



mnassa

Monthly Notes of the Astronomical Society of Southern Africa
Vol 72 Nos 7 - 10
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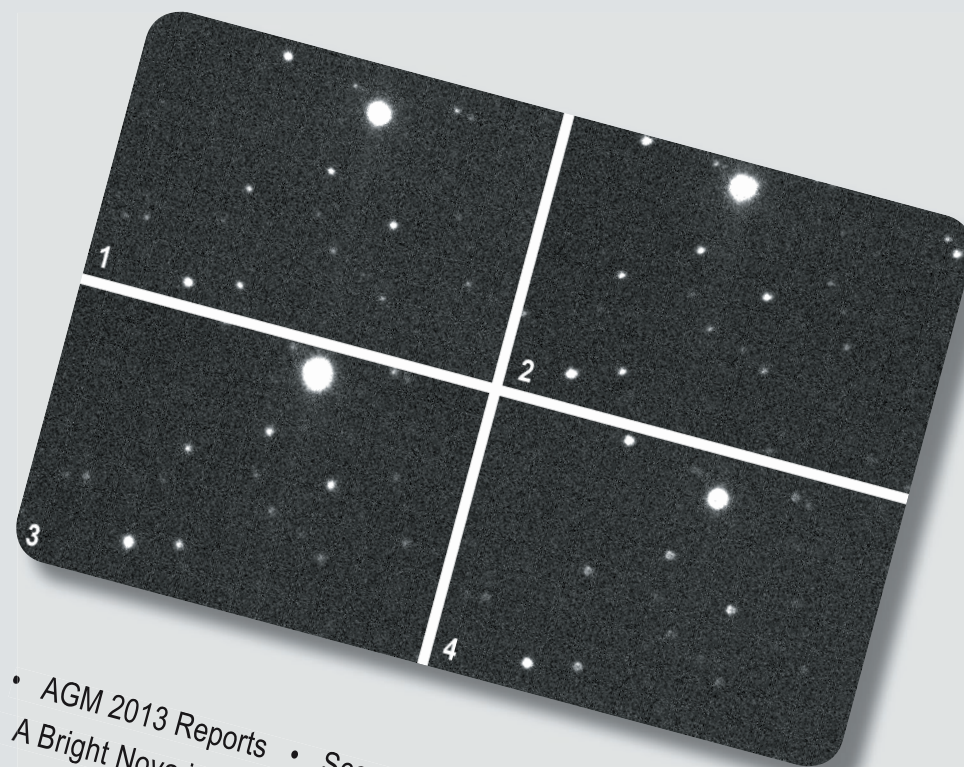
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monthly notes of the astronomical society of southern africa

OCTOBER 2013

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monthly notes of the astronomical society of southern africa

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Cover: Nova Delphinus

Nova Del as imaged by Brian Fraser (see article on p. 158). The Nova is the brightest star in every frame. Image 1 was taken on 15 August, image 2 on 16 August, image 3 on 17 August and finally image 4 on 26 August 2013.

astronomical society of southern africa

The **Astronomical Society of Southern Africa** (ASSA) was formed in 1922 by the amalgamation of the Cape Astronomical Association (founded 1912) and the Johannesburg Astronomical Association (founded 1918). It is a body consisting of both amateur and professional astronomers.

Publications: The Society publishes its own electronic journal, the *Monthly Notes of the Astronomical Society of Southern Africa* (*MNASSA*) bimonthly and an annual printed *Sky Guide Africa South*.

Membership: Membership of the Society is open to all. Potential members should consult the Society's web page assa.saa.ac.za for details. Joining is possible via one of the Local Centres or as a Country Member.

Local Centres: Local Centres of the Society exist at Bloemfontein, Cape Town, Durban, Harare, Hermanus, Johannesburg, Pietermaritzburg (Natal Midlands Centre), Pretoria and Sedgfield district (Garden Route Centre). Membership of any of these Centres automatically confers membership of the Society.

Sky & Telescope: Members may subscribe to *Sky & Telescope* at a significant discount (proof of Centre membership required). Please contact membership secretary for details.

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astronomical society of southern africa

two fishes in the starry sea

Robert Douglas sees this little gem, which comprises six stars of various magnitudes, as a “Flying Wing”. What stands out is the combination of yellow-coloured stars taking pride of place alongside the brighter magnitude 7 orange star.

A rich galaxy group known as the Pisces Group of Galaxies is situated in the far north-eastern part of the constellation and virtually on the border with Andromeda. In the central concentration of the group, which could total a few hundred galaxies, is the peculiar galaxy **NGC 507**. The galaxy displays a lovely round haze, brighter than one would have expected it to be. The nucleus is a third of the total glow and quite outstanding. NGC 508, another elliptical galaxy on the periphery of NGC 507's northern edge, is considerably smaller, but relatively bright, and shows concentric rings in deep photographs. NGC 504, slightly further south of NGC 507, is a smart, edge-on galaxy, but rather faint to appreciate to

its full capacity. Just west of it, the lovely bright yellow magnitude 7.6 and golden magnitude 10 pair complement this immediate group of galaxies.

About 2.5° further south-west, among a multitude of galaxies, another asterism can be found. Sadly, the little cluster is rather faint, but for the odd diversion within galaxy world, searching for objects like this can be worthwhile and fun. The author could only ferret out three magnitude 12 stars in a north-south formation, together with a few fainter ones, 23' east of the galaxy NGC 420. The asterism is listed as **PKL 98** – the acronym and date derive from Platais, Kozhurina-Platis and Van Leeuwen 1998 (*Star Clusters – Archinal & Hynes*).

If you have time to search, go out and claim galaxies one by one from within the vast starry sea of fish. But be sure to use a moderate to large telescope, and most importantly, pick a very dark starry night ☆

Object	Type	RA (J2000.0)	Dec	Mag	Size
III Zw 002	Galaxy	00 ^h 10 ^m 5	+10°58	18	-
HD 4798	Grouping	00 50 2	+28 22	9.5	5.6'
NGC 305	Open Cluster	00 56 3	+12 04	11.5	2.5'
PKL 98	Asterism	01 13 8	+32 02	12	3'
NGC 507	Galaxy	01 23 7	+33 15	11.2	4.1'x3.5'
NGC 628 - M 74	Galaxy	01 36 7	+15 47	9.4	10.5'x11'
NGC 660	Galaxy	01 43 1	+13 39	11.2	9.2'x4.2'
NGC 7714	Galaxy	23 36 2	+02 09	12.5	1.6'x1.4'
NGC 7715	Galaxy	23 36 4	+02 10	14	2.9'x0.4'



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Editorial

I recently received a copy of *Crux* – the newsletter of the Astronomical Society of Victoria, in Australia. The one thing that I noticed was that it contained a number of really good images taken by members. I have judged many astrophotographs over the years, including those at ScopeX, I know that our members are capable of producing some really stunning images that deserve a wider viewing. I am more than happy to publish good and

interesting images in *MNASSA*. I would like to suggest that those wanting to submit images, to send me* an image of about 200kB and I will then ask for a higher resolution image for those that will be published in *MNASSA*.

I look forward to seeing some of your efforts!

* Either at particles@mweb.co.za or case@sao.ac.za ☆

This year's Annual General Meeting of the ASSA was held in Auditorium of the SAAO, Cape Town on 7 August 2013 where the following reports were presented.

ASSA Council Report, 2012-2013

IS Glass, President

Membership

The following membership numbers have been provided by the relevant Centres:

Cape Centre	73
Hermanus	76
Pretoria	93
Garden route	49

The total of these is about similar to last year.

AGM 2012

The proceedings of the 2012 Annual General Meeting were published in the August 2012 issue of *MNASSA*.

Council Matters

The Council met on seven occasions via Skype during the 2012-13 year. Once again, Chris Stewart is thanked for setting up the on-line meetings.

The dates and attendances of the Council meetings were as follows:

Date	Present	Apologies
29 September 2012	9	6
27 November 2012	10	5
24 January 2013	8	7
18 March 2013	9	6
20 May 2013	11	4
17 June 2013	8	7
15 July 2013	13	2

The Hon. Secretary, Lerika Cross, is thanked for preparing the agendas and writing up the minutes for each meeting. Chris Stewart facilitated the Skype contacting.

Sky Guide

Auke Slotegraaf continues as editor of the *Sky Guide* and was given a contract for the 2014 edition, which is nearly ready for the press, awaiting last-minute items such as the Committee memberships from the Centres. A number of changes will be introduced in this edition. Sales of the 2013 edition came to 4144 as of 29 July, according to Struik Random House.

MNASSA

MNASSA has been published six times during the year, electronically on the website: www.mnassa.org.za. Case Rijdsijk has continued as editor and Willie Koorts has continued with the typesetting and layout. Maciej Soltynski remains book editor. All those who have contributed are thanked for their work. Most *MNASSA* articles are listed on the NASA-ADS data service and are findable via Google etc. About 1 500 hits per month were recorded. A new layout was introduced at the start of 2013.

ASSA Website

Auke Slotegraaf, assisted by the ASSA webmaster Christian Hettlage, undertook a revision of the existing ASSA website by reviewing the current content and incorporating new material, to produce a content analysis for a future site. The new structure contains the amendments to certain ASSA functions, primarily relating to the Society's Sections, to create a final organogram. This has been implemented in WordPress and includes, as a major novelty, a discussion forum. The implementation has been beta-tested by a small group of interested volunteers. Migration of the data from the existing site to the new site continues. It is expected to go live mid-September or a bit later.

ScopeX

The Johannesburg Centres' ScopeX event, organized by Lerika Cross, was held on 20 July and was attended by approximately 2 000 of which about a third were youngsters. A detailed report will in due course appear on the website www.scopex.co.za.

ASSA Symposium 2012

The biennial ASSA symposium on the theme "Looking backward, Looking forward", was held on Saturday 13 and Sunday 14 October in the Auditorium of SAAO in Observatory, Cape Town.

Twenty-five papers were presented on a variety of subjects by members of the amateur and professional communities.

out considerably more than the slightly defined southern part. The nucleus is not at all outstanding, just a slight brightening towards the middle area. On the eastern edge of the galaxy a faint magnitude 13 star just comes to light. Even though the galaxy is visible only as a washed-out oval cloud, it is incredible when one thinks of and tries to grasp the process and composition of the object. William Herschel discovered this galaxy on the night of 12 September 1784.



NGC 628 also known as M74 - a spectacular face-on galaxy. Source: APOD

The showpiece of the Pisces constellation is **NGC 628** (M74), the one and only Messier object to be found in Pisces. The large face-on galaxy is situated only 1.3° east of eta Piscium and is relatively outstanding against the starry field. Although listed as relatively bright, the surface brightness is low, since the visible light is spread over a large area. With high magnification and steady observation the soft glow seems granular, enfolding a small nucleus. A flimsy unwinding structure can be glimpsed which cannot be defined, but which probably constitutes the spiral arm structures (see picture). Towards the west a handful of faint stars drape down into the southern field of view. So much more can be discovered and said about this galaxy, but the best is to study this object in more detail for oneself! The distance to this galaxy is about 24

million light years. On 11 July 1991 the asteroid Thisbe crossed over the galaxy, having what many believe to have been a supernova explosion. However a supernova has been reported in M74 on 27 July 2013 and spectroscopically confirmed as a young type II supernova. The Central Bureau reported position 1'.5 east and 2'.2 south of the centre of the galaxy. The discovery report gave magnitude 12.4, and a follow-up of magnitude 12.9.

A lovely break away from galaxy world is an asterism known only as the **HD 4798** group, after the identification of its brightest star. Situated in the far north-western part of the constellation and only 8' from the Andromeda border, this lovely asterism is a delight.

