The

Volume 124 No. 5
May 2015

Bulletin

Monthly newsletter of the
Astronomical Society of South Australia Inc

In this issue:

- An observatory battery monitor
- Monster black hole in the early Universe
- Comets galore in May
- Explore the Abell Galaxy Cluster 1060 in Hydra

Registered by Australia Post
Print Post Approved PP 100000605

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ASTRONOMICAL SOCIETY of SOUTH AUSTRALIA Inc

GPO Box 199, Adelaide SA 5001

The Society (ASSA) can be contacted by post to the address above, or by e-mail to *info@assa.org.au.* Membership of the Society is open to all, with the only prerequisite being an interest in Astronomy.

Membership fees are:

Full Member	$75
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Concession information and membership brochures can be obtained from the ASSA web site at:
http://www.assa.org.au
or by contacting The Secretary (see contacts page).

Member Submissions

Submissions for inclusion in The Bulletin are welcome from all members; submissions may be held over for later editions.

Wherever possible, text submissions should be sent via e-mail or posted on CD-ROM in almost any word processing format and may still be submitted handwritten or typed. Your name may be withheld only if requested at the time of submitting. Images should be high resolution and uncompressed, e.g. TIFF file formats, although high resolution JPEGs are acceptable. Your full name and object designation must be provided with each image and will be published. Equipment/exposure etc details are welcome but optional.

Advertising & Classifieds

Small adverts and classifieds are free for members (space permitting). Commercial advertising is available at a cost of $50.00 per quarter page per issue.

All enquiries and submissions should be addressed to The Editor and preferably sent by e-mail to:
editor@assa.org.au

For large files (e.g. on CD) or hardcopy items, post to:
Joe Grida
Editor, The Bulletin
PO Box 682,
Mylor SA 5153

Contributions should reach the Editor no later than the 7th of each month, for publication in the following month's issue of The Bulletin

In this issue:

Sister Society relationships with:

Orange County Astronomers
www.ocastronomers.org
Colorado Springs Astronomical Society
www.csastro.org
Central Arkansas Astronomical Society
www.caasastro.org

Cover photo: The Eta Carina Nebula (NGC3372) imaged by Paul Haese at Clayton Bay, SA. Equipment – Takahashi FSQ106ED refractor telescope and QSI683-8 CCD Camera. Exposures: SII Hα OIII RGB 150 270 120 100 80 120 (30 minute subs narrow band). Processed in CCD stack and Photoshop CS6. Cropped image.

Activities

April 2015 - the month at a glance

General Meeting

Wednesday, 6 May, 2015
@ 8:00pm
Kerr Grant Lecture Theatre
2nd Floor, Physics Blg
University of Adelaide
North Terrace, Adelaide

Guest Speaker:
Martin Lewicki
Astronomical Society of SA & Adelaide Planetarium

(See speaker bio on page 5)

The 17th century telescope

Take a step back into time and follow the challenges that 17th century telescopic astronomers faced in building and observing with their simple lens refractors. Plagued by chromatic aberration, long, unwieldy telescopes they managed to make epochal discoveries such as those of Galileo and the satellites of Jupiter, Huygens and the nature of Saturn's rings, rotation period of planets, binary stars, nebulae, determining the orbital elements of comets and asteroids.

In this talk we will follow the development of the refracting telescope its optical performance from the beginning of the 17th century through to the mid 18th century when the invention of the achromatic lens finally liberated observers of their long wobbly tubes.

While simple lens telescopes are now relegated to low power toys and opera glasses a large aperture simple lens species of the telescope still survives today as the medial refractor with surprising optical performance characteristics.

Planning on going observing?

Save yourself unnecessary travel and time. If the weather looks doubtful where you are, check with the following people to see if the event is still on (or see www.assa.org.au after 5pm).

Stockport Observatory (DO 3-13)

Observatory 8528 2284

Lyn Grida 8388 5980

Tony Beresford 8338 1231

Heights Observatory (DO 3-34)

Robert Bronca 8266 7504

Black Forest

Greg Weaver 8293 2341

Whyalla

Ernie Ernesti 8645 3613

Tooperang

Jeff Lowrey 0429 690 610

Northern Yorke Peninsula

Tony Henderson 0429 352 382

Riverland

Tim Vivian 0407 800 225

May 2015 Calendar

Day		Time	Activity
Wed	6	7:00pm	Beginners' Meeting
Wed	6	8:00pm	General Meeting
Thu	7	8:00pm	Members' Meeting, Whyalla
Sat	16	8:30pm	Members' Viewing Night – Stockport
Sat	16	8.30pm	Member's Viewing Night - Riverland
Sat	16	8:30pm	Members' Viewing Night – Tooperang
Fri	22	8:30pm	Public & Members' Viewing – NYP
Fri	22	8:30pm	Public Viewing Night – The Heights
Sat	23	8:00pm	Autumn Star Party – Stockport
Wed	25	7:30pm	ASSA Council Meeting
Fri	29	7:30pm	Deep Sky Imaging Group

Note: Times shown above and throughout this document are:
5 Oct 2014 to 5 Apr 2015 : South Australia Summer Time (UTC+10:30)
6 Apr 2015 to 3 Oct 2015 : South Australia Standard Time (UTC+ 9:30)
4 Oct 2015 to 3 Apr 2016 : South Australia Summer Time (UTC+10:30)

Astronomy Education - Beginners' Talks

Wednesday, 6 May, 2015 @ 7:00pm
Kerr Grant Lecture Theatre, University of Adelaide
This month—"Collapsars"

Collapsars are literally Collapsed Stars which have gravitationally contracted at the end of their long lives into incredibly dense objects. Tonight we explore White Dwarfs, Neutron Stars and Black Holes.

ASSA Calendar Competition

As part of the fund raising program, the council has decided to produce a calendar for 2016. The images to populate the calendar will come from photographs supplied by members in a competition which will close in September.

This competition will be completely separate from the Astrophotography Awards. The only criteria for the images are that they must be taken by a member and have an astronomical theme. This means they could be planetary, solar, deep sky, wide field or it could even be an image from an ASSA event. They can be old images or ones that have previously been submitted in the imaging awards.

Please submit you entries to me at beginners@assa.org.au or any other media including a title to be included with the image on the calendar.

The winning entries will be decided by David Malin Award winner, Paul Haese, who will not be submitting an image. The 12 successful entrants will each receive a free calendar. Only one image per entrant will be included. This is a great opportunity to get your images out there and help ASSA raise some funds.

Colin Hill, Beginner's Councillor

Guest Speaker Biography

May 2015 General Meeting

Martin Lewicki

Martin Lewicki is the current serving Light Pollution Officer for the Astronomical Society of South Australia & leads the Dark Sky special interest group.

