one of its moons. The next requirement then is that our

hypothetical world should orbit a "Jupiter" with a reasonably circular orbit so that the seasons are not too extreme. That rules out anything with an orbit that is more eccentric than, say, Mars. We also need to be in the so called "Goldilocks zone" where it is not too hot and not too cold – just right for life! Taking account that other stars are different in brightness to our Sun, we are now down to just three possibilities. Two of these, around the stars HD 23079 and HD 10697 would have Mars-like conditions. The third planet however has a nearly circular orbit and very Earth-like warming from it's star, HD 28185. This planet has the mass of at least 5.6 Jupiters.

So far so good, but is a moon orbiting the planet HD 28185 b really going to have conditions to support life? What will it be like?

Certainly it mustn't be any smaller than Mars or else it won't have enough gravity to retain an atmosphere of gases like oxygen and nitrogen. The other thing that is also certain that because of the huge size of the planet it circles, tidal effects will ensure that it always shows the same face towards the planet. Here lies the problem. Such a moon is likely to take several earth-days to go round the planet especially seeing as it so big in this case. This means that the length of the "day" will be rather long, just like Earth's Moon where day lasts a fortnight followed by a fortnight of night. Just like our own Moon the effect of this on our imagined world is an intensely hot day followed by an intensely cold night. If there was a thick atmosphere then there would be perpetual hurricane force winds blowing from the day side to the night side. Suddenly it doesn't seem such a nice place to live after all!

Recommended reading/browsing

http://www.obspm.fr/encycl/encycl.html

The Extrasolar Planets Encyclopaedia. An excellent website which is completely up to date on exoplanets. Maintained by a researcher in the field. Has links to the original papers and discovery data and as much detail on the planets themselves as you are likely to find.

"New Worlds in the Cosmos, The discovery of Exoplanets" Michel Mayor & Pierre-Yves Frei, Cambridge University Press 2003

One of the authors is co-discoverer of the first exoplanet 51 Pegasi b.

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Scientists Discover the First of a New Class of Extrasolar Planets

Press release sent by Ray Worthy

Astronomers announced today the first discovery of a new class of planets beyond our solar system about 10 to 20 times the size of Earth - far smaller than any previously detected. The planets make up a new class of Neptune-sized extrasolar planets. In addition, one of the new planets joins three others around the nearby star 55 Cancri to form the first known four-planet system.

The discoveries consist of two new planets. They were discovered by the world renowned planet-hunting team of Paul Butler, Geoffrey Marcy and Barbara McArthur. "NASA, along with our partner NSF, is extremely proud of this significant planetary discovery," said Al Diaz, Associate Administrator of NASA's Science Mission Directorate. "The outcome of the tremendous work of the project scientists is a shining example of the value of space exploration." "These Neptune-sized planets prove that Jupiter-sized, gas giants aren't the only planets out there," Marcy said. Butler added, "We are beginning to see smaller and smaller planets. Earth-like planets are the next destination."

Future NASA planet-hunting missions, including Kepler, the Space Interferometry Mission and the Terrestrial Planet Finder, will seek such Earth-like planets. Nearly 140 extrasolar planets have been discovered. Both of the new planets stick very close to their parent stars, whipping around them in a matter of days.

The first planet, discovered by Marcy and Butler, circles a small star called Gliese 436 about every two-and-one-half days at just a small fraction of the distance between Earth and the sun, or 4.1 million kilometers (2.6 million miles). This planet is only the second known to orbit an M dwarf, a type of low-mass star four-tenths the size of our own sun. Gliese 436 is located in our galactic backyard, 30 light-years away in the constellation Leo.

The second planet, found by McArthur, speeds around 55 Cancri in just under three days, also at a fraction of the distance between Earth and the sun, at approximately 5.6 million kilometers (3.5 million miles). Three larger planets also revolve around the star every 15, 44 and 4,520 days, respectively. Marcy and Butler discovered the outermost of these in 2002. It is still the only known Jupiter-like gas giant to reside as far away from its star as our own Jupiter. The 55 Cancri is about 5 billion years old, a bit lighter than the sun, and is located 41 light-years away in the constellation Cancer. "55 Cancri is a premier laboratory for the study of planetary system formation and evolution," McArthur said.

Because the new planets are smaller than Jupiter, it is possible they are made of rock, or rock and ice, rather than gas. According to the scientists, the planets may have, like Earth, formed through gradual accumulation of rocky bodies. "A planet of Neptune's size may not have enough mass to hold onto gas, but at this point we don't know," Butler said.

