

Chairman's Report for the meeting of 25 March 2015 by Tony Viljoen

Percy Jacobs gave a feedback report on the February Monthly Observing Challenge where George Dehlen, Johan Moolman and Johan Smit/Michael Moller/Dawie Venter submitted entries for the Jupiter Double Shadow Transit. The last three tried photographing the event, but "Although nothing submitted, "yet", this is to demonstrate the spirit and fun had in attempting the Obs Challenge". George Dehlen submitted sketches of the event, and Johan Moolman took photographs and both were winners and received R100 vouchers, submitting "fantastic observations" of the event.

Percy's target for March is the open star cluster NGC2362 (ASSA 22) in Canis Major. Percy requires an estimate of the magnitude, size and number of stars in the cluster and an observation of the 4,4 magnitude star Tau Canis Majoris (brightest star in cluster) relative to the other cluster stars when the telescope tube is tapped (Jumping Spider Star).

Percy went on to talk about his challenge in the future, the "Constellation Watch Observing Challenge".

Record and submit:

The constellation name

The location in the sky – alt / az – date / time

Number of targets seen in the constellation

Types of targets to note (globular clusters, open clusters, nebula, galaxies, double stars)

Any specific "wow" or "stand-out" detail seen or anything that leaves an impression on you

The rules, objectives

Constellations in the Southern Sky, viewed looking North

Only constellations that are in the 0° to +60° declination area (looking North, anything below the Celestial Equator)

Only constellations that are at least 50% in the selected area

All targets, magnitude +8 to -2, in each constellation, within constellations boundaries, must be observed all together in one night for that specific constellation

Use detailed star map references to identify all to see in each constellation. Best book to use here, would be Wayne Mitchell's, Star Gazer's, Deep Space Atlas

Completing of standard observation sheets, along with observed sketching, is not mandatory, but recommended

Photo's of each target also welcome

The key to this challenge is preparation and planning before going out to observe

Percy also mentioned what may be the last Shekinah Dark Sky Weekend, 15th to 17th May 2015. Reservations Piet/Zika Bennett Tel : 083 632 3412/ 083 412 2914.

The April Observing Challenge is "Percy's "Miniature Baby Cross", just off Acrux .

Approx. magnitude of the 4 stars? Similarity & orientation to the real Southern Cross?

Approx. size?

For Beginners Corner Pat Kuhn gave a very interesting talk on the complex personality of Isaac Newton. ("Isaac Newton and the age of Reason").

"Nature and Nature's laws lay hid in night;

God said, Let Newton be! and all was light." Alexander Pope.

Sir Isaac Newton was revered as a scientific genius of the 17th and 18th centuries, and gave us the laws of motion, a universal theory of gravity and calculus. He was:

"Natural Philosopher", Mathematician and Astronomer
Contemporary of: Halley, Wren, Hooke, Boyle, Flamsteed, Bach, Handel, Vivaldi, Purcell. He lived through the English

civil wars (1642 – 1659). Great Plague (1665) – closure of universities. Great fire of London (1666) – closure of universities. Great fire of London (1666) - Affected 70 000 of 80 000 inhabitants

Quotable quotes - Isaac Newton:

I do not know what I may appear to the world, but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.

If I have seen further than others, it is by standing upon the shoulders of giants.

Tact is the art of making a point without making an enemy.

Newton was a difficult man, prone to depression and often involved in bitter arguments with other scientists, but by the early 1700s he was the dominant figure in British and European science.....

Vital Statistics:

1643: Born farmer's son – date & Galileo

1661-65: Educated at Cambridge

1665-67: University closed. Private studies “apple incident”

1667-69: Return to Cambridge – Professorship, refusal of Holy Orders – special dispensation

1671: Reflecting telescope demonstrated to RA

1672: Optics and the Nature of light (particle theory)

1678: Mother dies – nervous breakdown.