The smaller starry fish stretch along the north-eastern border of Pegasus, with the middle area indicated by eta Piscium, which glows with a magnitude of 3.6 and a yellow colour, with two close outstanding objects only a step away. The very rare galaxy **NGC 660**, which is called a polar ring, can be spotted about 3° south-east from eta Piscium and only one degree west of the constellation Aries. It is a type of galaxy in which an outer ring of gas and stars rotate over the poles (see picture). These polar rings can form when

two galaxies interact with each other. Material is tidily stripped from a passing galaxy or it could be that a smaller galaxy collides with the larger galaxy's plane of rotation. It is impossible to see the ring through ordinary amateur telescopes, but with favourable dark night vision the galaxy might be seen as a fairly soft, hazy oval. Some observers claim that they can spot a shape slightly resembling an "S" through larger telescopes. What stood out for me with high magnification was that the northern part of the galaxy fades



NGC660 - a rare polar ring galaxy. Credit: 24-inch telescope on Mt. Lemmon, AZ. Courtesy Joseph D. Shulman (Gemini)

The programme and abstracts were reported in the October 2012 *MNASSA*. The talks are available in their entirety on YouTube thanks to Auke Slotegraaf who recorded them and edited in the power point slides. These generated 8300 views so far. A list can be found by Googling "assa symposium".

A special feature was a workshop on Astrophotography processing, held in the SAAO 1896 building under the leadership of Dale Liebenberg on Friday, 12 October.

Delegates also visited the Iziko Planetarium at the Museum in Cape Town on 12 October.

Special thanks are due to those who participated in this event, those who helped organize it, those who spoke, those who helped on the actual days and to SAAO for the venue. Members of the Cape Centre took care of many of the practical matters. Oxford University Press contributed to the funding. Garth Hampshire, Hon. Treasurer of the Cape Centre, looked after the accounting.

The Symposium resulted in a small profit to ASSA.

ASSA Symposium 2014

The next ASSA Symposium will be held in Durban at the Hotel School Auditorium of the Durban Institute of Technology on 25-27 September. The Durban Symposium Committee is already hard at work!

ASSA Midlands Centre

The ASSA Natal Midlands Centre ceased to be viable last year and was closed down. Its residual funds were transferred to the Durban Centre.

SA National Committee for the IAU

ASSA was invited to nominate a member of this committee. Council agreed to appoint Case Rijsdijk. This Committee deals with matters pertaining to South Africa's membership of the IAU, such as nominations for membership.

Constitutional Matters

1. Registration as non-profit organization

The Hon. Treasurer, Adv. AJ Nel, has been corresponding with the Department of Social Development on this matter. The initial submission has resulted in the need to make some constitutional changes to comply with their regulations. A referendum among members will have to be held to ratify these changes.

2. Section Directors and proposed changes

To Council's great regret, Tim Cooper resigned as Section Director of the Comets, Asteroids and Meteors section, effective the date of the AGM. It was felt by all that this was a great loss to the Society, particularly since Tim had carried out this task in a really excellent manner.

Tim's resignation sparked a review on alternative ways to approach the objectives set out for ASSA Sections envisaged in the ASSA Constitution. A number of Section

Directors contributed to the review – notably Auke Slotegraaf – and a number of volunteer Council members. The key outcomes were to appoint specialists to support the work of the Section Directors and also to deploy the new ASSA website to facilitate communication and information sharing among everyone in the various area of interests.

Astronomy “Town Meeting”

The National Research Foundation held a “Town Meeting” of the professional astronomical community in Cape Town on 1-2 August 2013. Astronomical activities have greatly expanded in South Africa with the KAT, MeerKAT and SKA projects as well as interest in Gamma-ray astronomy. A large number of new posts have been created and a number of universities now offer astronomy courses that did not previously do so. A presentation on ASSA was made by Ian Glass, Case Rijdsdijk and Maciej Soltynski to promote the Society among the delegates and try to encourage more participation by the professional community.

Thanks

We have many people to thank for the help they have given to the Society during the year.

The Annual General Meeting has been hosted by the SAAO and members of the Cape Centre have arranged the refreshments. We thank their Chairperson, Lia Labuschagne, Tony Jones, Karen Koch and Christian Hettlage.

This is my last report as Chairman and I would like to take the opportunity of thanking all Council members for their help. As last year, Lerika Cross has done an excellent job of providing timeous agendas and minutes for each meeting. Much of the actual work of the Council rested on the shoulders of our Hon. Treasurer, AJ Nel. Chris Stewart set up the Skype meetings and much help was provided by Auke Slotegraaf and Christian Hettlage. Pat Booth is thanked for her work as Membership Secretary. ☆

Annual Report, Deep-sky Observing Section

Auke Slotegraaf

The recent surge in interest in observing the deep-sky, as reflected by observations submitted to the Section during the year, is surely mirrored by unreported observations made elsewhere (e.g. at Centre gatherings). Members are reminded that reports of all deep-sky observations are welcome.

New observers in the year under review include Allan Cassells and Jaco Wiese, who are hereby formally welcomed to the Section.

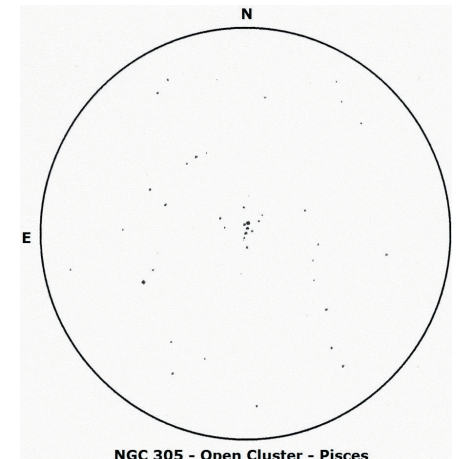
George Dehlen has distinguished himself by becoming the first observer to formally complete the “ASSA Top-100” deep-



Fritz Zwicky, 1898 - 1974 - source Wikipedia.

persuasive case that supernovas actually occur and ought to be observable in other galaxies and predicted the existence of low mass galaxies. He discovered the first such “dwarf” galaxies with the 100-inch telescope at Mt. Wilson observatory. Zwicky in effect discovered that most of the mass in the universe is invisible and called it “dark matter.” He was responsible for positing numerous cosmological theories that have a profound impact on the understanding of our universe today.

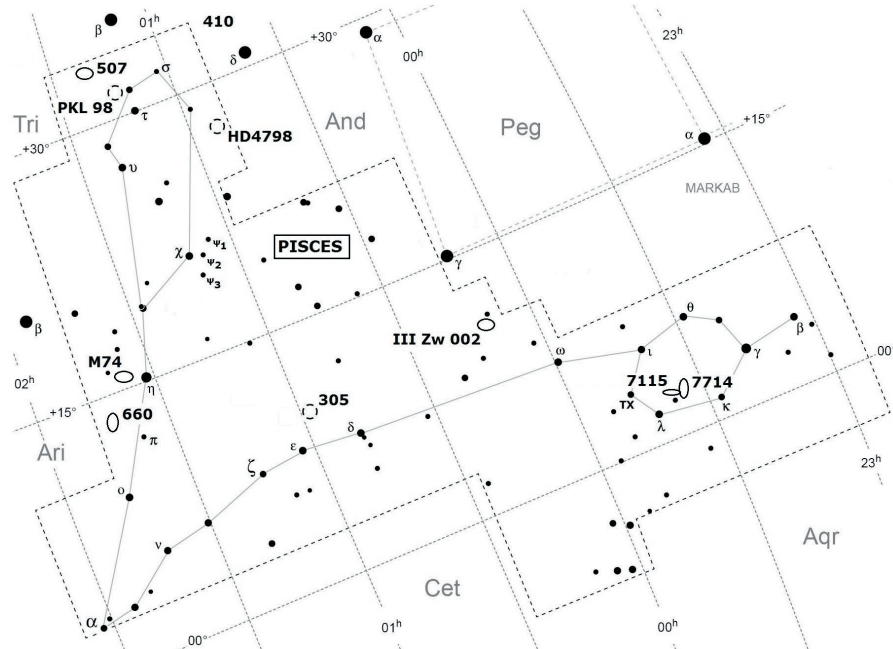
Halfway along the slender fish body, epsilon Piscium points the way to a very small, tight, open cluster. **NGC 305** is situated among several galaxies, all very faint. However, this open cluster



NGC 305 - Open Cluster - Pisces

is special and displays a very tight faint grouping of about eight stars running in a north-south direction (see sketch). The brightest northern-most star in this grouping is a buttery-yellow-coloured magnitude 11 star (GSC 608 677 2). It is also a double star with an equally yellow companion to the east. To find such a lovely grouping, although faint, in galaxy world is such a nice surprise. The cluster forms a triangle north of the galaxies IC 62 and IC 57, spanning only 50' distance between them.

Further along this body line of stars the beautiful double star zeta Piscium can be seen – a white-coloured magnitude 5 star with a yellow magnitude 6 companion with a separation of 23" that should be easy to spot through a medium telescope. Further east connecting the two fish at the tail ends is no other than alpha Piscium, a very close pair of magnitude 4 and 5.2 stars.



The line-up of stars forming the body of this larger fish are omega, epsilon, delta and zeta Piscium. A strange pair of galaxies that can be found about 5° north of omega Piscium is III Zw 002. The smaller galaxy has an extremely high compact redshift for its apparent magnitude and colours that resemble a quasi-stellar source due to hydrogen emission lines. However the larger galaxy was initially classified as a Seyfert-type, but later included in the PG quasar data basis. The galaxy shows dramatic radio outbursts roughly every five years, but interestingly, before and after the rapid expansions, there was a period of virtually no expansion. The jets interacting with a molecular cloud, describing the inflating balloon model and the evolution of radio lobes.

The Zw galaxies was named after Fritz Zwicky (see picture) who was born in Varna, Bulgaria 14 February 1898 and died 8 February 1974. He received an advanced education in mathematics and experimental physics at the Swiss Federal Institute of Technology, located in Zurich Switzerland. He reasoned that the violent collapse and explosion of a massive star would leave a dense ball of neutrons, formed by the crushing together of protons and electrons. Such an object, which he called a "neutron star," would be only several kilometers across but as dense as an atomic nucleus. This bizarre idea was met with great skepticism. The notion that an entire star could be made of such an exotic form of matter was startling. Zwicky made a

sky list. In recognition he was awarded a Director's Certificate at a meeting of the Pretoria Centre on 22 May. The Pretoria Centre also issued him with a special (and handsome) ASSA Pretoria Centre Top 100 badge, a creative innovation inspired by Percy Jacobs.

Percy deserves his own gold star (or perhaps an entire open cluster) for his ongoing efforts to promote deep-sky observing amongst members of the Pretoria Centre. At the time of writing, active observers include Andre de la Ponte, George Dehlen, Percy Jacobs, Louis Kloke, Craig Kloke, Pat Kühn, Albie Lombard, Graham Low, Michael Moller, Michael Poll and Grant Thompson.

Magda Streicher continues her unfailing support through her series of articles in *MNASSA*, *Canopus*, and elsewhere.

Cape Town observer Richard Ford is approaching 400 observations and his dedication, sometimes under difficult conditions, deserves special mention. Richard is presently working on the Bennett Catalogue and is looking forward to its completion before the end of 2013.

Michael Poll and Johan Smit, through their efforts at the Pretoria Centre's observing evenings, continue to ensure that the deep-sky remains in the public eye, so to speak.

Imaging of the deep-sky continues to be a growing area of activity and although

outside the central scope of this observing section, the efforts of Kos Coronaio, Dany Duprez, Brett du Preez, Chris Forder, Louis Kloke, Dale Liebenberg, Michael Moller, Leslie Rose, and Dieter Willasch, beautifully complement the visual observations.