Martin has had many years experience as an astronomy lecturer and is now the resident educator at the Adelaide Planetarium. Martin presents most of the planetarium sessions to schools, clubs and community groups.

He has interests in astrophotography and physics and runs a number of popular short courses at the Adelaide Planetarium.

Telescope

A poem by John Newell

Open for us your aperture
Swing your lovely cradle round
Bring one of your favoured stars to focus
and point your guests eye
Toward your marvellous window

Losing all too quick
Your fix upon that star
The manual Dobsonian's flaw is
Lack of follow through

Open for us a fresh understanding
Of distance and time
Bring one of your
Gasps of 'Lost in Awe'

You are here for the children
The unaccustomed and the poor
You are here because
Knowing sky is wanting more..

Building an observatory battery monitor

Colin Hill reports on another project for his observatory.

Following the successful completion of my homemade Cloud Detector (see The Bulletin, July 2014), I thought I could relax and just observe and do imaging.

That was until I went away for the weekend and left the inverter running in the observatory. When I got back, the 12 Volt, 100 A/H battery which is solar charged was down to 10 Volts. It never fully recovered from that and I had continual power supply problems until I replaced it with a 120 A/H battery. This was an expensive mistake as the battery was only 12 months old and cost $200.

When I purchased the new battery, the salesman said I should buy a battery monitor which would remove the load if the voltage drops too low. Great idea, I thought. Another project to build!

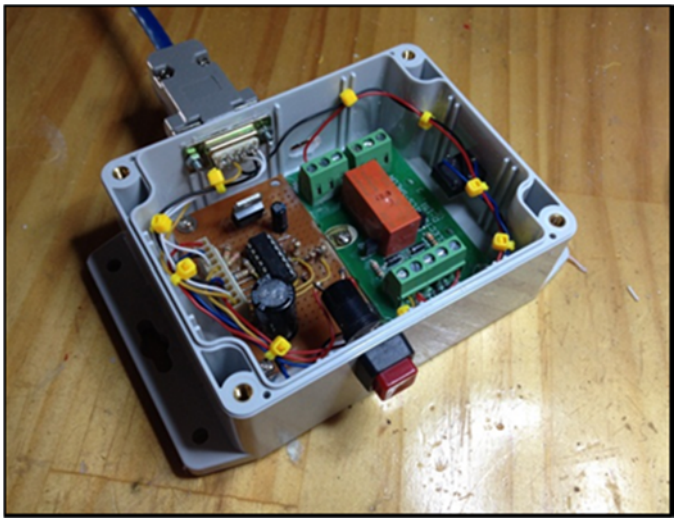
Like the Cloud Detector, my Battery Monitor would be based around the PICAXE microcontroller, in this case the PICAXE 14M. It would also include a device called a latching relay. Unlike a conventional relay, a latching relay does not require power to hold it on. It just needs a pulse to switch it over so it wouldn't be consuming current itself when the load was removed.

The monitor is designed to give a visual warning when the battery drops below 12V by illuminating an amber LED on the Observatory Load Centre panel. If it drops below 11.5V, the microcontroller switches the latching relay to remove the load and illuminate a red LED to alert me that it had tripped. A reset button can be pressed to reset the relay and resume normal operation assuming the battery had recharged sufficiently from the solar panel.

I also wanted a way to easily test it because it may not be activated for a long time if ever. I added a test button which would simulate a low battery condition and trip the relay. Construction was fairly straightforward. The software for the PICAXE was written and the unit tested and calibrated using a bench power supply. Everything worked properly. There was a fair bit of work installing into the observatory but when the time came to test it, the power came on for about 30 seconds before the monitor disconnected the load. I hadn't expected this as it had worked perfectly on the bench.

It didn't take me long to work out that it was the inverter causing the problem. I think it was feeding spikes back onto the 12 Volt line causing the battery monitor to see it as low voltage. I tried fitting a large capacitor across the inverter input terminals but that didn't help. In the end I changed the PICAXE program to only react to a low voltage condition that lasts for more than 1 second. This cured the problem. The Low Battery warning LED still flashes in response to the spikes but it doesn't trip the relay.

Another successful project completed.



Above: *The completed battery monitor.*

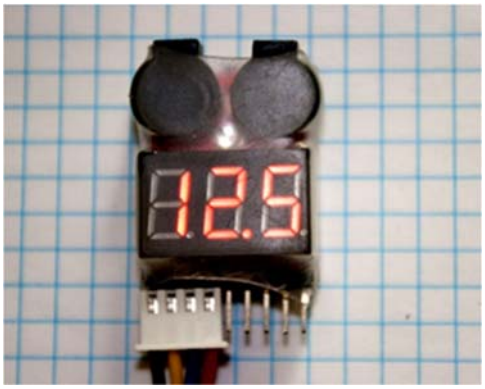
Remote power

Over the past 10 years, the development of mobile devices has advanced battery technology considerably. Recent developments have not only reduced the size and weight of rechargeable power storage, it has also reduced the price.

Back in the 90's, if you had a requirement for remotely powering your telescope, or other equipment, the usual 12Vdc solution would be heavy 7 or 17 amp-hour SLA (sealed lead acid) batteries, or packs of 10 rechargeable 1.2vNiCad batteries. Fortunately back then we had less equipment that required power, but for the keen observer and astrophotographer these days, the list has grown longer. Go-to mounts, laptop computer, dew heaters, imaging camera, illumination, auto-guider and the list goes on. These days NiCad batteries have been replaced by NiMH (nickel metal hydride) and while SLA is still popular, they are still a heavy option.

Today the most popular Mobile Device battery chemistry is Lithium-Polymer (Li-po) and Lithium-Ion (Li-ion), which is one reason why today we have the SmartPhone, and not the SmartBrick in our pockets. It allows us to have low cost, compact, high density energy storage which powers most of the portable devices that we use today.

Unlike Ni-Cd and Ni-MH cells which have a charge of 1.2Vdc, Li-po and Li-ion cells charge to 4.2V and drop to about 3.8Vdc at 50% charge and to maintain long battery life, discharging below 3.3Vdc per cell (under load) should be avoided. To help maintain this limit, inexpensive digital voltage indicator modules ***(pictured above)*** with low voltage warning alarms, which will monitor the charge of each individual cell, are available for just a few dollars.



A 3 cell 5 Amp-hour Li-po pack, weighing in at just 360g, is only 14% the weight of a standard 7 Amp-hour Sealed Lead Acid battery, yet it still provides just under 70% of the power, (based on an average 3.8V per cell) and costs about the same.