1678-84: Withdraws from “intellectual exchange”

gravitation and planetary motion – Hooke's letter

1684: Visit by Halley re planetary motion

1687: Mathematical Principles of Natural Philosophy

(Laws of motion, Universal law of Gravitation, Calculus). Hooke. Fame

1689: Elected to Parliament for Cambridge

1693: 2nd Nervous breakdown. Concerns

1690's: Prolific writings on Theology and Biblical Chronology

1699: Master of the Royal Mint: reforms. 1702 coronation medal

1703: President of Royal Academy of Sciences - Hooke

1705: Knighted for his scientific achievements

1705: Leibniz and the Calculus controversy

1712: Flamsteed and the aborted publication saga

1700's: Alchemy - extensive writings kept secret

Died March 1727 at age 85

For What's Up Michael Poll initially mentioned that Solar Cycle 24 is one of the weakest cycles in more than a century. He then mentioned conjunctions of the Moon and Aldebaran, Moon near Jupiter, Moon near Spica, Moon near Saturn, and the Moon and Venus near Aldebaran.

He then mentioned April Constellations: Looking South: Centaurus, Crux., Carina, Vela, (False Cross), Puppis, Canis Major. Then Argo Navis : Vela, Carina & Puppis Michael then talked about objects in these constellations.

Lastly he talked about the very complex business of determining the date of Easter, something we could probably do with an update on every year.

The main talk of the evening was given by Neville Young on: “Did we Really think That? – Astronomy 100 years ago”. His talk was based on a 1909 book by Garrett P Serviss – “Curiosities of the Sky”. Garrett Putnam Serviss was an American astronomer and populariser of astronomy. Of the fifteen books he wrote, eight are devoted to astronomy.



We looked at some objects in the north west before they set. Venus was showing a distinct gibbous phase, although there are some months to go before maximum elongation, when it will show a half phase. We showed the Pleiades in a low power telescope, which were quite well seen, although in twilight. Some visitors used Johan's binoculars free hand for a view of the Pleiades just before they went behind the trees. This was probably the last view we will have of this fine group this season. We also pointed out the bright star Aldebaran and the "V" of Taurus.

Jupiter was high in the north east, and was suitably appreciated. The equatorial belts showed up well, and all four Galilean moons were on view: Europa was to the east, Io and Ganymede were close in on the west, with Callisto much further out.

We did quite a lot of naked eye touring for those who wished to know their way around or be reminded – how Orion's Belt points to Aldebaran in one direction and to Sirius in the other, and the difference in colour between Betelgeuse and Rigel. Also Sirius and Canopus were almost over head, and their differing distances were compared - even though the two stars have similar brightnesses, Canopus is about 40 times further away than Sirius. In the north the outline of Gemini was pointed out – basically a rectangle comprising Castor and Pollux (Alpha and Beta Geminorum respectively), Gamma and Mu, with Eta a little branch off Mu. We noted that Jupiter was in Cancer, and the stars above and to the right of Jupiter made up the Sickle of Leo. (The right angled triangle which forms the hindquarters of the Lion was not high enough at this stage). We pointed out the path of the zodiac, starting with Taurus, and passing through Gemini, Cancer and Leo, and later on we saw Spica, the brightest star in Virgo. Corvus was noted lying above Spica, the long axis of the Southern Cross extended northwards points to this distinctive quadrilateral. The stars of Corvus are magnitude 3, but, with the light pollution and moist atmosphere they were *only just* visible to the naked eye on this evening.

In the telescopes: We showed the Sword of Orion with low power, and then high power views of the Nebula (M42). Double stars in the north were Castor, we could see the A and B components but the C component was not seen in a 6 inch telescope, and we looked at Gamma Leonis, (a.k.a. Algieba), a nice pair, with a third, unrelated bright star, in the same field. It was noted during the evening, that according to one reference, the bright star Adhara (Epsilon Canis Majoris) was double. Attempts made to split the pair were unsuccessful. The companion is much fainter than the primary, and was probably lost in the glare. (Shades of the companion of Rigel – Michael had an optimistic look there too but did not see Rigel's companion, although it has been seen at previous observing evenings). We showed Alpha Centauri as another example of a double star.