In October, the director held a Skype-based workshop with observers from the Pretoria Centre. The experience showed that, with some modifications, such online meetings should be pursued in future (in lieu of more logistically-challenging face-to-face meetings) and that informal live-chat sessions should be considered, too.

Work on digitising historical deep-sky observations and published sketches (to make these unique resources readily available) has continued in fits and starts throughout the year. Valuable discussions with Shireen Davis-Evans, SAAO Librarian, has helped clarify the way forward. Meanwhile, Richard Ford has begun assisting the effort as Digital Archivist, and his painstaking contributions are gratefully acknowledged.

In December, the German-language book "Pearls of the Southern Skies - A journey to exotic star clusters, nebulae and galaxies" was published (Oculum Press, Erlangen; ISBN 978-3-938469-55-2). Dieter Willasch provided the astrophotos and Auke Slotegraaf wrote the text. An English-language edition is scheduled for publication later in the year. ☆

Annual Report, Comet and Meteor Section

TP Cooper

Summary of observed meteor showers

Observer (no. of showers observed)	Showers Observed and duration	Total Time hrs
Tim Cooper (1)	Eta Aquariids (10.7)	10.7
Cliff Turk (3)	Pi Puppids 2011 (1.0), June Lyrids (1.0) Velids 2011 (0.3), Velids 2012 (1.5)	3.8
Michael Poll (2)	Leonids (1.5), Geminids (1.7)	3.2
Kos Coronaios (2)	April Lyrids (1.4), Geminids (1.5)	2.9
Auke Slotegraaf (1)	Geminids (2.7)	2.7
Total		23.3

Seven meteor showers were observed by five individuals totalling 23.3 hours observations. Notes on some specific showers observed

April Lyrids – observed by Kos Coronaios on the morning of 21 April, seeing 4 Lyrids and 4 sporadics in 1.4 hours under LM=4.4 skies.

Pi Puppids 2011 – observed by Cliff Turk, reporting no enhanced activity in 2011.

Eta Aquariids – unlike recent years, conditions remained clear for the entire observing period, though full moon coinciding with the predicted date of maximum on May 6 was problematic. Tim Cooper managed observations on all mornings from 30 April to 6 May, seeing 91 eta Aquariids out of a total of 136 meteors in 10.7 hours. This represented over two thirds of the observed number of eta Aquariids reported globally to the IMO during the 2012 campaign.

June Lyrids – observed by Cliff Turk on the morning of 15 June, seeing 1 Lyrid and 1 sporadic in 1.0 hours under LM=5.5 skies.

Leonids – Michael Poll observed on the mornings of 17 and 18 November under

considerable influence of cloud. Only two sporadic meteors and no Leonids were observed in 1.5 hours over both mornings.

Geminids – were observed by Auke Slotegraaf located at Hakos Observatory, Namibia and Kos Coronaios and Michael Poll who were both badly affected by summer weather up north. Auke spotted 115 Geminids and 39 other meteors in 2.7 hours on the night of 13/14 December with LM=5.8 skies. Kos managed to observe for 1.5 hours on 14/15 December, seeing 34 Geminids under LM=4 skies. The mornings before and after were clouded out. Michael observed on the mornings of 14 and 15 December, both heavily influenced by cloud. On the 14th he saw 6 Geminids in 0.8 hours with LM=5.5 in the parts of sky that were visible.

Velids – were observed by Cliff Turk, who logged 11 meteors in 1.5 hours of which 6 were noted as Velids.

Summary of observed fireballs

A total of four fireball reports were submitted during 2012. The full details have been submitted for publication in *MNASSA* as a



Two fishes in the Starry Sea

Magda Streicher
magdalena@mweb.co.za

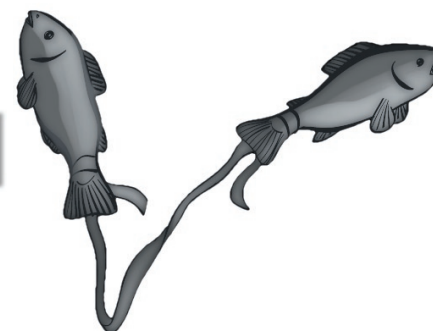


Image source: Stellarium.org

The constellation of Pisces is distinctive and special, with the characteristic “V” formed by the stars within the image. Fishing must certainly have been a major source of food supply in antiquity. Alpha Piscius connects the tails of the two starry fish projected by the constellation at a slight angle just to the north of Cetus. Two circlets hang on to each leg – one to the north-east of Pegasus and the other towards the more southerly side of Pegasus, which appears as the smaller fish as seen from the southern hemisphere. In ancient Babylon the constellation was seen as sacrificed the fishes to the god of water and wisdom. It is even possible that the constellation reflects the period of Christ, which refers back to the two fishes and 12 loaves.

Pisces as a constellation houses some of the objects with the lowest numbers on the NGC list, and is also the last of the 12 zodiac sign constellations to have been named. But alas, because the constellation is so far from the Milky Way it does not contain very bright objects. Pisces does boast a multitude of galaxies, but most of them are too faint to observe; nonetheless, there is a lot of interesting data associated with them.

The larger fish almost appears to be hugging the northern border of Pegasus, perhaps more evident the circlet made up of the stars iota, theta, gamma, kappa, lambda and TX or 19 Piscium, a red irregular star.

Very appropriately, the inner circle swallows up the galaxies **NGC 7714** and **NGC 7715**, which mingle with each other. They are situated in a 1.5° triangle slightly north of kappa and lambda Piscium. NGC 7714, the north-western galaxy, is slightly oval in shape with a sudden brighter nucleus with the companion galaxy NGC 7715 hugging the eastern edge of NGC 7714. This galaxy, in a north-east to south-west direction, is extremely faint and difficult even to glimpse by any means. In-depth photographs of this pair show NGC 7715 only as an elongated stream of faint dust. The yellow-coloured magnitude 5.6 star is situated just 4' towards the south-east, which also makes observation difficult, but it is a good star mark to search out this pair. John Herschel discovered this outstanding pair on 18 September 1830.

AIMS

Title: Cosmology with the redshifted 21cm line

Speaker: Dr Gianni Bernardi (SKA)

Venue: The Hall, AIMS research centre

Date: 14 August

Time: 12:00

Abstract: In the last two decades, theoretical models have shown the potential of the redshifted 21cm line to unveil the epoch of reionization and the dark ages. Several experiments are currently underway, attempting the first measurement of the 21cm signal from the epoch of reionization. I will review the experimental challenge, the current status of the observations and the future perspectives

Astro-coffee**Title: SALT's spectrographs, from the inside out**

Speaker: Lisa Crause (SAAO)

Date: 4 July

Venue: 1896 Building

Time: 11:00

Abstract: Exciting instrumentation projects involving SALT's two spectrographs will be outlined in a photo-rich synopsis of a recent trip to the US and the UK. The US leg was associated with preparations for our collimator repair project that aims to restore the throughput of the Robert Stobie Spectrograph (RSS), while the UK visit was to participate in the pre-ship acceptance testing of the

High Resolution Spectrograph (HRS) at Durham University's Centre for Advanced Instrumentation. With HRS due to be installed and commissioned during the coming months and RSS to undergo its optical tune-up in the first half of next year, SALT's spectroscopic prospects are set to ramp up substantially in the year ahead. While some of the RSS photos may prove upsetting for those with delicate optical sensibilities, photographs of the HRS optics ought to provide ample compensation for any discomfort experienced. All welcome! ☆

Summary of observed fireballs

Date, 2012	Time, UT	Observer	Location	V mag
March 20	20h50-21h00	Wim Filmlalter Bennie Coetzee	Riversdale, Cape Ashton, Cape	-6
May 4	17h08	Peter le Roux	Benoni, Gauteng	-5
September 28	18h10	Jacques Cronje, Henry Atkinson, Andre Freeborn	Cape Town, W. Cape	?

separate article. The observed events are summarised in the table above.

mon Walsh and Auke Slotegraaf all imaged Comet 2011 L4 PanSTARRS.

Summary of observed comets

No visual observations of comets were received during 2012. Kos Coronaios, Si-

Summary of asteroid observations

No observations of asteroids were received in 2012. ☆

Annual Report, Double Star Section

David Blane

Magda Streicher has set up and calibrated the Meade Astrometric eyepiece on the 400mm SCT and has started a formal programme of double star measurement, concentrating on one constellation at a time. She is cutting back on her deep-sky observations and will in future concentrate on double stars. It is hoped that she will make a valuable contribution in this field.

The Johannesburg Centre of ASSA is in the process of renovating the cardex archive of double star measurements going back to 1835. Following discussions with Brian Mason of the US Naval Observatory, who maintains the Washington Double Star (WDS) Catalog, the writer has established that all of the entries in the cardex system have been captured in the WDS. This means that the information in the cardex system is more of historical interest rather than of any scientific value.

The dome of the 26-inch Innes telescope in Johannesburg has been repaired in anticipation of Bob Argyle's visit from UK. There is still work required to lubricate the telescope bearings and the Johannesburg Centre is assisting SAASTA to get this done.

In an effort to generate grass roots interest in double stars, the writer has produced a "Double star of the month" column in *Canopus*, the newsletter of the Johannesburg Centre and positive input has been received from several observers, with Jerome Jooste making a major contribution by imaging most of the double stars discussed.

The author continued his programme of measurements of double stars using a 150 mm refractor and an Astrometric eyepiece. ☆

Annual Report, Cosmology Section

Frikkie de Bruyn

Purpose

The purposes of the Cosmology Section of the Astronomical Society of Southern Africa are:

- To disseminate news of importance in the field of cosmology to members,
- To circulate scientific papers in the field of cosmology to members and
- To do research and promote the study of cosmology as a science.

Membership

The Cosmology Section was established in 2008 with a membership of 28. Currently the number of members is 51. Membership is restricted to members of the Astronomical Society of Southern Africa, but an exception was made in the case of Prof Ildus Nugayev, a cosmologist at the Moscow State University.

Activities

A total of 381 submissions/discussions have been received by the Cosmology Section. The most important discussion was the awarding of the SKA to South Africa and Australia. Among others, the SKA will be able to receive the 21 cm signal emitted by neutral hydrogen even before recombination, which is of great importance to cosmology. The discovery of the signature of the Higgs boson at the Large Hadron Collider captured the imagination of particle physi-

cists and cosmologists. A great number of press releases and discussions and reports regarding this event have been devoted to the Higgs. The discovery of the furthest quasar ever was reported on. Of great importance was the results of 10 years of observation by the WMAP satellite of the Cosmic Microwave Background Radiation. This has confirmed the high energies and densities of the early universe, the expansion of the universe and has put cosmology as a science on a firm footing. It was a year of many highlights and the events mentioned above are by no means the only important events discussed. A low point was the claim by scientists at CERN that neutrinos travelled faster than the speed of light which turned out to be incorrect.

The Director was involved in a number of articles published and interviews by the local newspaper. This has resulted in an awareness of cosmology as a science among readers as shown by the number of questions received from members of the public. SKA promotional material has been given to the local library to form part of the reference section of the library.

Future activities

There are great expectations that the Higgs boson will be discovered at CERN. ☆

increasing source density at fainter fluxes results in a higher incidence of both multiple potential counterparts and random spatial alignments between two catalogues. The relatively poorer resolution of radio maps compared to optical observations provides a further complication. The likelihood ratio is a powerful tool to identify the correct counterparts when matching deep datasets with mismatched resolutions. I will present results on the completeness and contamination produced by this method when matching current radio and infrared datasets, and how this performance degrades with lower resolution and deeper datasets.

Title: Examples of mixtures of distributions

Speaker: Prof Chris Koen (UWC)

Venue: Room 1.35 (Physics UWC)

Date: 26 July

Time: 13:00

Abstract: Some examples of fitting mixtures of statistical distributions to astronomical data will be presented.