Over the past few years I have started to replace my 12V SLA batteries with the smaller Li-po packs and have found that I can run my Meade LXD55 GEM for at least 6 hours from a 2.2 Amp-hour 3 cell pack, while my more power hungry HEQ5-Pro GEM can get just under 5hours with a 5 Amp-hour pack. Joe Grida and Alan Brinkworth both run their 16-inch and 18-inch Dobsonian - Argo Navis/ServoCat setup for at least 10hrs on a 5 Amp-hour pack.

Because of the unique charging profile required for Lithium rechargable batteries, special battery chargers have been developed, to monitor and control the charge rate of each individual cell in the battery pack. Most of these chargers allow you to select the particular type and size of the Lithuim battery that you require charging. These chargers generally cost about the same as the average Lead Acid type battery charger and most will even have the SLA battery charging capability.

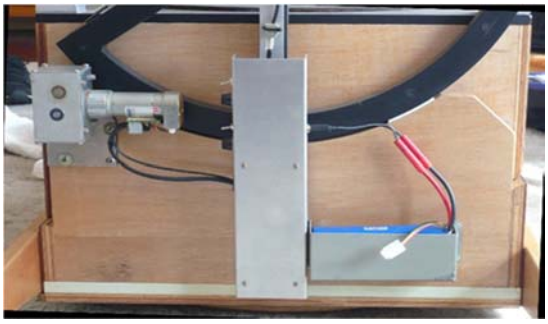
Like any battery power pack, care needs to be taken to ensure that the circuit is suitably protected with a fuse, all wiring/connectors be adequately insulated and that the power requirements/polarity be correctly matched for the equipment being powered. Because Li-po batteries are capable of extremely large discharge currents, up to 40 times the rated capacity, care should be taken when charging/storing/transporting them. Radio control model shops will stock Li-po safe storage bags if you require one.

If you do need to replace that ageing SLA or Ni-MH battery pack used for powering your astronomy gear, Li-po and Li-ion battery packs could be a more compact and light weight solution.

Left: *5 Amp-Hour Li-po battery pack.*

Right: *Battery mounted on an 18" telescope.*

Photos: *Alan Brinkworth*



Profile

A occasional series of articles profiling amateurs from Australia and abroad

We start this series with Andrew Hradesky, from the Central Arkansas Astronomical Society in Little Rock, Arkansas, USA. I first met Andrew, early in 2014, when I was asked to do a presentation about ASSA to the CAAS.

When not on some grand outdoor adventure, Andrew Hradesky (Ra-desk-ee) spends his spare time assisting the Arkansas Oklahoma Astronomical and Central Arkansas Astronomical Societies with their endeavours. His interests and involvement in Astronomy date back to 1977, when at the age of 16, he joined his first astronomy club, the St. Petersburg Astronomical Society (SPAC), located in the state of Florida, U.S.A., his home state. Over the years, his dedication earned him the seat of Vice President.

Among his other achievements:

- *President of the Clearwater-Largo Astronomical Society (CLAS) for two terms*
- *Director-At-Large and Key Holder to the Hickory Hill Observatory Complex for the former Tampa Amateur Astronomical Society (TAAS)*
- *Life long member of the Colorado Springs Astronomical Society (CSAS),*
- *Optical and Telescopic Equipment Chair, Out-Reach Supporter and Presenter for the Central Arkansas Astronomical Society*
- *Vice-President of the Arkansas Oklahoma Astronomical Society*
- *Member-at-Large for both the Royal Astronomical Society of Canada and the Astronomical League*
- *Chapter Leader for the state of Arkansas with the International Dark Sky Association (IDA)*

Andrew earned his B.A. degree in Information Systems at Eckerd College in St. Petersburg, FL. From 1986 to 1994, his enrolment into the United State Air Force, and afterward, with the Lockheed Technical Operation Company (LTOC), offered further opportunities and training in the support of launch, early orbit, and on-orbit operations as a Data Handler and Satellite Operations Controller. Today, after working as a Lieutenant for the Arkansas Department of Correction's Training Academy, Andrew has been working as a Training and Exercise Coordinator for the Arkansas Department of Health's Preparedness and Emergency Response Branch.

His off time hours are spent at his Pine Mountain Observatory (see photo below) where he collaborates with the Kiowa Creek Observatory and the Arkansas Sky Observatories. He loves to give presentations and talks from light pollution to Star Party (Astro-Camps) Etiquette and observational techniques. He also provides field data on Grazing Occultations with the United States Naval Observatory.

Pine Mountain Observatory (PMO), was rebuilt at the current location in April 2013. Even though PMO's address is off of Pine Mountain Drive, it's namesake is in honour of Andrew's very first sighting of the night sky sprinkled with the summer Milky Way near a resort named Calloway Gardens in the first mountain range of the Appalachians. He was 9 years old and had never seen so many stars. Because of this impression, that single moment would forever shape his future as an amateur astronomer.

The design for PMO was laborious on several different levels. One being cost while the other contributing to ease of use. A dome was not considered because of cost. Weather was the next consideration. Winds, during approaching storms can gust up to over 100 kms/hr. The Force 4 tornado, that skimmed by in April 2014, left structural damage to the property buildings due to the debris path and 10 fallen trees.

So, he settled for a building that is low profile, tough in the wind with a raised floor due to sharp terrain angles and allow thermals to dissipate underneath. The building allows the scope to be pretty much acclimated all the time to internal thermals. Oh yes, and the need for security from wildlife since there are mountain lions, coyotes/wolves, deer, wild turkeys, and just recently discovered, black bears!

The back wall stops at a 45 degree angle and will used as a chart table. Designs for 3 cubby holes and angled red lighting are in the works. Installation of a floor rail is also planned so a seat can glide back and forth while working star charts. The telescope mounted inside PMO is an Orion SkyQuest XX14g Computerized GoTo Truss Tube Dobsonian F4.6.

Monster black hole discovered at cosmic dawn

The discovery of the brightest quasar in the early universe, powered by the most massive black hole yet known at that time presents a puzzle to researchers: How could something so massive and luminous form so early in the universe, only 900 million years after the Big Bang?

The discovery of this quasar, named SDSS J0100+2802, marks an important step in understanding how quasars, the most powerful objects in the universe, have evolved from the earliest epoch, only 900 million years after the Big Bang, which is thought to have happened 13.7 billion years ago. The quasar, with its central black hole mass of 12 billion solar masses and the luminosity of 420 trillion suns, is at a distance of 12.8 billion light-years from Earth.

The discovery of this ultraluminous quasar also presents a major puzzle to the theory of black hole growth at early universe, according to Xiaohui Fan, Regents' Professor of Astronomy at the UA's Steward Observatory, who co-authored the study.

"How can a quasar so luminous, and a black hole so massive, form so early in the history of the universe, at an era soon after the earliest stars and galaxies have just emerged?" Fan said. "And what is the relationship between this monster black hole and its surrounding environment, including its host galaxy?