With a low power refractor Johan viewed the Beehive Cluster (M44 in Cancer), the Jewel Box in Crux, the Southern Pleiades (IC 2602) and NGC 3532 (the Wishing Well Cluster) in Carina, and Omega Centauri (in Centaurus). This refractor is one that Johan made, using an aerial camera lens that was rescued from the scrap bin. It ended up as a 5.5 inch f5 telescope. With an eyepiece made from other scrap optics it provides nearly 3 degrees field of view. It is very nice for viewing open clusters, and in fact Johan spent much of the evening hunting down such clusters suitable for wide field viewing. Percy and Bosman showed most of these targets in their 10 inch telescopes too. After Percy found NGC 2547 (the Heart Cluster) Johan also observed it at low power. Some visitors also had a look at these clusters with Johan's 10 x 50 (rescued-from-the –rubbish-bin and re-collimated) binoculars.

Michael & Nigel had a telescopic look at the region around Mu Velorum. A globular cluster –NGC 3201, No 38 on the ASSA 100 list, lies in this region. We found the globular via Nigel's Go To telescope, but Michael has not found it at his home yet (light pollution!). There were a couple of nice asterisms in the field, and a couple of cute double stars. According to Stellarium, one of the stars is HIP 51561 and the other is t Velorum.

We left the field at about 10.25 pm, by which time Arcturus was coming up in the north east. **Ω**



NOTICE BOARD



Magda Streicher is a very active and experienced observer of the night sky. She regularly writes an article for our newsletter about her observations. Elsewhere in this newsletter, there is an article written by her again. **Her husband is ill and was in hospital**, but he is improving. You can enquire about her husband's well-being and wish him well at magdalena@mweb.co.za. She will also present a paper on the 20th of June at the AGM of the Webb Society Astronomy Club at Cambridge University in the UK.



Johan Smit writes: "The evening (the Observing Evening on March 20th 2015) was the first light test of my own eyes after the recent cataract operations. I am glad to report that my eyesight has improved dramatically, the only negative to report is that the colour aberration in refractors is now more obvious. It is normally a very faint blue fringe and normally invisible, but with the clear lenses in my eyes I am more sensitive to the higher frequencies, and the colour fringe is now seen as a bright purple halo. Normal eye lenses have a slight yellow tint that filters out the deep purple frequencies. Replacement "plastic" lenses are clear and allow these frequencies through, changing the user's colour sensitivity quite a bit. The positive side is that faint colour tints in the stars are more easily seen. Thanks to modern technology and skill I can now rediscover all the wonders again".

Contact him at johans@firsttech.co.za or 072 806 2939 if you wish.

Images and video clips on the Internet

Superstars of Astronomy Podcast.

<http://www.astronomy.com/magazine/superstars-of-astronomy-podcast>

Watch Eric Chaisson's important cosmic evolution interview.

<http://cs.astronomy.com/asy/b/daves-universe/archive/2015/03/31/watch-eric-chaisson-s-important-cosmic-evolution->

Exclusive online story: Why the asteroid threat should be taken seriously.

<http://cs.astronomy.com/asy/b/daves-universe/archive/2015/04/02/exclusive-online-story-why-the-asteroid-threat-should-be-taken-seriously-now-live.aspx>

Hubble goes high def to revisit the iconic 'Pillars of Creation'. In celebration of its 25th anniversary, the HST has revisited the famous pillars, providing astronomers with a sharper and wider view. An exceptional image to use as a screen saver.