Title: An overview of Euclid and its science goals

Speaker: Prof Martin Kunz (U. of Geneva & AIMS)

Venue: Room 1.35 (Physics UWC)

Date: 16 August

Time: 13:00

Abstract: Euclid is an ESA medium class mission selected for launch in 2020 in the Cosmic Vision 2015- 2025

programme. The main goal of Euclid is to understand the origin of the accelerating expansion of the Universe, but it will address a wide range of science questions. In my presentation I will give an overview of the mission and of the cosmological science goals of Euclid, with a special emphasis on constraints on the properties of the dark energy and tests of modified gravity

SKA

Title: CHILES, an HI deep field with the Very Large Array

Speaker: Prof Jacqueline van Gorkom (Columbia University)

Venue: 2nd floor auditorium, SKA-SA Office, Cape Town

Date: 25 July

Time: 13:00

Abstract: Although the growth of large scale structure in dark matter seems well understood, many questions remain on the formation and evolution of galaxies. HI images of galaxies over a range of redshifts can help constrain the gaseous physics at play. This is one of the key science drivers for the SKA path finders. The recent upgrade of the VLA has made it possible to probe in one observation a redshift range from 0 to 0.45.

I will present the results of a pilot for such a survey covering the range from $z=0$ to $z=0.2$. I will discuss problems and promises for such surveys, which may also be relevant for MeerKAT, ASKAP and SKA.

film was conceived and produced by Jarita Holbrook and Romeel Dave' of the University of Arizona now both at University of the Western Cape.

Title: First HI Observations with KAT-7 and updates on MeerKAT & the SKA

Speaker: Dr Claude Carignan (UCT)

Venue: RW James Lecture Hall C

Date: 14 August

Time: 13:00

Abstract: I will present the first HI observations obtained with KAT-7, the pathfinder for the SKA precursor MeerKAT. I will show that because of its short baselines and low system temperature, KAT-7 is the ideal instrument to observe large scale low surface brightness HI emission. These new observations with KAT-7 allow the measurement of the rotation curve of NGC 3109 out to 32 arcmin, doubling the angular extent of previous measurements. KAT-7 detected 40% more flux than previous VLA observations. Finally, I will give a short update on the MeerKAT project and on SKA, phase 1.

UWC

Title: The luminosity function and clustering of mJy radio sources at $0.1 < z < 3$.

Speaker: Stephen Fine

Venue: Room 1.35 of the Physics Department, UWC

Date: 12 July

Time: 13:00

Abstract: I will discuss a technique for constraining the source density and clustering strength of samples that have no redshift information through cross correlations with samples that do. We apply the technique to the NVSS catalogue using spectroscopic QSOs as the redshift markers. We reproduce the known evolution of mJy sources to $z \sim 1.5$ and continue past that to $z \sim 3$. Contrary to brighter samples we find no evidence for a turnover in the density of mJy ($L < 10^{27} \text{W}$) sources at $z \sim 2$. In the range $2 < z < 3$ the NVSS probes the roughly the peak of the luminosity density distribution and these results constrain the bulk of the radio emission in the Universe at these redshifts.

Title: The likelihood ratio as a tool for cross-matching the SKA and Euclid.

Speaker: Kim McAlpine

Venue: Room 1.35 (Physics UWC)

Date: 19 July

Time: 13:00

Abstract: The scientific return of continuum radio surveys can be greatly enhanced by the cross-matching with optical and infrared datasets. These provide photometric redshifts for studies of the evolution of radio sources with cosmic time as well as a more detailed characterisation of the properties of the radio source host galaxies. As surveys push to greater depths reliably identifying the true optical/infrared counterpart becomes an increasingly difficult task. The

Annual Report, Historical Section

Chris de Coning

Introduction

During the past year (Calendar Year 2012) the following has happened concerning the History of Astronomy.

The centenary of the Cape Astronomical Association (C.A.A.) was in 2012. The C.A.A was the pre-cursor to A.S.S.A. Cape Centre and A.S.S.A. National. At the bi-annual A.S.S.A. symposium held in Cape Town a talk was given on the History of the C.A.A. as well an article that appeared in *MNASSA*

Website

The Website has undergone a mayor change. In 2007 the look and layout was totally changed. In 2009 more content was added to the website. The process is ongoing in nature. In 2012 an archival section was added to the website, including the book by Andrew Gray named "Raindrops, Test Tubes and Galaxies" about the Natal Observatory.

Archive

The scanning of the most valuable documents in the Archive, the minute books of A.S.S.A. Council and Cape Centre, was completed. The digital copies of A.S.S.A. Council where then made available to researchers and the public in general by being placed on the web site of the Historical Section. Thanks to Lesley Hart for assistance and allowing us to use the A3 scanner, a special piece of equipment

required to scan imperial measurement (non-metric) documents.

Publications

Individuals in their private capacities wrote articles with historical content. Please note my appreciation to the following people:

- Ian Glass; "McClean Telescope back in service", Vol 71, nos. 3 & 4, April 2012.
- Ian Glass; "The Astrographic Telescope of the Royal Observatory, Cape", Vol 71, nos. 5 & 6, June 2012.
- Ian Glass; Presidential Address: "Forty years of Infrared Astronomy", Vol 71, nos. 9 & 10, October 2012.
- Greg Roberts; "Station 13 - South Africa's Area 51", Vol 71, nos. 3 & 4, April 2012.
- Greg Roberts; "Early Days of Satellite Tracking in South Africa", Vol 71, nos. 5 & 6, June 2012.
- Greg Roberts; "Paardefontein Satellite Tracking Station, 1965 - 1981", Vol 71, nos. 7 & 8, August 2012.
- Greg Roberts; "Station 13 revisited", Vol 71, nos. 9 & 10, October 2012.
- Chris de Coning; "History of the Cape Astronomical Association", Vol 71, nos. 11 & 12, December 2012.
- E Swanepoel; "Zeekoegat Observatory - A Nostalgic Journey", Vol 71, nos. 11 & 12, December 2012.
- Willie Koorts; "ESO Site Testing in South Africa", Vol 71, nos. 11 & 12, December 2012.

Obituaries

MNASSA published obituaries on the following astronomers:

- Sir Bernard Lovell (OBE FRS) 1913 - 2012; Vol 71, nos. 7 & 8, August 2012.
- Pat Wild 1937 - 2012; Vol 71, nos. 9 & 10,

October 2012.

- William Gordon Pearson, 1939 - 2012; Vol 71, nos. 11 & 12, December 2012.

- Patric Moore, 1923 - 2012; Vol 71, nos. 11 & 12, December 2012. ☆

Annual Report, Scholarships

Maciej Soltynski (Convenor, ASSA Scholarships Committee)

The **ASSA Scholarship** was established in 2000 to encourage the study of Astronomy at any Southern African university at the 2nd and 3rd year level. The Scholarship is funded by ASSA with occasional financial support from the ASSA Endowment Trust.

There were a number of applicants in 2013 and the Scholarship was awarded to Emma Platts, a 3rd year B.Sc. student at UCT who plans to obtain her degree with three majors: in physics (already completed), and this year in astrophysics and applied maths.

Claire Antel, who held the ASSA Scholarship in 2011, obtained her B.Sc. Honours in Astrophysics and Space Science in the National Astrophysics and Space Science Programme (NASSP) at UCT in 2012 (she was the top student). She worked at the SANAE base in Antarctica at the beginning of 2013. She is currently studying for an M.Sc. in Physics at UCT as part of the ATLAS collaboration at CERN. She is presently based at CERN.

The holder in 2006 and 2007, Wendy Williams, continues working towards her PhD on the Giant Metrewave Radio Telescope (GMRT) and LOFAR observations of radio galaxies at the University of Leiden.

Dr Renée Hlozek, holder of the ASSA Scholarship in 2005, is a Lyman Spitzer Jr. Postdoctoral Fellow in the Astrophysics department of Princeton University. Recently she has co-authored a number of papers relating to data obtained from the Atacama Cosmology Telescope.

SAAO - ASSA Scholarships

The purpose of the three SAAO - ASSA Scholarships is to encourage current or *intending* undergraduates (i.e. 1st, 2nd or 3rd year) studying for a B.Sc. degree at any university in South Africa, who have a stated interest in astronomy, to prepare for furthering their interest. The Scholarships are financed by SAAO and are administered by ASSA. The value of each Scholarship in 2013 was R10 000, up from R6 000 in 2012.

will conclude with a brief discussion of what has been done recently and what will soon be possible.

Title: Exploring the Early Universe with the Cosmic Microwave Background

Speaker: Jean-Christophe Mauduit (IAU office at SAAO)

Venue: RW James Lecture Hall C

Date: 24 July

Time: 13:00

Abstract: The International Astronomical Union (IAU) is the largest body of professional astronomers in the world and has set up the Office of Astronomy for Development (OAD) in partnership with the South African National Research Foundation (NRF). The OAD is located at the South African Astronomical Observatory (SAAO) in Cape Town. Its mission is to realise the IAU's Strategic Plan, which aims to use astronomy as a tool for development. In 2012 the first open Call for Proposals was launched, focusing on three main areas: "Universities and Research", "Children and Schools" and "Public Outreach". Eighteen projects worldwide have been approved for 2013 and are currently under way. The OAD is also setting up regional nodes and language expertise centres around the world. This presentation will describe the ongoing activities of the OAD and plans for the future.

Title: LOFAR fringe-finding

Speaker: Ian Stewart (University of Bonn in Germany).

Venue: RW James Lecture Hall C

Date: 31 July

Time: 13:00

Abstract: The LOFAR interferometer array consists of a large number of antennas, has some international baselines, and observes at meter radio wavelengths over a substantial bandwidth. These factors introduce several complications into the task of calibrating the observations, some of which will also be faced by the SKA. In this talk I try to explain why phase is a centrally important quantity in interferometry; I outline the main issues that have to be addressed in (phase) calibration; and finally I discuss some of the calibration approaches I have been trying out. At the end of the talk you should at least know what fringes are and how you find them.

Title: Hubble's Diverse Universe

Speaker: Dr Jarita Holbrook (UWC)

Venue: RW James Lecture Hall C

Date: 31 July

Time: 13:00

Abstract: Hubble's Diverse Universe is a 40 minute documentary focused on nine African American and Hispanic American astronomers and astrophysicists. Ethnic diversity and a diverse set of scientific topics are explored within astronomy: The astrophysicists discuss their research and their experiences being minority astronomers. An inspirational film, the astrophysicists share their personal stories and give advice on how to succeed in the sciences. The

epoch by tiny modifications of General Relativity (GR). Within these theories, a subclass called viable gravities can keep the main predictions of GR and also reproduce a realistic cosmological evolution. In this talk, I will review some aspects of these theories, and point to some of their problems, as the occurrence of cosmological singularities, and possible solutions. Moreover, the cosmological evolution for some simple models will be shown. In addition, another class of modified gravities with a non-standard coupling among the gravitational field and the matter sector, will be discussed.

Title: xPand: An algorithm for perturbing homogeneous cosmologies

Speaker: Obinna Umeh, UCT/UWC

Venue: M111, Maths Building, UCT

Date: 20 August

Time: 12:00

Abstract: I will describe in detail a package we developed recently that uses a fully geometrical method to derive perturbation equations about a spatially homogeneous background. The package uses the capabilities of the tensor algebra package xTensor in the xAct distribution along with its extension for perturbations xPert. The package is extremely user friendly especially for the UCT cosmology group since it relies on 1+3 decomposition technique. With xPand, deriving perturbation equations up to any order in perturbation theory and for any metric theory of gravity becomes very simple

NASSP

Title: From voids to clusters: HI imaging surveys of galaxies in different environments.