"This ultraluminous quasar with its supermassive black hole provides a unique laboratory to the study of the mass assembly and galaxy formation around the most massive black holes in the early universe."

The quasar dates from a time close to the end of an important cosmic event that astronomers referred to as the "epoch of reionization": the cosmic dawn when light from the earliest generations of galaxies and quasars is thought to have ended the "cosmic dark ages" and transformed the universe into how we see it today.

Discovered in 1963, quasars are the most powerful objects beyond our Milky Way galaxy, beaming vast amounts of energy across space as the supermassive black hole in their center sucks in matter from its surroundings. Thanks to the new generation of digital sky surveys, astronomers have discovered more than 200,000 quasars, with ages ranging

Above: *This is an artist's impression of a quasar with a supermassive black hole in the distant universe. Credit: Zhaoyu Li/ NASA/JPL-Caltech/Misti Mountain Observatory*

from 0.7 billion years after the Big Bang to today.

Shining with the equivalent of 420 trillion suns, the new quasar is seven times brighter than the most distant quasar known (which is 13 billion years away). It harbors a black hole with mass of 12 billion solar masses, proving it to be the most luminous quasar with the most massive black hole among all the known high redshift (very distant) quasars. "By comparison, our own Milky Way galaxy has a black hole with a mass of only 4 million solar masses at its center; the black hole that powers this new quasar is 3,000 time heavier," Fan said.

Feige Wang, a doctoral student from Peking University who is supervised jointly by Fan and Prof. Xue-Bing Wu at Peking University, the study's lead author, initially spotted this quasar for further study.

"This quasar was first discovered by our 2.4-meter Lijiang Telescope in Yunnan, China, making it the only quasar ever discovered by a 2-meter telescope at such distance, and we're very proud of it," Wang said. "The ultraluminous nature of this quasar will allow us to make unprecedented measurements of the temperature, ionization state and metal content of the intergalactic medium at the epoch of reionization."

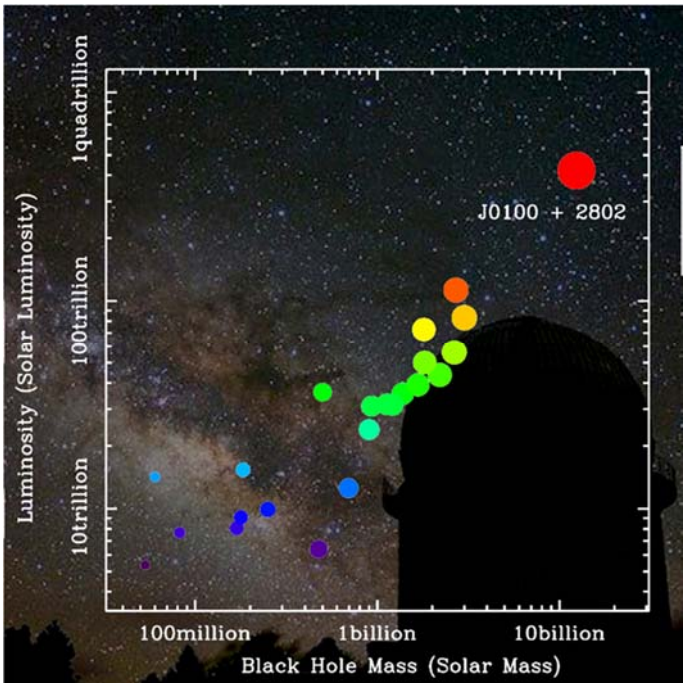
Following the initial discovery, two telescopes in southern Arizona did the heavy lifting in determining the distance and mass of the black hole: the 8.4-meter Large Binocular Telescope, or LBT, on Mount Graham and the 6.5-meter Multiple Mirror Telescope, or MMT, on Mount Hopkins. Additional observations with the 6.5-meter Magellan Telescope in Las Campanas Observatory, Chile, and the 8.2-meter Gemini North Telescope in Mauna Kea, Hawaii, confirmed the results.

"This quasar is very unique," said Xue-Bing Wu, a professor of the Department of Astronomy, School of Physics at Peking University and the associate director of the Kavli Institute of Astronomy and Astrophysics. "Just like the brightest lighthouse in the distant universe, its glowing light will help us to probe more about the early universe."
Wu leads a team that has developed a method to effectively select quasars in the distant universe based on optical and near-infrared photometric data, in particular using data from the Sloan Digital Sky Survey and NASA's Wide-Field Infrared Explorer, or WISE, satellite.

"This is a great accomplishment for the LBT," said Fan, who chairs the LBT Scientific Advisory Committee and also discovered the previous record holders for the most massive black hole in the early universe, about a fourth of the size of the newly discovered object. "The especially sensitive optical and infrared spectrographs of the LBT provided the early assessment of both the distance of the quasars and the mass of the black hole at the quasar's center."
For Christian Veillet, director of the Large Binocular Telescope Observatory, or LBTO, this discovery demonstrates both the power of international collaborations and the benefit of using a variety of facilities spread throughout the world.

"This result is particularly gratifying for LBTO, which is well on its way to full nighttime operations," Veillet said. "While in this case the authors used two different instruments in series, one for visible light spectroscopy and one for near-infrared imaging, LBTO will soon offer a pair of instruments that can be used simultaneously, effectively doubling the number of observations possible in clear skies and ultimately creating even more exciting science."

To further unveil the nature of this remarkable quasar, and to shed light on the physical processes that led to the formation of the earliest supermassive black holes, the research team will carry out further investigations on this quasar with more international telescopes, including the Hubble Space Telescope and the Chandra X-ray Telescope.



Story Source:
University of Arizona. "Monster black hole discovered at cosmic dawn." ScienceDaily, 25 February 2015.
www.sciencedaily.com/releases/2015/02/150225142452.htm

Left: *The newly discovered quasar SDSS J0100+2802 is the one with the most massive black hole and the highest luminosity among all known distant quasars. The background photo, provided by Yunnan Observatory, shows the dome of the 2.4meter telescope and the sky above it. (Image: Zhaoyu Li/Shanghai Observatory)*

Solar System Highlights

The major planets during May 2015

by Joe Grida

Four of the five naked eye planets all grace the evening sky this month.

As the diary below indicates, **Mercury** reaches its greatest elongation east of the Sun on the 7th of May, however you'll need a very clear western horizon, preferably over water to glimpse it. Just half an hour after sunset, at 6:00pm CST, it will only be at an elevation of 4°! The NASA Messenger mission to Mercury will end about the time you read this, with a fiery crash of the spacecraft into Mercury expected to occur in late April-early May, after 4 very successful years of exploration.