<http://hubblesite.org/newscenter/archive/releases/2015/01/>

Hubble finds extremely distant galaxy through cosmic magnifying glass. The HST has spotted one of the farthest, faintest, and smallest galaxies ever seen. The diminutive object is estimated to be more than 13 billion light-years away. <http://hubblesite.org/newscenter/archive/releases/2014/39/> This image is also a nice screen saver.

Basics: Determination of distance to a star cluster by main sequence fitting - by Pierre Lourens

Main sequence fitting determines the unknown distance r to a cluster of stars using the Hertzsprung-Russell (H-R) diagram for the stars in the cluster and the H-R diagram for stars of known distance. The stars in a cluster are gravitationally bound, all located at essentially the same distance, and formed at the same time from the same cloud of gas and dust.

The apparent magnitudes m of the stars in the cluster are measured and their surface temperatures determined from inspection of their spectra. The apparent magnitudes are then plotted against the temperatures, i.e. in an H-R diagram. (See the grey dots in the diagram below.) Most of the points lie in a band that stretches from the top left to the lower right in the diagram. These represent stars that are fusing hydrogen in their cores. This band is known as the main sequence.

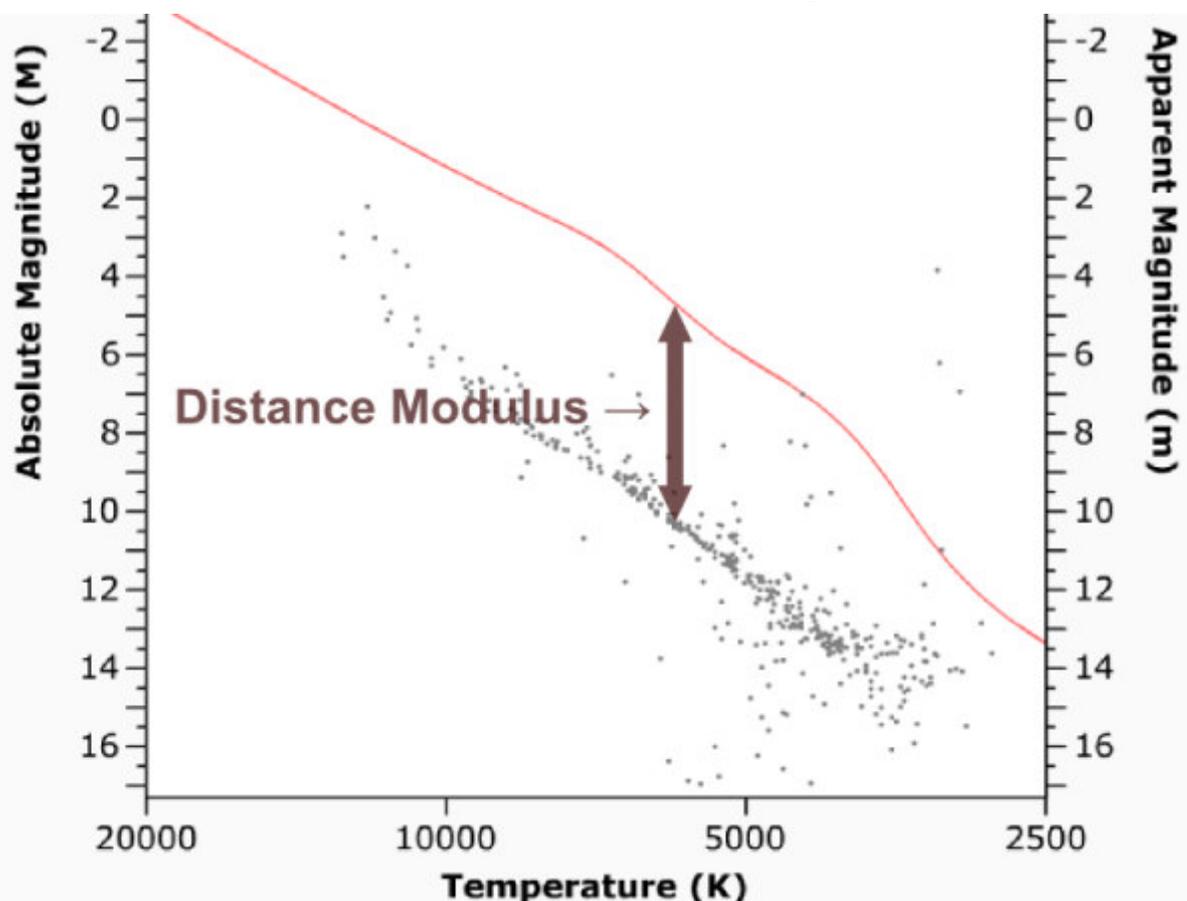
The absolute magnitudes M for nearby stars, whose distances are well-known from parallax measurements, are then plotted on the same diagram. (The absolute magnitude of a star is the apparent magnitude it would have had if it had been located at a distance of 10 parsecs. It can be determined when the distance is known.) The plot is represented by the red line in the figure below.