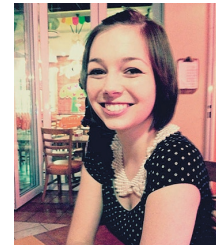
Speaker: Prof Jacqueline van Gorkom of Columbia University

Venue: RW James Lecture Hall C

Date: 17 July

Time: 13:00

Abstract: Our understanding of the formation and evolution of galaxies and the large scale structure has advanced enormously over the last decade, thanks to an impressive synergy between theoretical and observational efforts. While the growth of the dark matter component seems well understood, the physics of the gas, during its accretion, removal and/or depletion is less well understood. Increasingly large scale optical surveys are tracing out the cosmic web of filaments and voids and mathematical tools have been developed to describe these structures and identify galaxies in specific environments. HI imaging surveys begin to answer the question: how do galaxies get and lose their gas. The best evidence for ongoing gas accretion is found in the lowest density environments, while removal of gas in the highest density environments stops star formation and reddens the galaxies. Although current HI emission surveys are mostly limited to redshifts less than 0.2, several HI imaging telescopes are being commissioned or planned that will be able to observe out to larger redshifts. I



Emma Platts



Yusri Dollie



Jaco Brink



Izak van der Westhuizen

In 2013 the Scholarships were awarded as follows:

- Yusri Dollie 1st year B.Sc. UCT
- Jaco Brink 3rd year B.Sc. UNISA
- Izak van der Westhuizen 3rd year B.Sc. UFS

Fawaaz Davids, B.Sc. student at UCT who held the Scholarship in 2011 and 2012, continues his studies, concentrating on computer science.

Mpati Ramatsoku, who held the Scholarship in 2007 and 2008 and Rocco Coppejans, who held the Scholarship in 2008 and 2009, both obtained their Masters degrees in the NASSP at UCT. Mpati is now a joint PhD student between Kapteyn Astronomical Institute at the University of Groningen, ASTRON and UCT. The topic of her PhD is 'A Westerbork HI imaging survey of the Perseus-Pisces filament across the Zone of Avoidance'. Rocco is a PhD student at Radboud University in Nijmegen working on LOFAR (Low-Frequency Array for radio astronomy).

Expression of appreciation

Dr Ian Glass, Sivuyile Manxoyi (SAAO) and Andrew Gray are thanked for their valued inputs in the evaluation and selection of candidates during the period under review. Thanks also go to the teachers and lecturers who supplied assessments of candidates. SAAO is thanked for making funds available for the SAAO-ASSA Scholarships. ☆

ASSA Council Appointees 2013/14

ASSA Council Appointees reporting into Council

The following people were appointed with these respective roles and responsibilities:

Editor – *MNASSA*, Case Rijdsdijk:

Select and edit material submitted and liaise with authors or potential authors

- Is copied on ASSA Agenda and requested to give input and receive ASSA minutes
- Submit annual report to Council by end June

Editor – *Sky Guide*, Auke Slotegraaf:

Compile the annual *Sky Guide* and liaise with the Publishers and Advertisers

- Is copied on ASSA Agenda and requested to give input and receive ASSA minutes
- Submit annual report to Council by end June

Webmaster, Christian Hettlage:

Establish and maintain the website (including administrative aspects of the forum) , Communications Groups/Sections, ASSA Mail lists

- Is copied on ASSA Agenda and requested to give input and receive ASSA minutes
- Submit annual report to Council by end June

Convener Scholarships, Maciej Soltynski:

- Is copied on ASSA Agenda and requested to give input and receive ASSA minutes
- Submit annual report to Council by end June

ASSA Observing Director, Kos Coronaios:

Keep alive and promote cross pollination of astronomical observing using own knowledge and input from Specialists, Section Directors and Centre Observing Officers

- Produces Annual Report based on input received from the Centre Viewing Officers and the Section Directors
- Create awareness of other observing activities throughout the country
- Updates the website with resources obtained from a variety of sources (including ASSA Observing Guide)
- Contact Country Members on upcoming Observing Events

independent of other stellar age determination methods. This talk will summarize how fragile binaries provide useful leverage on these and other problems of interest.

Title: **Measuring Pulsar Masses in Black Widow and Redback Systems**

Speaker: Rene Breton (University of Southampton)

Venue: M111, Maths Building, UCT

Date: 19 July

Time: 13:00

Abstract: Typical neutron star densities are beyond the reach of Earth laboratory experiments and the study of their equation of state can provide important knowledge about the behaviour of ultra-dense matter. While the neutron star equation of state remains elusive due to observational challenges (e.g. namely the lack of reliable simultaneous mass and radius measurements), the most massive neutron stars can constrain it to increasingly stiff models. The most promising candidates to search for massive neutron stars are the binary millisecond pulsars, which are old, once-slowly rotating pulsars that have been spun-up by accreting mass from a close companion star. Empirically, the so-called black-widow systems seem particularly promising: for the prototype system, PSR B1957+20, we recently inferred a mass of 2.4 solar masses. If confirmed by further study, this would make it the heaviest known neutron star. In this talk, I will describe how the light curve and spectrum of the

strongly irradiated companion was used to determine the black-widow pulsar mass. I will also discuss perspectives of several new mass measurements in similar systems detected with the help of the Fermi gamma-ray observatory (also delivered at AIMS on 16 July).

Title: **The polarized radio sky**

Speaker: Dr Gianni Bernardi (SKA-SA)

Venue: Lecture Theatre D RW James Building UCT

Date: 29 July

Time: 13:00

Abstract: Radio polarization is one of the best probes of magnetic fields on a wide range of cosmic scales. I will present results from radio polarization observations at cm and meter wavelengths, discussing what they tell us about Galactic ISM, diffuse emission in galaxy clusters and the physical condition in extragalactic radio sources. I will conclude by describing the future perspectives in the light of the new radio telescopes (SKA pathfinders).

ACGC

Title: **On viable modified gravities and the cosmological evolution**

Speaker: Diego Saez Gomez (UCT)

Venue: M111, Maths Building, UCT

Date: 16 July

Time: 12:00

Abstract: In recent years, much attention has been paid on modified gravities, and specifically on the possibility to describe the dark energy

Title: The Equilibrium Model for Galaxy Evolution

Speaker: Prof Romeel Davé (SARChI in Cosmology with Multiwavelength Surveys, SAAO/UWC/AIMS)

Date: 15 August

Venue: SAAO Auditorium

Time: 16:00

Abstract: I will present a new analytic formalism for the evolution of the stellar, gaseous, and metal content of galaxies. It is based on the idea, inspired by state-of-the-art cosmological hydrodynamic simulations, that galaxies live in a slowly-evolving equilibrium between inflows, outflows, and star formation. The critical parameters in this formalism describe ejective feedback (outflows), preventive feedback (retardation of inflows), and wind recycling (return of ejected material). I will illustrate some straightforward predictions of this model, such as the evolution of the specific star formation rates and the second-parameter dependence of the mass-metallicity relation on star formation, that are broadly in agreement with observations. I will highlight areas where the intuition provided by this scenario for the origin of global galaxy properties differs substantially from canonical views. At its core, the equilibrium model intimately connects galaxies and their surrounding gas in a cycle of baryons that is centrally responsible for governing galaxy growth, and hence suggests that improving observations of gas in and around galaxies is the key to

understanding galaxy evolution. If time permits I will present early results from a large Hubble program to do so.

UCT**Title: Fragile Binary Stars: Observational Leverage on Difficult Astrophysical Problems**

Speaker: Terry D. Oswalt, Florida Institute of Technology, Melbourne, FL

Date: 1 July

Venue: RW James lecture theatre C

Time: 12:00

Abstract: Loosely bound, “fragile” binary stars are like star clusters with two components of the same age and original composition. They provide a largely overlooked avenue for the investigation of many astrophysical questions. For example, their orbital characteristics provide limits on the cumulative effects of the Galactic environment. In older pairs, orbits have been amplified by post-main-sequence mass loss, potentially providing useful constraints on the initial-to-final mass relation for white dwarfs. The nearly featureless spectrum of a white dwarf usually provides little information about its radial velocity, space motion, population membership, or chemical abundance. However, a distant main sequence companion provides a benchmark against which those properties can be determined. Conversely, the cooling age of a white dwarf provides a useful limit on the age of a distant main sequence companion,

- Co-ordinates Observing events using any appropriate Means/Mechanisms available with Country Members
- Visits /encourages/ promote observing practices with the Centre Viewing Officers
- Provides Council with updates and queries before Council meetings
- Issues ASSA Observing Certificates based on recommendations from Section Directors
- Is copied on ASSA Agenda and requested to give input and receive ASSA minutes
- Submit annual report to Council by end June

ASSA Communications Officer, Case Rijdsdijk:

Answers and provides info to public and Web Master

- Sends press releases to the general Media;
- Receives and answers queries from Media and where necessary contacts Facilitator for input and if necessary the Specialist
- Sends tweets (optional)
- Be available for interviews
- Is copied on ASSA Agenda and requested to give input and receive ASSA minutes

ASSA Outreach Officer, Johan Smit:

Guide/encourage Centre members and local public for practical astronomical outreach.

Example of involvement:

- Accreditation of Outreach efforts. Acknowledgement of achievement by approving submitted material and provide accreditation of such efforts in the form of an ASSA stamp of accreditation on certificate that is issued. Process
- consider training programmes in place
- obtain professional comment from the Editorial Board and approves the material and recommends to Council for approval - must be more than one person involved
- Is copied on ASSA Agenda and requested to give input and receive ASSA minutes
- Submit annual report to Council by end June

ASSA Archivist, Chris de Coning:

Looks after the ASSA history specifically.

Example of involvement:

- Obtains and secures all documentation produced by the ASSA and makes it

- available - appropriately - for search and retrieval
- Is copied on ASSA Agenda and requested to give input and receive ASSA minutes
- Submit annual report to Council by end June

ASSA Section Directors

The following ASSA Sections were decided upon and their respective directors elected:
Shallow Sky (i.e. Asteroid, Meteors, Comets, Lunar, Occultations, Planetary, Satellites & Solar): Dave Blane

Deep-sky (i.e. Deep-sky, Double Stars & Variable Stars): Auke Slotegraaf

Photometry, Spectroscopy: Vacant

Cosmology and Astrophysics: Frikkie de Bruyn

Southern African Astronomy History: Chris de Coning

Dark Sky: Johan Smit

Imaging: Gary Els

Instrumentation; including ATM (Amateur Telescope Making): Chris Stewart

The responsibilities of Section Directors were defined to:

- Drive the activities in their respective areas
- Populate and update the website with relevant information received from variety of sources including own and from Specialist (such as Observing Guide/s)
- Solicit information from Specialists
- Moderates his section of the Forum
- Posts new information to the Forum and escalates to Specialist where necessary
- Inform the Communications Officer of significant events/information on forum/ website
- Submit annual observing report to the ASSA Observing Director (where applicable)
- Will be named in ASSA general publications and website – with contact details
- Are copied on ASSA Agenda for input and receive ASSA minutes
- Where required (such as in terms of Variable Stars) encourage observers to report their observations directly to external entities such as the AAVSO and also to send these in for publications for record purposes
- Submit annual report to Council by end June. ☆

have been developed in the last years. Nevertheless, a comparison of the matter power spectrum predictions made by these theories with available data has not yet been subjected to a detailed analysis. In this talk, I will show the evolution of cosmological scalar perturbations and the implications of focusing theorem in the context of $f(R)$ and $f(R,T)$ theories of gravity. Finally, I will also describe the predicted power spectra features using a dynamical systems approach and comparing the theoretical results with the SDSS data.