You can find brilliant **Venus** in the twilight north-western sky, just 4° north of the Crab Nebula in Taurus on May 1st. By the 8th, it will have crossed into Gemini. In a telescope, it displays a disk of 19 arc-seconds, at a magnitude of –4.2. Catch a nice view of the 3-day old crescent Moon and Venus on May 21st.

Mars is disappearing into the sunset, chasing a solar conjunction in mid-June.

Venus might be the flashy one early in the night, but **Jupiter** still dominates the northern sky. It's pulling away from M44 (the Beehive) in Cancer, heading east for the border with Leo by month's end. At this time, Jupiter is 9° to the south-east of M44; whilst Venus is catching up, 9° to the north-west of M44. I'm looking forward to their very close conjunction on July 1. Meanwhile, the Galilean moons are a delight to watch. Io begins a transit just after 9:00pm on May 1st, whilst its shadow begins its crossing of the planet at 10:19pm.

There's none more glamourous than the ringed planet, **Saturn**. And, what a glorious sight it is! It reaches opposition on May 22nd, so it's visible all night. With its rings tilted a wide 24°, they help to bring Saturn' brightness to mag 0.0. The planet displays a diameter of 18.5 arc-seconds, whilst the rings span 42 arc-seconds. It retrogrades back into Libra by mid-May.

Of the outer planets, **Uranus** rises before dawn in Pisces; whilst **Neptune** is still lurking with Aquarius, rising in the early hours of the morning.

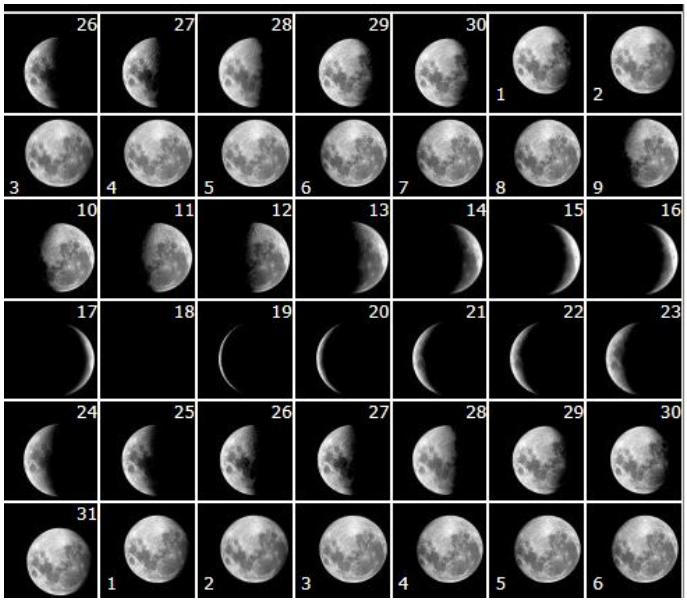
Dairy of phenomena

May 2015

d	h(UT)	
2	14	Spica 3.3°S of Moon
4	3	**FULL MOON**
5	16	Saturn 2.0°S of Moon
7	4	Mercury greatest elong E(21°)
7	13	Moon furthest South (-18.3°)
8	21	Pluto 3.1°S of Moon
11	10	**LAST QUARTER**
12	19	Neptune 3.3°S of Moon
14	23	Moon at perigee
15	12	Uranus 0.2°N of Moon
18	4	**NEW MOON**
18	17	Mars 4.6°N of Moon
19	2	Aldebaran 1.0°S of Moon
19	7	Mercury 5.6°N of Moon
19	12	Mercury stationary
20	9	Moon furthest North (18.4°)
23	1	Saturn at opposition
24	4	Jupiter 5.0°N of Moon
25	9	Regulus 3.6°N of Moon
25	17	**FIRST QUARTER**
26	22	Moon at apogee
27	9	Mercury 1.6°S of Mars
28	20	Mercury 3.9°N of Aldebaran
29	21	Spica 3.4°S of Moon

Above: *Excellent picture of Jupiter taken by Damian Peach on 2 March 2015, using a Celestron 14 telescope and ASI174MM CCD*

Moon Phases - May 2015



Southern Hemisphere Comets

by Michael Mattiazzo

A roundup of bright and telescopic comets visible for southern hemisphere observers

Comets galore, including a potential faint naked eye southern comet C/2015 G2 MASTER this May!

Last March and April were very active months with no less than 6 comets discovered by amateurs.

Three objects, C/2015 C2 SWAN, C/2015 F3 SWAN and C/2015 F5 SWAN-Xingming all could have been found by southern hemisphere comet hunters.

Alas, the opportunities went begging for these northward bound comets.

See last months bulletin on my discovery story of C/2015 C2 SWAN. I must have been sleeping whilst the other SWAN objects were being picked up!

C/2015 F3 SWAN

Was found by R Matson and V Bezugly on SWAN images and confirmed by numerous observers as a 10th magnitude comet, observable only from the northern hemisphere. Perihelion occurred on 2015 March 9 at a distance of 0.83AU.

It is a very interesting object as the orbital elements appear to be identical with 2 other comets, C/1988 A1 Liller and C/1996 Q1 Tabur.

The most likely explanation is that a comet broke apart 3000+ years ago and the fragments are now returning, separated by nearly 30 years.

How many more fragments are still on their way in? Only time will tell, but let's hope the biggest piece is yet to arrive.

C/2015 F5 SWAN-Xingming

Was found by S Liwo and W Boonplod in SWAN images, as well as from the ground by G Sun, in the course of the Xingming sky survey.

Perihelion occurred on 2015 March 28 at 0.34AU. It was as bright as 8th magnitude but located deep in twilight.

There were 2 other fainter comets discovered that were located in the southern hemisphere.

C/2015 F2 Polonia

Arrived at perihelion on 2015 April 29 at a distance of 1.2AU. It is closest to Earth on 2015 May 8 at 0.71AU.

At the start of May, It will be situated in Capricorn, rising after midnight. It is not expected to be brighter than magnitude 13 but being periodic in nature (with an orbit of around 50 years) it could surprise us.

C/2015 F4 Jacques

Arrives at perihelion on 2015 August 9 at a distance of 1.67AU. It is closest to Earth on 2015 July 17 at 0.77AU. It may peak at magnitude 12 during July as it treks northwards through Aquila, Delphinus and Sagitta.

C/2015 G2 MASTER

Another opportunity missed. The story begins on the morning of March 31st, Rob Kauffman, Bright, Victoria and I both imaged comet 88P Howell, situated in the morning sky.

Above: *Comets 88P Howell and M503ujx in the same field of view, imaged by Michael Mattiazzo on 2015 April 8 at 19:15UT. Canon 60Da + Sigma 200mm lens, 3 minute exposure. FOV 4^{o} wide. North top left.*

Southern Hemisphere Comets

by Michael Mattiazzo

A roundup of bright and telescopic comets visible for southern hemisphere observers

Little did we know that a new, undiscovered comet was situated only a couple of degrees away from 88P!