The red line is where the grey dots, representing the main sequence of the cluster, would have been if the cluster were located at a distance of 10 parsecs. Any difference in position between the main sequences must be due to the distance of the cluster. The difference $m - M$ between the two graphs for any star temperature is known as the distance modulus. This is also the amount by which the lower graph would have to be shifted vertically to fit on the red graph. $m - M$ is read off from the diagram. The distance is now found by using the formula

$$m - M = 5 \log_{10} r - 5$$

Here r is the distance to the cluster in parsecs. Now the only unknown in this equation is r , which is then calculated.

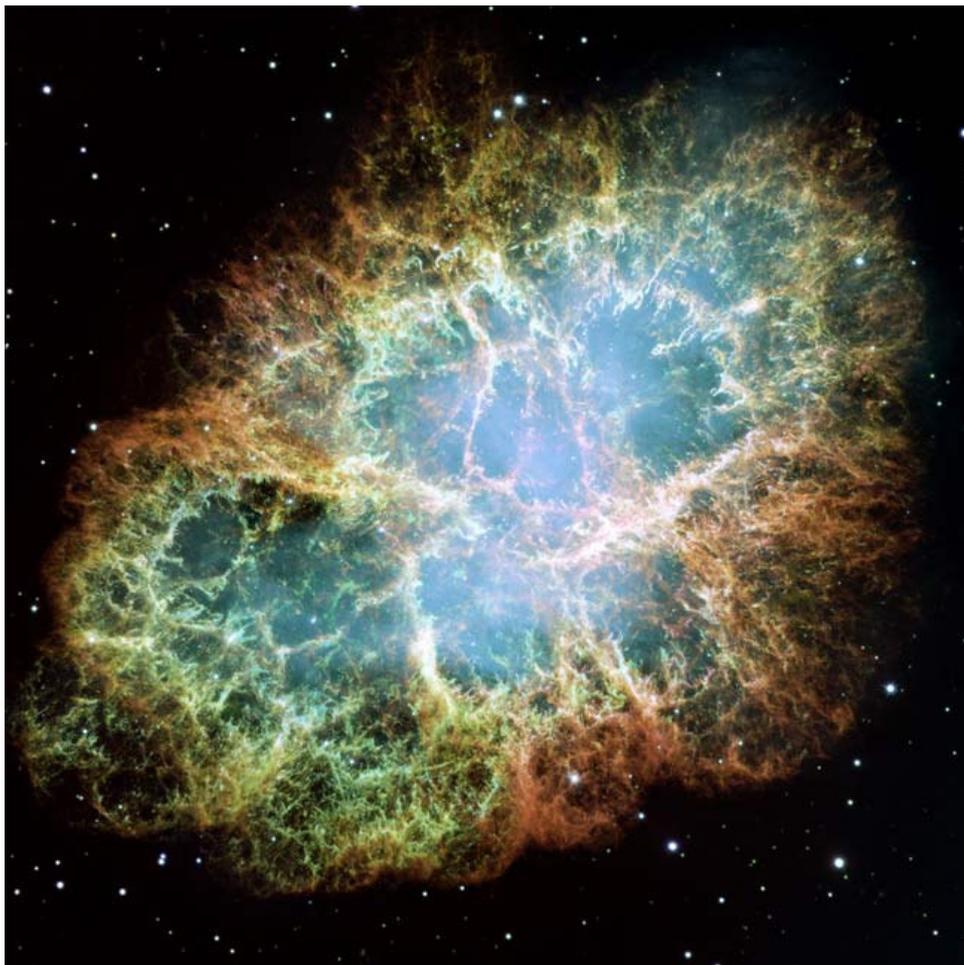
There are some complications with main sequence fitting, which will not be discussed here. Ω