Title: The echo of the Big Bang as seen by the Planck satellite

Speaker: Prof Martin Kunz (University of Geneva)

Date: 30 July

Venue: SAAO Auditorium

Time: 11:00

Abstract: Earlier this year ESA's Planck space telescope released the most detailed map ever created of the cosmic microwave background - the relic radiation from the Big Bang. The map shows the Universe at a time when it was just 380 000 years old, and the tiny fluctuations that it contains represent the seeds of all future structure: the stars and galaxies of today. The new data by the Planck satellite agree quite well with the cosmological standard model, and we will see what this implies for our understanding of the Universe. But we will also encounter some surprises in the Planck data that

may eventually force us to reconsider some of our basic assumptions.

Title: La Caille's visit to the Cape

Speaker: Dr Ian Glass

Date: 8 August

Venue: SAAO Auditorium

Time: 16:00

Abstract: This year sees the 300th birthday of Nicolas-Louis de La Caille, the first important scientist to visit the Cape. One of the ablest astronomers of his time, he was a member of the Royal Academy of Sciences, a writer of influential textbooks and a propagandist for Newtonianism. His chief interest lay in refining the orbits of solar system objects through precision observations. At the age of 39, he came to the Cape and built an observatory from which he determined the distances of the planets. He surveyed the southern sky through a telescope - the first such systematic survey ever made. Feeling that the heavens were poorly described, he named fourteen new constellations, one of them being Table Mountain (Mons Mensa). While here, he decided to measure the earth's local radius. His astonishing conclusion, affected by the gravitational attraction of nearby mountains, was that the planet seemed to be pear-shaped! La Caille made other important contributions. For example, he devised a practical way to determine time at sea using observations of the Moon and he mapped the western part of the Cape. It was also he who gave Halley's Comet its name.

Astronomical Colloquia

These form an important part of a research facility, often as a sort of pre-publication discussion or a discussion of an individual's current research, and as such it is virtually impossible to "publish" this material. However by recording the topics discussed in the form below does indicate to those, who are unable to attend, what current trends are and who has visited to do research: it keeps everyone 'in the loop' so to speak.

Also included in this section are the colloquia/seminars at the SAAO, NASSP, UWC and the Astrophysics, Cosmology and Gravity Centre at UCT, ACGC. Also included are the SAAO Astro-coffees which are 15-20min informal discussions on just about any topic including but not limited to: recent astro-ph papers, seminal/classic publications, education/outreach ideas and initiatives, preliminary results, student progress reports, conference/workshop feedback and skills-transfer.

Editor

SAAO

Title: Monet, school kids and eclipsing binaries

Speaker: Tim-Oliver Husser (Universität Göttingen)

Date: 27 June

Venue: 1896 Building

Time: 16:00

Abstract: Everybody knows the large

black 'tool box' sitting on the plateau in Sutherland. Open rarely, few know that there actually is a 1.2m-telescope inside! Even less know that it has a twin at MacDonald Observatory in Texas. The history of the Monet telescopes is a long and fraught one and so firstly I would like to give a brief tour of the need-to-know of what was, is, and will be. Contrary to the Monet in Sutherland, the one in Texas is in fact working and has been used extensively by school kids. I will be reporting on one of their projects in which they looked for timing variations in the periods of eclipsing post-common binaries in a search for exoplanets - with great success! This motivated extension of the project with observations from SALT and the SAAO 1.9m.

Title: A trip in modified gravity theories: from cosmological background to perturbations evolution

Speaker: Alvaro de la Cruz-Dombriz (ACGC, University of Cape Town)

Date: 18 July

Venue: SAAO Auditorium

Time: 16:00

Abstract: Modified gravity theories have attracted a lot of attention in order to find a geometrical explanation for the late time acceleration of the Universe. Different techniques for a better understanding of the cosmological background evolution as well as the structure of black holes

ScopeX 2013

Willie Koorts

ScopeX 2013 took place on Saturday 20 July at their usual venue, the SA Military History Museum in Johannesburg. It was again a roaring success, seeing some 2 000 people through the gates. This year the emphasis was on amateur

spectroscopy which started with a workshop, titled "Spectra data-reduction and analysis, measure star-temperatures", presented by international guest, Olivier Thizy of Shelyak Instruments in France on the Friday afternoon. This was supplemented by night- and daytime demonstrations with Thizy also doing the keynote presentation. The usual commercial and non-commercial exhibitors manned their stalls with this year's outreach in the form



International guest Olivier Thizy (centre), putting one of his Shelyak Instruments spectrographs through its paces.

of rocketry, employing safe "pop-rockets". As always, the main auditorium saw non-stop presentations every hour on a variety of subjects (see list below), which were all well attended. The judges of the amateur telescope making (ATM) exhibition was pleasantly surprised by the number of worthy examples of new and interesting items on display with the Pretoria contingent dominating the field with a plethora of new instruments, claiming the lions share of the awards. The astrophotography entries were up to the usual standard and included some interesting shots of an airplane transiting the full Moon. A perfect day was followed by a perfect night for stargazing, sharing telescopic views of the night sky with fellow ATMs and the public.

Presentations

The following talks were presented in the JC Lemmer Main Auditorium:

- *What's looking up at Sutherland* by Willie Koorts, SAAO



One of the Voortrekker guides, showing the learners how to launch two pop-rockets simultaneously.

- *Rise of the Machines: Supercomputers and Astronomy Research* by Dr Shazrene Mohamed, SAAO
- *Doing Astrophotography with a DSLR on a tripod* by Prof Barbara Cunow, ASSA Pretoria Centre
- *The Virtual Atomic and Molecular Data Centre (VAMDC)* by Prof Derck P Smits, UNISA
- *Amateur spectroscopy with small telescopes* by Olivier Thizy, Shelyak Instruments
- *Astrophotography from a backyard Observatory* by Dale Liebenberg
- *Sub-Saharan Africa's first digital planetarium* by Prof Matie Hoffman, UFS

ATM Awards

The original purpose for ScopeX was for ATMs to show off their handiwork. The ATM exhibitions therefore still form a major part of the event. This was again judged by Chris Stewart and Dave Blane who reported as follows:

Peter Rendall is a woodworker par excellence. His beautiful wooden-tubed scope which took an award last year was joined by an unusual take on the curved-bolt barn door tracking platform for astrophotography. This item, beautifully

executed in wood and brass with an 18th century steampunk appeal, netted him a 6x30 GSO finder scope from Eridanus and a small home toolkit from MTS.

Percy Jacobs has an endearing habit of polling for advice then going his own way and battling through to the finish. True to form, he chose to build a German equatorial mount using basic pipe fittings. Traditionally this involved some machining and pouring white metal babbited bearings. However, by exploiting modern plastic components in addition to the conventional parts, he was able to produce eminently workable bearings at low cost and effort, without the need for machine tools. He then went on to motorise the polar axis. An elbow joint enabled the tee joint holding the polar axis to be coupled to the tripod such that the latitude angle could be set. These efforts garnered him a Baader Planetary Moon & skyglow filter from Eridanus plus a set of screwdrivers from Industrial Hardware.

George Jagals keeps telling us, "This is the last mirror I am making" – and then pitches up with yet another telescope. His latest, a 9-inch long-focus truss-tube Dobsonian, is robust yet disassembles into a few relatively compact modules for



George Jagals showing off his latest creation, a 9-inch long-focus truss-tube Dobsonian.

Of course, with this degree of precision there are few stars that do not show some degree of proper motion, so it had to be assumed that each one of them might have a measurable proper motion and parallax that had to be solved for. No star in the Milky Way can be regarded as fixed. Only objects beyond the Milky Way, such as quasars, can be taken as positional standards. In future the motions of even these may be a problem.

One of the results of Hipparcos was the verification that Proxima really is more distant than α Cen.

The Gaia satellite

The newest astrometric satellite, Gaia, will be launched in October 2013 for a 5-year mission. It is expected that it will find the positions, motions and temperatures of 100 billion stars. It will be many times

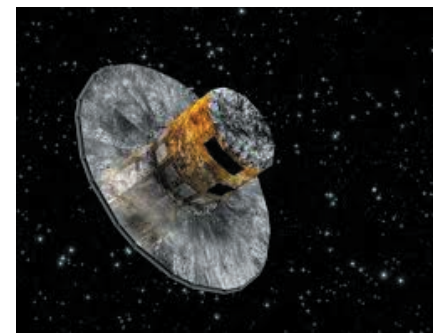


Fig. 6 The Gaia satellite. The large sunshield, which also carries the solar cells, always faces the Sun. The cylindrical part of the satellite spins on its axis. The cameras look out of the sides of the cylinder and data on the whole sky are accumulated as the satellite spins and revolves around the Sun.

more accurate than Hipparcos, i.e. about 5 microarc-sec, and will collect 10 000 times more data than it. Its precision will be such that it will be able to measure the distances of stars at the Galactic Centre with an accuracy of 20%.

Gaia (Fig. 6) will be located at the "L2" point. This is a position on the opposite side of the Earth from the Sun at a distance of 1.5 million km. It will orbit the Sun with the same one-year period as the Earth. Its sunshield, incorporating its solar cells, and having a diameter of 10m, will always face sunwards. Gaia will spin on its axis of symmetry in order to scan the sky in great circles in a similar manner to Hipparcos.

Gaia will be able to reach to much greater distances than Hipparcos, enabling us to learn more about the shape of our own galaxy, the Milky Way. It will become possible to study the motions of stars around the centre of the Galaxy and classify them according to their orbits. Their motions are related to age and should reveal information on the formation history of the Milky Way.

References

De Houtman, F., 1603. *The Earliest Star Catalogue for the Southern Hemisphere*, Reprinted 1927, University Observatory, Oxford.

Glass, I.S., 2008. *Proxima, the Nearest Star (Other than the Sun)*, Cape Town, Mons Mensa. ☆

The types of the nearest stars

Once we know its distance and apparent brightness we can figure out the luminosity (wattage) of a star. In the case of a binary, we can study its orbit and figure out the masses of its two components using Kepler's and Newton's laws. This is the only way to find out the exact masses of stars.

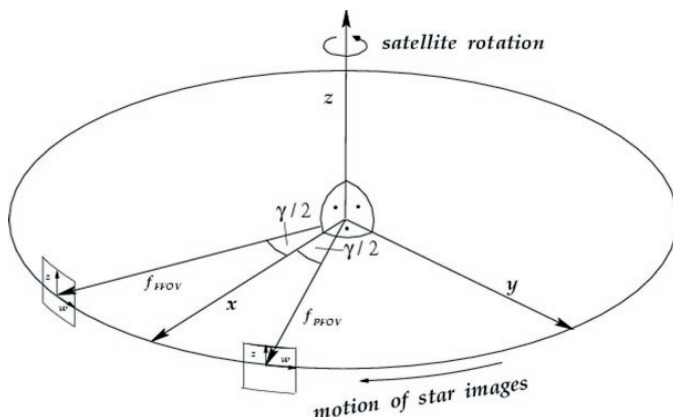


Fig. 5 The principle of the Hipparcos satellite. The positions of the stars in the two rectangular fields could be compared. Thanks to the motions of the satellite and a great deal of computation, the positions of all stars within its sensitivity range could be determined.

Alpha Cen is in fact a binary [when we speak of its proper motion and parallax we are actually referring to the centre of gravity of the system] and each of its components, a G2 and a K1 dwarf, somewhat resembles our Sun, a G2 dwarf. Proxima, which may or may not be gravitationally bound to α , is a much smaller and cooler M5.5 dwarf. The other nearest stars fall into several categories: (1) very cool M dwarfs, (2) Brown dwarfs (which have the size of Jupiter but have masses from 13 to 75 or 80 times Jupiter's mass. They are not hot enough to burn hydrogen), (3) cooler L-type brown dwarfs (which show metal hydride bands in infrared) and (4) T-type brown dwarfs (coolest of all, showing methane, and water in their infrared spectra). Some of the nearby stars are so cool and thus faint in visible light that they

were in fact discovered during infrared surveys.

However, Proxima is still the nearest star known!