Then on April 7, D. Denisenko reported the discovery of a comet on images taken with the Mobile Astronomical System of Telescopic Robots at the South African Astronomical observatory. The comet was posted on the PCC webpage as M503ujx, I checked my 88P images, but the new comet was located just outside my field of view. Rob Kauffman however had taken a pre-discovery image of it but hadn't noticed it at the time!

My visual magnitude and coma-diameter estimate on April 8.80 UT was 9.7 and 2'.5, using a 20-cm reflector in moonlight. The comet appeared more condensed but slightly smaller and fainter than Comet 88P, which was 2.5° to the northeast. See image at top right, sporting an ion tail, taken at the same time using the remote I-TEL 0.50m F/6.8 astrograph at Siding Spring.

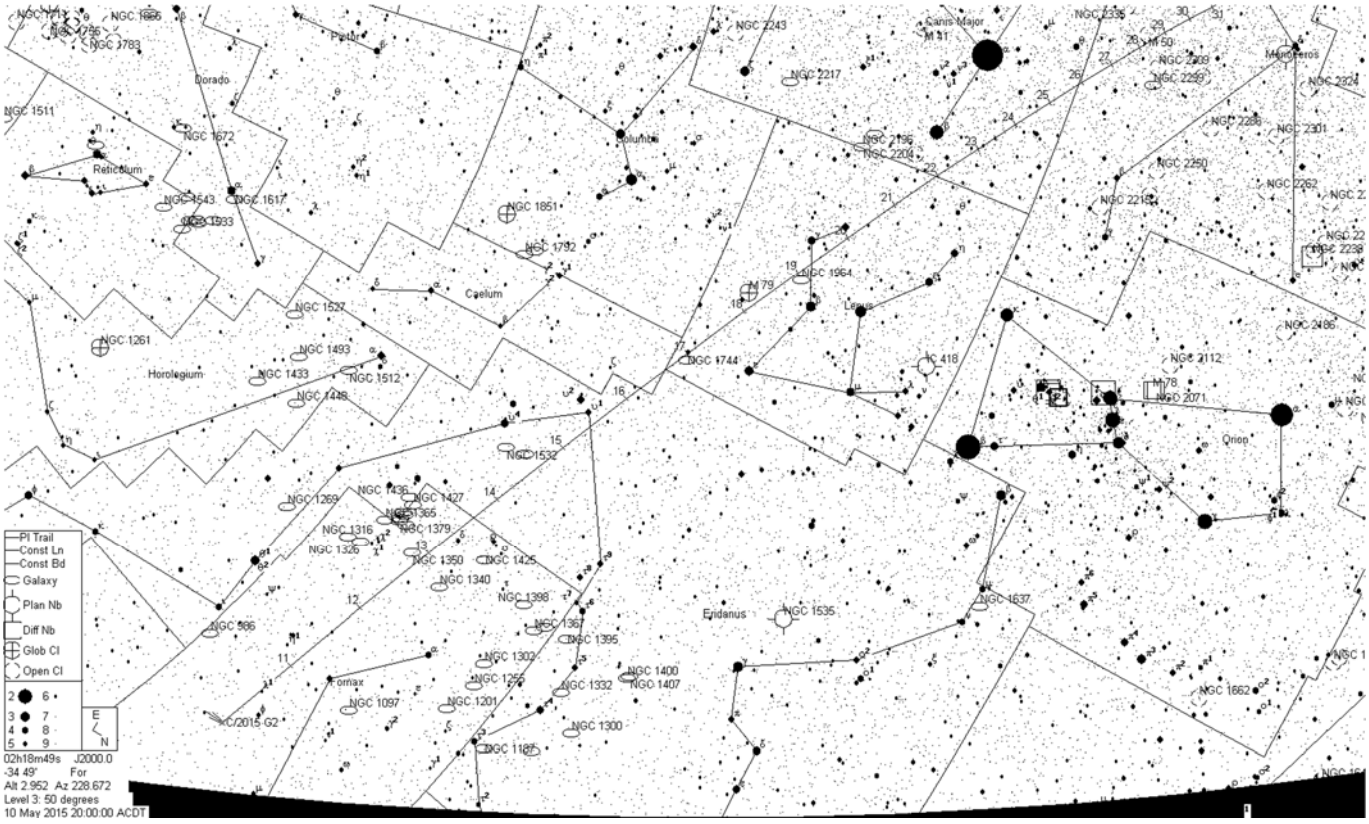
Comet MASTER will be a promising target for southern observers this May, when the comet arrives at perihelion on May 23 at 0.77AU. (See attached chart). Prior to this, it will have a close Earth encounter at a distance of 0.47AU on May 13.

At the start of May, you will find the magnitude 7 comet situated in Sculptor, in the hour before dawn. Moonlight will interfere from the 3rd but fortunately the comet moves rapidly into the evening sky and will be visible from May 10 in Fornax, low in the southwest after sunset. The comet should be at maximum brightness of magnitude 6 when it passes Earth on May 13, however if the comet is periodic in nature, it has potential to become brighter, particularly if an outburst occurs.

The comet's rapid easterly motion will take it through Eridanus by May 14, Lupus by May 17, Canis Major by May 22, and Monoceros by May 26.

However, moonlight will start to interfere from May 22. Interesting deep sky rendezvous occur on the 13th, near NGC 1350 and Fornax galaxy group, on the 17th near NGC 1744, on the 18th near globular M79 and on the 19th near NGC 1964.

As usual, check my website for latest updates on the predicted peak brightness of comet MASTER.
http://members.westnet.com.au/mmatti/sc.htm