M1 aka NGC 1952: The Crab Nebula - by Magda Streicher

The Crab Nebula deserves priority on your observing list. I had a few good reasons to motivate it. This unique deep sky object can be taken back to the very beginning of its birth. On the morning of July 4, 1054, Chinese observers sighted a new star close to 3th-magnitude Zeta Tauri, the Bull’s southernmost horn. The star, which formed in the wake of a supernova explosion, could be seen during daytime for almost 20 days and compared well in brightness with the planet Venus at the time. It was recorded around the ancient world and remained visible during the night until early in the year 1056. It is expanding at about 1600 kilometres per second. Charles Messier the comet hunter happened to stumble upon this nebula in Taurus on the evening of September 12, 1758. It became M1, the Crab Nebula in his famous catalogue of deep-sky objects, a place of honour well deserved. It was identified as a radio source in 1963, and as an X-ray source in 1964. In 1968 it was discovered that it is one of the Milky Way’s supernova remnants that contains a spinning pulsar with more or less the mass of the Sun, but compressed to only 10 km in diameter.

I will not let a year pass without visiting this pleasing object which never failed to impress me. No matter how hard I try to describe it for you, there will be a lot more wonderful ways to describe it. All powers show this soft large oval (NW-SE) cloud with ease. The soft hazy diffuse glow is around 6’ x 4’ in diameter, and quite well outstanding against a dense star field. Real high power and care reveals an uneven edge with irregular patches on a somewhat even surface. No central brightening is seen. On a few nights in January 2003



mother nature placed the planet Saturn on the spot where this exploded star appeared in the year 1054. I can clearly recall the memory of glancing towards the Taurus constellation, imagining Saturn to be the visible supernova. Through my telescope on the night of the 3rd January 2003, the contrast between the well-defined planet and diffuse nebula glowed in the same field of view at 96x magnification. It will always be one of my precious memories. Take time to explore this wonderful object to its full potential, and think back about its rich history and how privileged we are to still see its outburst. Ω

Left: The Crab Nebula as seen by the HST.

| Object | Other names | Type | RA | Dec | Mag | Size |
|----------|-------------|--------|-----------|----------|-----|---------|
| NGC 1952 | M 1 | Nebula | 05h 34.5m | +22° 01' | 7 | 6' x 4' |

Noteworthy astronomy-related articles on the Internet

Space research

- **ESA's space plane back on dry land.** ESA is forging ahead with plans for a reusable spacecraft for launch around 2020. The Intermediate eXperimental Vehicle (IXV) was launched recently. Released into a suborbital trajectory, it flew autonomously, reentering and splashing down in the Pacific Ocean after 100 minutes. http://www.esa.int/Our_Activities/Launchers/IXV/ESA_s_spaceplane_back_on_dry_land
- **EAS's planetary defense test set for 2020.** ESA's Asteroid Impact Mission (AIM) will travel to a binary asteroid system which will pass only 11 million km from Earth in 2022. Intended to demonstrate technologies for future deep-space missions, AIM will also be the Agency's very first investigation of planetary defense techniques against asteroids headed towards Earth. http://www.esa.int/Our_Activities/Space_Engineering_Technology/ESA_s_planetary_defence_test_set_for_2020