Hipparcos satellite

Hipparcos stands for High Precision PARallax COLlecting Satellite. This was a very fruitful project of the European Space Agency that ran for 3½ years (Fig. 5). Hipparcos always looked at two fields simultaneously as it spun around its axis. Sorting and cross-correlating the resulting images was an enormous computational task. The final catalogue contained 118 000 stars at 0.001 arcsec accuracy. Each one had been measured many times so that both proper motions and parallaxes could be determined.



(above) Johan Smit revived this WWI vintage 700mm f/5 Zeiss aerial camera lens into a beautiful telescope.

(left) Bosman Olivier with his award winning "string telescope".

transportation. The strut connections are rather elegant and the rocker box also disassembles into a virtually flat pack. His prize, a Celestron accessory kit including two eyepieces and three filters from G&L Agencies, will help him enjoy lunar and planetary views through this new scope.

Bosman Olivier, no stranger to the travails of figuring difficult mirrors, is tackling a thin fast one which deserves something special in the way of a home. And now it has one, in the form of a "string telescope". Technically a tensegrity structure, the tube comprises a set of thin struts in compression, stabilised by steel cables under tension. Together they rigidly hold the ring to which spider, focuser and finder are attached. This extremely lightweight structure is collapsed by simply unscrewing the struts on their jackscrews, relieving the tension on the cables. The struts can

then be removed and the top ring stored in the mirror box with strings still attached, ready for an equally quick set up. This instrument is appropriately dubbed Lyra (the lyre). There are other interesting aspects to the scope that are worth emulating too; seek it out and take a look. A fast mirror needs a good quality short focal length eyepiece and this one appropriately earned a Baader Planetarium 3mm eyepiece from Eridanus.

Johan Smit is well known for his stalwart support of the ATM community. Many people have benefitted from his generous assistance and willingness to help at all hours, not to mention his long involvement in the ATM class. This has been such a busy and productive year for him that he exhibited a slew of instruments, each with an adventurous and innovative aspect. Notably, these include his half of



(top) Rainer Jakob hand-made sundials on display.
(left) The creators of the 8-inch, f/7 Castor & Pollux twin scopes, Wessel Nel (left) and Johan Smit.
(below) Graham Lynch (left), Director G&L Agencies and sponsor of ScopeX, hands Helena Davy the raffle prize of a Canon 60Da DSLR camera with 10-22mm EF-S USM lens.

the Castor and Pollux twin scopes, a refractor using an exquisite Zeiss aerial camera lens of WWI vintage and a mounting for a commercial short-focus Newtonian that not only brings the OTA to a convenient height but also stores it for transportation. Several other scopes in the field sported versions of his signature finderscope mount and focuser designs, a testament to his dedication in making it possible to produce viable instruments from basic materials. This body of work certainly deserved his award of a Baader planetarium clickstop 8-24mm zoom eyepiece with matched 2.4x Barlow, courtesy of Eridanus.

The following deserve special mention. Wessel Nel for the other half of the Castor & Pollux twins and a Polarex refractor with a flexion hinge Crayford focuser. L Lombard for 6-inch f/8 Dob sporting a low profile Crayford focuser and altitude trunnions running on bearings with an adjustable damper that still needs a little more



development to be effective. Eric Slaghuis for his wooden strip tube, which is work-in-progress but the workmanship was much admired. Rainer Jakob for his magnificent array of sundials, each of which is a work of art, plus his work-in-progress Dobsonian with aluminium structure and carbon fibre on foam tube. We look forward seeing the unfinished items in their final form. Rainer is also due a huge vote of thanks for all the behind-the-scenes work he does for ScopeX and the ATM class. ☆

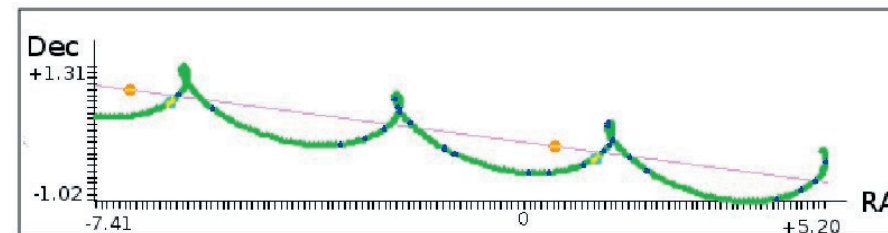


Fig. 4 The movement of Proxima Cen in R.A. and Dec. over 3 ½ years according to the Hipparcos satellite. The scales are in arcsec.

to be too high and has been reduced to 0.742 arcsec, but Alpha Cen is still the nearest star other than its possible companion Proxima Cen. Based on this figure, its distance is 4.396 light-years.

The discovery of Proxima Cen

RTA Innes, a young astronomer at the Royal Observatory, Cape of Good Hope, had been given the job of analysing data from the Cape Photographic Durchmusterung. He found a star that Kapteyn had thought was missing – it turned out to have a high proper motion and had moved a significant amount since its position had been measured some time before in Cordoba, Argentina. It is now called Kapteyn's star.

A few years later, after he had become director of the Union Observatory, Innes had the idea of looking for high proper motion stars near ones that were already known. While comparing two photographs of the region of sky near α Cen, he found a faint star that had a high proper motion similar to that of α . This is the star he afterwards called 'Proxima'.

Innes had no suitable telescope for doing parallax work, but he nevertheless tried, using a 9-inch refractor with a micrometer eyepiece. Though his results were not sufficiently accurate to be certain, he nevertheless declared that 'Proxima' is the nearest star.

Quite a few other observers over the following decades attempted to get parallaxes of Proxima but the results concerning its true proximity often seemed marginal or contradictory. [The history can be read in Glass (2008)].

It was really the Hipparcos satellite that settled the question. Fig. 4 shows its proper motion and parallax. As seen from the Earth, Proxima moves around a small parallax ellipse once per year. But, because of proper motion, the ellipse itself is moving at about 3.85 seconds of arc per year in R.A. and 0.8 seconds per year in Declination. The amplitude of the parallax at 0.772 arcsec is still less than one second of arc, or less than 1 part in 1 296 000 of a complete circle. Proxima's distance is thus 4.225 light-years.

have been due to a fear of being proved wrong – several other astronomers had in recent years ‘found’ parallaxes that had been shown to be non-existent – and he would not have wished to look foolish.

Meanwhile, Friedrich Wilhelm Bessel (1784-1846) started work on parallax in Königsberg, East Prussia. He had been informed of the measurement by Piazzi of the very high proper motion of 61 Cyg.

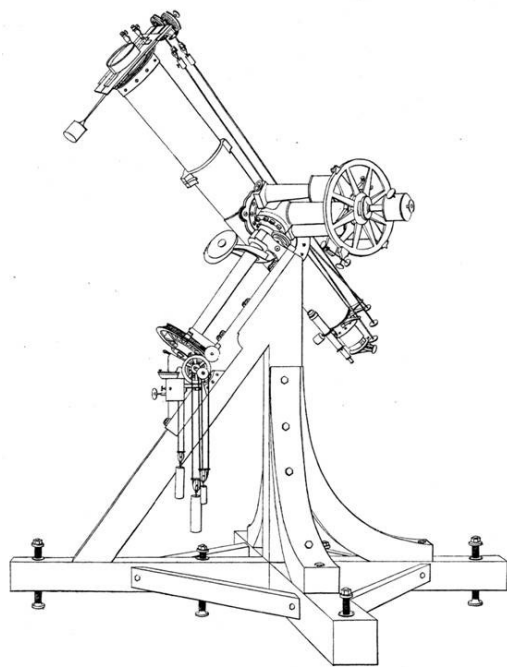


Fig. 3 The heliometer used by Bessel. The objective consisted of two semicircular lenses that could be moved very precisely relative to each other and also rotated. This enabled the angle between two stars to be measured very precisely.

Bessel used a very fine split-objective telescope called a ‘Heliometer’ that had been made by Fraunhofer (Fig. 3). Though again, the technique was to measure the position of 61 Cyg versus a distant star in a nearby direction, the method was quite different from Henderson’s. Henderson had to measure each star separately in declination and then in Right Ascension, using two separate instruments. With a heliometer, the two halves of the objective lens were rotated and moved sideways until the two images overlapped. The separation was much more accurately determined because it resulted from a single observation.

Bessel started his observations of 61 Cyg only in September 1834 (after Henderson!). On 23 October 1838 he announced a parallax of 0.31 arcsec, through the Royal Astronomical Society. His results astounded the whole astronomical world. Here at last was a proof that Copernicus was right – the Earth really does go around the Sun! According to John Herschel, “Such results are among the fairest flowers of civilisation”.

Henderson made his own announcement on 11 January 1839, but he had lost priority to Bessel. However, they remained good friends! Henderson obtained for Alpha Cen the value 1.16 ± 0.11 arcsec. This value is now known

2013 Astronomy Town Meeting

An ‘Astronomy Desk’ was set up within the Department of Science and Technology in 2011 as a National Astronomy Agency to coordinate the many astronomical activities within South Africa, particularly the new ‘big science’ projects. It is also concerned with human capacity development. With these in mind, a second Astronomy Town meeting was held in the iThembalABS auditorium on 1 and 2 August 2013.

A Town Meeting occurs when the citizens come together to talk about the issues of the day. Following the very successful 2012 Astronomy Town Meeting held at the University of Pretoria in July 2012, a number of senior academics approached the NRF, requesting that another Town Meeting be held in 2013. To this end **Prof Nithaya Chetty**, Group Executive for Astronomy within the NRF agreed that this would be an opportune time to meet to deliberate on various matters of relevance to the community. It is not intended that a Town Meeting will be held on an annual basis, but NRF is happy to take advice from the astronomy community-at-large on when it is appropriate to schedule another such meeting in the future.

More and more in the future, it was felt that the Town Meeting should be in the hands of the community in determining the agenda for the gathering, with NRF playing a supportive and facilitating role. NRF and Government have a vested interest to

ensure that the Astronomy community in South Africa is positioning itself optimally to take maximum advantage of the large-scale investments that are being made in Astronomy in the country. It is not always a matter of more money that is needed to attain our great many different goals for Astronomy, but often it is a matter of ensuring that we are making fuller use of the many opportunities that already exist.

While South Africa is clearly prepared to continue to invest significantly in the field of Astronomy, it is extremely important that everyone is cognizant of the many other competing government imperatives; within NRF, this comes in the form of the quest for support from the many other scientific disciplines, some of which are struggling under enormous pressures to survive, let alone to grow: the community needs to be sensitive to this reality. An Astronomy Town Meeting is one way of ensuring that there is a forum to share information, promote new ideas, stimulate new thinking about what is being done why, increase collaborations and linkages, and communicate and consult with each other. It is a means of building more coherence in the system, and ensuring that there is a continuing positive growth trajectory in the country. However, the Town Meeting is not a decision making body *per se*, but is a means of testing the views of the community on particular issues; decision making will continue through the normal Astronomy governance systems

With the advent of new projects, such as the KAT, MeerKAT and SKA, as well as possible SA participation in the Large Cerenkov Array project, interest and professional involvement in astronomy has greatly increased, there is every reason to expect that Astronomy will aspire to the highest international academic standards. From this position of excellence, the astronomical community is in the best place to address many of the educational, social, economic and political benefits that Astronomy promises and is already delivering. Astronomy is a leading edge science that is setting the standard for other disciplines to follow in our developmental agenda in our country, and more broadly in Africa. It is intended to adopt a multi-wavelength approach and to produce a decadal plan along the lines adopted in other countries

New professorial appointments have been made in astronomy and cosmology at AIMS (African Institute for Mathematical Sciences, Muizenberg) and several universities such as UKZN, Wits, UWC and UCT. And many new faces were also to be seen, including officials of the Department of Science and Technology, the National Research Foundation, under which SAAO, HartRAO, and the National Magnetic Observatory fall.