Both discoveries were made using the "radial velocity" technique, in which a planet's gravitational tug is detected by the wobble it produces in the parent star. Butler, Marcy and collaborators, including Dr. Deborah Fischer of San Francisco State University and Dr. Steven Vogt of the University of California, Santa Cruz, discovered their "Neptune" after careful observation of 950 nearby stars with the W.M. Keck Observatory in Mauna Kea, Hawaii. They were able to spot such a relatively small planet, because the star it tugs on is small and more susceptible to wobbling.

McArthur and collaborators Drs. Michael Endl, William Cochran and Fritz Benedict of the University of Texas discovered their "Neptune" after obtaining over 100 observations of 55 Cancri from the Hobby-Eberly Telescope at McDonald Observatory in West Texas.

Combining this data with past data from Marcy, Fischer and Butler from the Lick Observatory in California, and archival data from NASA's Hubble Space Telescope, the team was able to model the orbit of 55 Cancri's outer planet. This, in turn, allowed them to clearly see the orbits of the other three inner planets, including the new Neptune-sized one.

For visuals depicting the new planets and information about NASA's planet-hunting missions on the Internet, visit: http://planetquest.jpl.nasa.gov/news/ssu_images.html http://planetquest.jpl.nasa.gov

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Several Members sent me emails reporting their sightings of Comet Macholtz. This is a compilation of three of them. I know other members have been following the comet for some time. I believe that one of the important functions of Transit should be a means of making your observations available to as many people as possible – especially other members. Please send an account of your observations. For example, a summary of your observation log book would be ok, or a more considered essay, if you have time. Editor.

Comet Machholtz Reports

1) From Neil Haggath, 9th January 2005

I finally got to see the comet tonight. Amazingly, I actually got a bit of clear sky on just the right night, as it was close to M45 and dead easy to find! At about 2300, from my back garden, I couldn't see it with the n/e. The trans. was noticeably better than the other night, and II seeing, but with the usual light pollution round here; the n/e limiting mag. was about 3.5, or 4.0 at best. I spotted the comet with my 8x21 mini-binoculars, as a faint fuzzy. Then, having located it, I got it in the 16x50's. It was an easy object in those, but I couldn't discern any structure or any tail. I then set off for the fields/woods a few hundred yards away, for a *marginally* darker sky - only a couple of hundred yards from the houses, but shielded by trees from the direct glare of streetlights and security lights! Guess what... during the few mins it took me to walk there, it clouded over.
Neil

2) From Rob Peeling, 9th January 2005

I first picked up comet Machholz on Christmas Eve. It was easily picked up with binoculars (8x40) to the west of Rigel. The finder chart in the BAA circular relating to the comet was helpful here. I have since seen it on several occasions when clouds have permitted. On the 28th Dec from my home (heavily light polluted from Stockton) I suspected it to be on the verge of naked eye but I won't claim a definite naked eye sighting until New Year's Day. I have not been able to see any sign of a tail at all. Sky at Night showed some photos and claimed a tail but it wasn't very convincing in the shots they showed. My sketches haven't scanned at a good enough quality to send with this. Has any else got sketches or images to share of this comet?

Rob

<u>3) From Keith Johnson , 8th December, 2004</u>

Hi'
Here's the first image of comet C/2004 Q2 Machholz. The comet thru' binoculars is what could be described as a "large faint fuzzy" which was at mag. 5.7 at the time of the capture. The image includes an insert of the comet using Skymap Pro.9 with the latest ephemerides.

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<u>Transit Tailpiece</u>

<u>Quote/Unquote</u>

You cannot fight against the future. Time is on our side.
William Ewart Gladstone

An unwillingness to admit the possibility that mankind can have any rivals in intellectual power occurs as much amongst intellectual people as amongst others; they have more to lose.
Alan Turing

Millions long for immortality who do not know what to do with themselves on a rainy Sunday afternoon.
Susan Ertz

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The Back Page Pictures

Interviewed this month – Eric Kendall

Good Moon pictures are not as easy as galaxies to find on the WWW – probably because the big telescopes don't look at it very much. I rely mainly on Keith Johnson and Malcolm Bannister for high quality images. However, this scanned picture from "Universe" by Kaufmann and Freedman is of a very prominent Mare as seen the right way up. Are the mare relatively uncratered because the lava covered up those already there or because they are young and were formed after the main bombardment ceased?