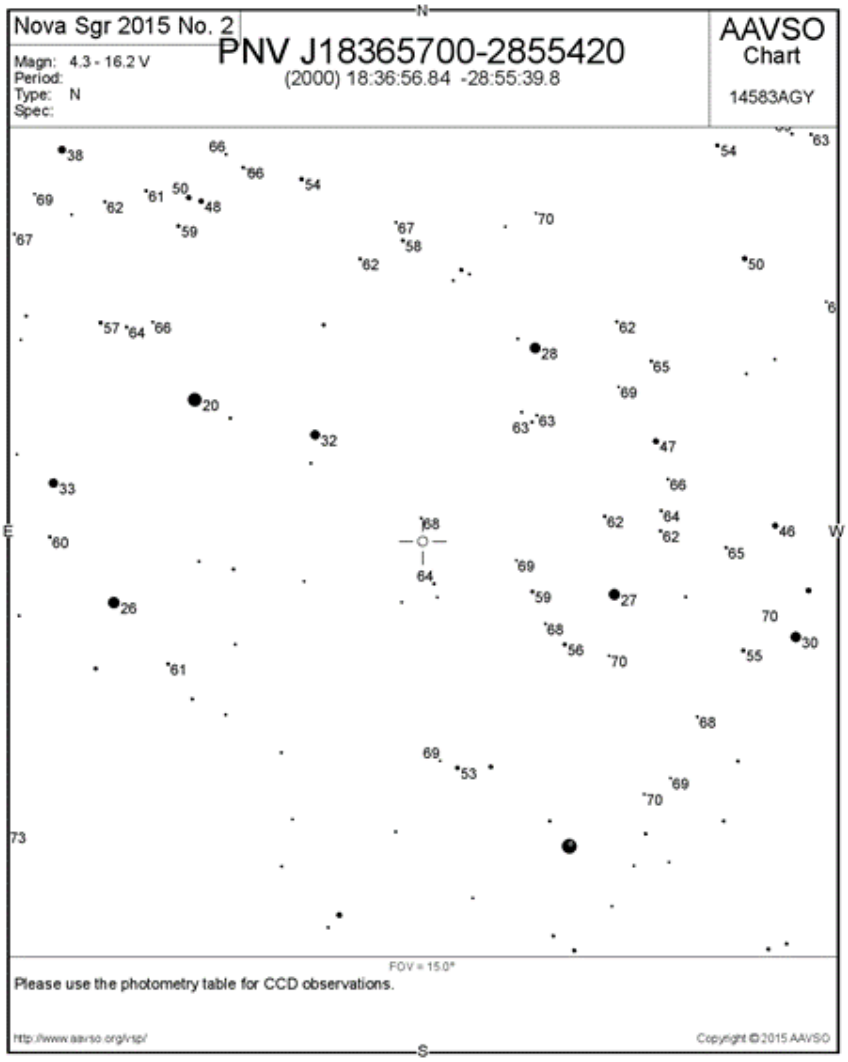


Variable Vagaries

by David Benn

This regular column will cover happenings in the ever-changing world of variable stars.

Nova Sagittarii 2015 No. 2 has kept me occupied since mid-March. This is how it appeared on March 22 in an image taken with my Canon 1100D, one I also used for photometry. ASSA member Jeff Lusher also took a great wide-field image of Sagittarius, with the nova circled: http://www.astrobin.com/168802

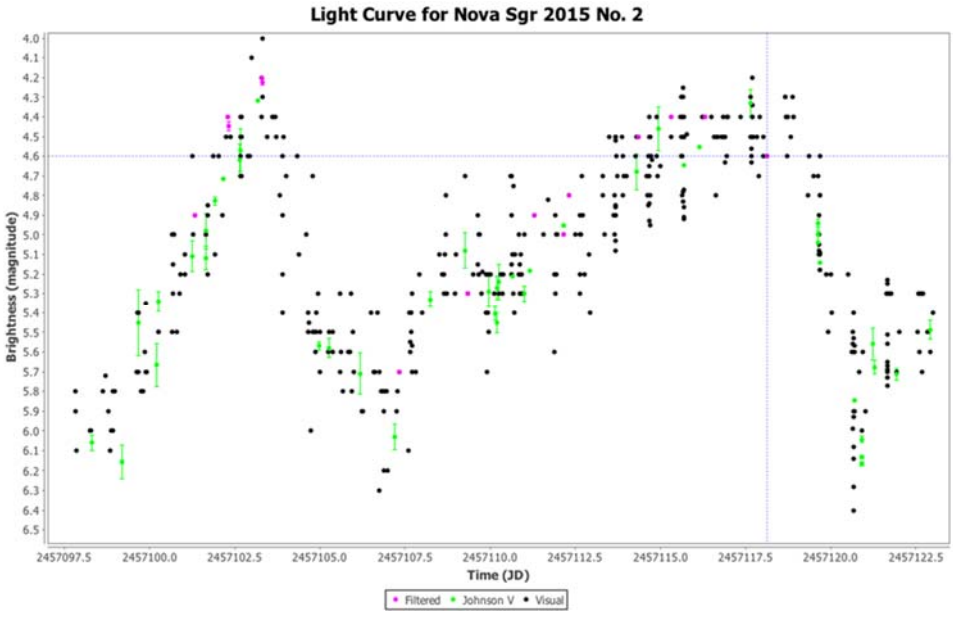


At right, is an AAVSO finder chart for the nova.

The rather noisy light curve (bottom right) as of April 11 shows the kind of early oscillations in magnitude that seem to be common in novae and were present in the last two I observed.

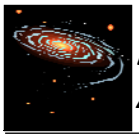
Novae often rise from obscurity to naked eye visibility within a day or two. This one peaked at around magnitude 4.3. My observations are highlighted in purple with the last one (on April 5) under the cross-hairs. Most of mine are visual estimates with two DSLR observations. I have two more waiting to be processed. Notice the sudden decline on April 7 and the odd behaviour in the last few days. I look forward to making more observations soon when the sky clears for long enough.

Discussion on the AAVSO nova forum (http://www.aavso.org/n-sgr-2015-no2-000-blp-536) shows that not only are amateurs doing visual and image based photometry of the nova, but are also obtaining spectra (both useful to professional astronomers), e.g. as NZ amateur Jonathon Powles is doing. Spectral changes over time reveal the evolution of the nova, in particular, the expanding ejecta shell, parts of which have reached a velocity of more than 1000 km per second.



The rate of decline of a nova helps to pin down its sub-type it is as well as its distance. I'll provide an update next month and, in the meantime, on the ASSA variable stars forum and my blog (https://dbenn.wordpress.com/category/astronomy/).

This Sky & Telescope News article about the nova is worth reading: http://www.skyandtelescope.com/astronomy-news/observing-news/nova-sagittarii-catch-it-while-you-still-can/



Alone in the dark

A guide to observing faint fuzzies in our night sky ***by Joe Grida***

Observing the Abell Galaxy Cluster 1060 in Hydra

With autumn well and truly here, every deep sky observer's heart turns to galaxies. Leo, Virgo, and Hydra play host to lots of beautiful extra-galactic vistas. This month, we visit the Abell Galaxy Cluster 1060 in Hydra, also known as The Hydra I Cluster, which in turn is part of the Hydra-Centaurus Supercluster. The cluster contains 157 bright galaxies at a distance of 158 million light years, and spans about 10 million light years. The cluster's largest galaxies are elliptical galaxies NGC 3309 and NGC 3311 and the spiral galaxy NGC 3312 all having a diameter of about 150,000 light years.