Our Galaxy

- **Astronomers solve decades-long mystery of the "lonely old stars".** A recent study shows that RR Lyrae stars may not be as lonely as previously thought. <http://www.astronomy.com/news/2015/04/astronomers-solve-decades-long-mystery-of-the-lonely-old-stars>
- **VLT confirms that G2 survived close approach and is a compact object.** The dusty gas cloud G2 made its closest approach to the supermassive black hole at the center of the Milky Way in May 2014 and has survived the experience. It is most likely a young star with a massive core that is still accreting material. <http://www.astronomy.com/news/2015/03/vlt-confirms-that-g2-survived-close-approach-and-is-a-compact-object>
- **APEX observations help unravel mystery of Nova Vulpeculae 1670.** The star, which astronomers saw appear in the sky in 1670, was not a nova, but a spectacular collision between two stars, more brilliant than a nova, but less so than a supernova. <http://www.astronomy.com/news/2015/03/apex-observations-help-unravel-mystery-of-nova-vulpeculae-1670>

SETI

- **New instrument extends the search for extraterrestrial intelligence to new realms.** The instrument has just begun to scour the sky for messages from other worlds. <http://www.astronomy.com/news/2015/03/new-instrument-extends-the-search-for-extraterrestrial-intelligence-to-new-realms>

Cosmology

- **Hubble and Chandra discover dark matter is not as sticky as once thought.** Dark matter does not slow down when colliding with each other. This means that it interacts with itself even less than previously thought. This finding narrows down the options for what this mysterious substance might be. <http://www.astronomy.com/news/2015/03/hubble-and-chandra-discover-dark-matter-is-not-as-sticky-as-once-thought>

Extragalactic astronomy

- **Hanny se Voorwerp (Dutch for Hanny's object).** This is a very rare type of astronomical object called a "quasar ionization echo". Eight other similar eerie structures have now been discovered. http://en.wikipedia.org/wiki/Hanny's_Voorwerp
<http://hubblesite.org/newscenter/archive/releases/2015/13>
- **Hubble helps find smallest known galaxy with a supermassive black hole.** This tiny dwarf galaxy contains only 140 million stars within a diameter of about 300 light-years. But

the black hole inside the galaxy has a mass of 21 million solar masses, five times the mass of the black hole at the center of our Milky Way. See an artist's illustration of the black hole amongst the densely packed stars in the galaxy. (The image is also a nice screen saver.)

<http://hubblesite.org/newscenter/archive/releases/2014/41/>

- **Quasars caught eating galaxies.** Discovered in 1961, quasars consist of super massive black holes at the centers of galaxies, each surrounded by an accretion disk. Astronomers have found the first direct evidence that some quasars fuel their bright energy emissions by feeding on gas from external sources, probably neighboring galaxies.

<http://www.space.com/4202-quasars-caught-eating-galaxies.html>

**Feature of the month:
Superplanet - by Pierre Lourens**



Imagine a planet with a mass between 10 and 40 times that of Jupiter, with a ring system 200 times as large as that of Saturn. It sounds like science fiction. But it really exists out there, and is named J1407b. It orbits the star J1407. J1407 is a main-sequence orange dwarf star about 434 light-years away from the Sun. "If we could replace Saturn's rings with the rings around J1407b, they would be easily visible at night and be many times larger than the full Moon," said the lead author of the new study of the planet. Watch an animation of the team's analysis of the eclipse of the star by the planet. Ω

<http://www.universetoday.com/118500/super-saturn-has-an-enormous-ring-system-and-maybe-even-exomoons/>



1 827 planets around other stars and 465 multi-planet systems (star systems with 2 or more planets) were known on 1 April 2015.

<http://exoplanetarchive.ipac.caltech.edu/index.html>