The cluster is centred around NGC 3311 at RA 10:36:43 and Dec -27:31:36. The central portion of the cluster is framed by 2 foreground stars. See the image below. The brighter one, 9.6' north-east of NGC 3311 is 4.87 mag HD92036, a spectral class K5 orange dwarf, 480 light years from Earth. The other star HD91964, 7.6' south of the galaxy, is fainter at mag 6.6, and is also a K2 orange dwarf. It lies 860 light years away.

The last time I observed this cluster was from Stockport, during the March 14 Members' Night, using the observatory 15" Dobsonian. Conditions weren't very good, with a bright sky, nevertheless all six of the bright member galaxies were easily viewed.

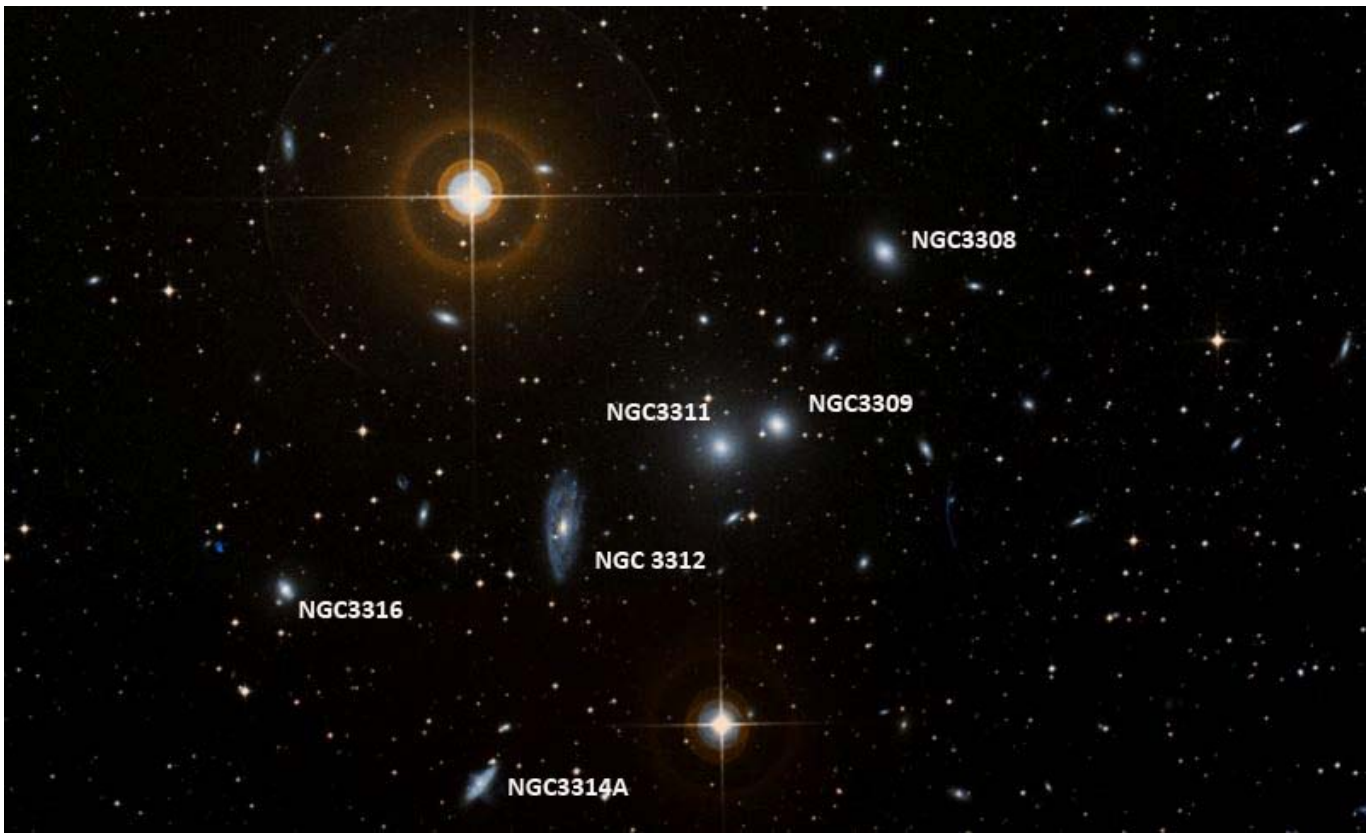
NGC 3311, with a visual magnitude of 11.6, and a size of 3.5'x2.9' is the largest, but with a surface brightness of only 14.1, not the easiest to see. That crown goes to nearby, 1.7' to the west, **NGC 3309**. Despite it being listed as the same magnitude as NGC 3311, it is smaller in size at 1.9' x 1.6', and therefore appears brighter. This galaxy has a surface brightness of 12.8.

NGC 3308 is located 7.1' to the north-west of NGC 3311. This is a fairly small galaxy of 1.7' x 1.3', at a magnitude of 11.9. It displays quite a bright core, looks slightly elongated.

NGC 3312, just 5' south-east of NGC 3311 is classified as an SAb (pec) galaxy, and contains an active galactic nucleus. It was discovered by John Herschel on March 26, 1835 whilst observing from the Cape of Good Hope in South Africa.

NGC 3316 is located 12' to the east-south-east of NGC 3311. This small galaxy is quite dim at mag 12.6, and appears as a round blob with a brighter core.

Another member of the group is the intriguing overlapping galaxy pair catalogued as **NGC 3314**, 11.3' to the south-east of NGC 3311. The HST took a remarkable image of NGC 3314, revealing a face-on galaxy superimposed on an edge-on galaxy with dust within the foreground galaxy seen only because it is silhouetted against the light from the galaxy behind it. See it here:
http://apod.nasa.gov/apod/ap110715.html



Above: *A Digitized Sky Survey image of the centre of AGC 1060. Field of view is 44' wide, with north at the top.*

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Here's how to contact various members of Council, Regional Co-ordinators and SIG's

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Whyalla

The group meets on the first Thursday of the month.

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Email: whyalla@assa.org.au

Northern Yorke Peninsula

The NYP'pers hold combined members' and public viewing nights monthly.

Coordinator: Tony Henderson
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Email: nyp@assa.org.au

Riverland

The Riverland group hold combined members' and public viewing nights monthly.

Co-ordinator: Tim Vivian
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Email: riverland@assa.org.au

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South Australia Telescope (36")	*sat@assa.org.au*	

Members' Gallery

Highlighting members' astrophotos

Above: Photo of Aurora Australis, taken by **Paul Haese** at Petrel Cove, SA on March 18, 2015.

Below: Image of the total eclipse of the Moon , taken by **Jarrod Koh**, Adelaide SA on April 4, 2015 at 10:33pm ACSST. Celestron CPC 11 with a f/6.3 focal reducer. ISO 400, 2 second exposure.