In order to facilitate this, the upper structure of government involvement in astronomy is as follows:

Within the Department of Science and Technology:

Minister of Science and Technology: Mr Derek Hanekom

Deputy Minister: Mr Tshililo Michael Masutha

Director-General, Science and Technology: Dr Phil Mjwara

Deputy D-G, Human Capital and Knowledge Systems: Dr Thomas Auf Der Heyde

Astronomy Desk: Director Prof Ramesh Bharuthram

Programme Astronomy Town Meeting

Thursday 01 August 2013

Astronomy sub-Agency of NRF by Albert van Jaarsveld (CEO NRF)

Astronomy perspectives from DST by Thomas Auf der Heyde (DDG DST)

Long-term Strategic Plan for Astronomy by Bonita de Swardt (DST Astronomy Desk)

MeerKAT, SKA by Bernie Fanaroff (SKA)

Current science with KAT7 by Nadeem

Oozeer and Sharmila Goedhardt (SKA)

African VLBI Network (AVN) by Anita Loots (SKA)

Radio Astronomy technologies by Oleg Smirnov (SKA and Rhodes)

Pathway to SKA Cosmic Magnetism Key Science by Russ Taylor (University of Calgary)

Spectro-imaging Follow-ups of MeerKat Surveys by Tom Jarrett and Claude Carignan (UCT)

New directions at SAAO by Ted Williams (SAAO)

Protecting our Astronomical sites by Peter

Discovery of Proper Motion

Halley, who had access to Flamsteed's data, showed in 1717 that three stars, Aldebaran, Sirius and Arcturus, had changed position by 20 to 30 arcmin since ancient times. The effect was so marked that the relatively poor quality of the ancient observations was not important. Their high proper motion tells us they are likely to be nearby. This can be understood simply by looking out of a window: a distant aeroplane may take several minutes to cross the view whereas a nearby bird can fly by quite quickly.

The accuracy of Piazzi's repeated observations, referred to above, was so good that he was able to find a large number of stars with detectable proper motions. One of these, 61 Cygni, moves at over 4 arcsec per year in R.A. and over 3 arcsec per year in Dec and received the sobriquet of 'Piazzi's flying Star',

In the south, permanent observatories began to be established in the 1820s. On St Helena, a young officer of the (British) East India Company, Manuel Johnson, was given the job of erecting a small observatory devoted to positional studies of stars that the Company hoped would be useful to them for navigation. Johnson was in close touch with the Royal Observatory, Cape of Good Hope. By comparing his results to those of La Caille, he found that α Cen has a very large proper motion, around 3.6 arcsec per year. Unfortunately for him, his observatory was shut down soon afterwards. However, before return-

ing to England, he informed His Majesty's Astronomer at the Cape, Thomas Henderson, about it.

The first successful observations of parallax

Henderson occupied the post of His Majesty's Astronomer at the Cape for a very short time only, namely March 1832 to May 1833. On hearing from Johnson, he set about observing α Alpha Cen more intensively, using a transit telescope to measure Right Ascension and a mural circle to measure declination. These were state-of-the-art instruments of the time.

To detect a parallax, which simply means the angle subtended by the radius of the Earth's orbit as viewed from a star, one observes the position of a star relative to another close by in direction but actually much more distant. This is repeated six months later, when the Earth is on the opposite side of its orbit. The angle between the star of interest and the distant one will have changed and trigonometry can be used to find out how far away it is, based on the known Earth-Sun distance. Measurements of this kind had been impossible before the 1830s because the effect was too tiny to be measured with the equipment then available.

Henderson's observations were successful. It is not clear if he realized this straight away or if he put his notebooks aside until after he heard of Bessel's success but fact remains, that he did not publish them immediately. His reluctance to publish may

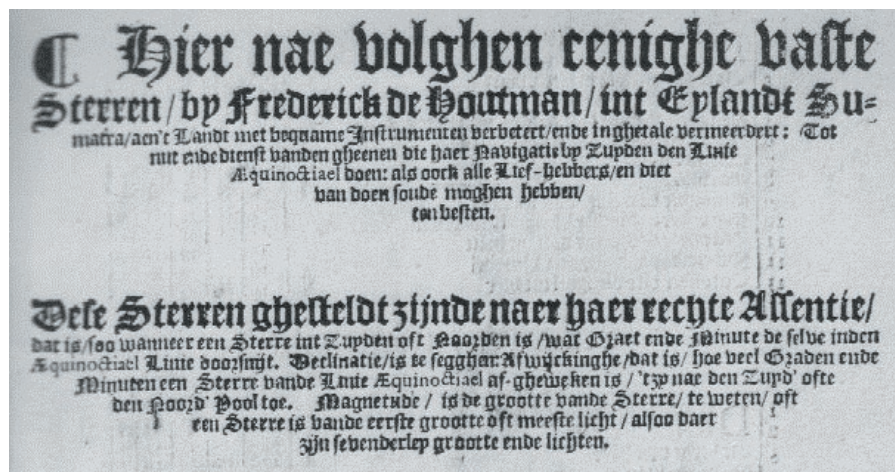


Fig.2 The title page of de Houtman's Catalogue (see de Houtman,1603). The first paragraph reads: "Here follow some fixed stars [observed] on land with appropriate instruments and in greater numbers by Frederick de Houtman in the island of Sumatra; with the aim of serving those who navigate south of the equator and also those who would like to have the best [information]".

In the mid-to-end 17th century, Flamsteed, the first Astronomer Royal, produced a northern hemisphere catalogue accurate to about 10 arcsec.

La Caille and his contemporaries in the mid-eighteenth century could make catalogues to a better standard, achieving errors around 3 arcsec. Though he was interested in searching for proper motions, La Caille did not have the repeated observations needed to find them. It was at this period that positions began to be corrected for the effects of aberration and nutation, just discovered by Bradley. These were significant at the accuracy now being reached.

Giuseppe Piazzi of Palermo used the latest instrument by Ramsden of London

around 1800. He was able to make a large catalogue of northern stars (1803) with an accuracy of 1.5 arcsec and, importantly, he repeated it after several years. This was of great importance to later studies, as we will see.

From about 1830 onwards, catalogues with a precision better than one arcsec were the norm as instruments became more and more accurate. Among the most important 19th century surveys were the Bonner Durchmusterung (BD) of Argelander and the Cape Photographic Durchmusterung (CPD) of Gill and Kapteyn. The latter was the first photographic catalogue. At last it was possible to have a permanent record of observations that could easily be verified and did not rely on the eye of an individual.

Martinez (SAAO) and Adrian Tiplady (SKA)

SALT instrumentation performance by Darragh O'Donoghue and David Buckley (SAAO)

Unravelling Galaxy Evolution with Targeted Surveys by David Gilbank (SAAO)

The High Energy Stereoscopic System (HESS) by Sergio Colafrancesco (Wits)

The Cherenkov Telescope Array (CTA) by Markus Boettcher (NWU)

Namibia's bid to host the CTA by Riaan Steenkamp (U. Nam)

Multi-messenger observations of astrophysical transients by Soebur Razzaque (UJ)

Gravitational Wave Astronomy by Nigel Bishop (Rhodes)

Neutrino Astronomy and intersections between Astrophysics and Nuclear Physics by Dr Zeblon Vilakazi (iThemba Labs)

Friday 02 August 2013

Collaborations with National Radio Astronomical Observatory (NRAO) by Tony Beasley (NRAO)

The Planck Surveyor: recent results by Cynthia Chiang (UKZN)

Large Synoptic Survey Telescope (LSST) by Patricia Whitelock (SAAO)

Giant Magellan Telescope: Science Goals and Project Status by Matthew Colless (Australian National Univ)

South African Astro-informatics Alliance (SAAA) by Lindsay Magnus (SKA and SAAA)

Mapping the Birth of the Universe:

Analysis of ACT Data by Jon Sievers (UKZN)

The Synergy Between Computational and Observational Astrophysics in the 21st Century by Romeel Dave (UWC and SAAO)

The Dome Project by Simon Ratcliffe (SKA)

The large SKA data rate problem by Francois Kapp and Jason Manley (SKA)

Cosmology on very large scales with future galaxy surveys by Roy Maartens (UWC)

Sutherland international telescopes by Ramotholo Sefako (SAAO)

African European Radio Astronomy Platform (AERAP) by Takalani Nemaungani (DST)

NRF-NWO Agreement by Renee Kraan-Korteweg (UCT)

National Astrophysics and Space Science Programme (NASSP) Programme by Kurt van der Heyden

Growing astronomy in the North by Chris Engelbrecht (UJ)

International Astronomical Union (IAU) Office of Astronomy for Development (OAD) by Kevin Govender (IAU OAD)

Free State Planetarium and Boyden Observatory by Matie Hoffmann and Pieter Meintjes (UFS)

Astronomical Society of Southern Africa by Ian Glass (ASSA)

Developing new university programmes in astronomy - Open discussion

Closure by Nithaya Chetty (NRF)

This report was compiled by the Editor from a note by Prof Nithaya Chetty and with additional contributions from Dr Ian Glass.

Attendees

Dr Thomas Auf der Heyde
 Dr Gillian Arendse
 Dr Sudanshu Barway
 Dr Bruce Bassett
 Dr Tony Beasley
 Prof Aroonkumar Beesham
 Prof Nigel Bishop
 Dr Sarah Blyth
 Prof Roy Booth
 Prof Markus Böttcher
 Mr Hannes Breytenbach
 Ms Sarah Buchner
 Dr David Buckley
 Prof Claude Carignan
 Ms Laure Catala
 Prof John Carter
 Prof Nithaya Chetty
 Dr H. Cynthia Chiang
 Prof Sergio Colafrancesco
 Dr Matthew Colless
 Prof Ludwig Combrinck
 Dr Lisa Crause
 Dr Steve Crawford
 Prof Romeel Davé
 Prof David Davidson
 Ms Kim de Boer
 Dr Bonita de Swardt
 Dr Roger Deane
 Prof Peter Dunsby
 Mr Robin Drenan
 Dr Chris Engelbrecht
 Dr Andreas Faltenbacher
 Dr Bernie Fanaroff
 Prof Michael Feast
 Mr Tony Foley
 Dr Michael Gaylard
 Dr David Gilbank
 Dr Ian Glass

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 Mr Jeremy Main
 Miss Fikiswa Majola
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 Prof Pieter Meintjes
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 Dr John Menzies
 Dr Brent Miszalski
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 Mr Lebo Moji
 Prof Kavilan Moodley
 Mr Takalani Nemaungani
 Dr Bernard Nthambeleni
 Dr Darragh O'Donoghue
 Dr Nadeem Oozeer
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The Nearest Stars

IS Glass, South African Astronomical Observatory

In this article it is shown how the improvement in the accuracy of star position measurements over the past 400 years led first to the discovery of 'Proper Motions' – the individual movements of the stars – and afterwards to 'Parallaxes' or the measurement of their distances by trigonometry. The pioneering work is described.

At present, the nearest known star is Proxima Cen, discovered by Innes at the Union Observatory in Johannesburg. Though he was right in calling it the nearest star, the accuracy of his data was insufficient to justify his claim. Many further observations were necessary to prove it.

The astrometric satellite Hipparcos has revolutionised this field and there are great expectations for Gaia, scheduled for launch in October 2013.

The progress of position measurements

Fig. 1 (Partly due to E Høg) shows how positional measurements improved over the centuries (by no means all catalogues are represented). In classical times, Hipparchus (ca 150 BC) catalogued a number of stars but no dramatic improvements in accuracy were made until end of the 16th century, when the Danish astronomer Tycho Brahe introduced much improved instruments in his large well-funded observatory located on the island of Hven. The Landgrave of Hesse was a contemporary of Tycho's though his measurements were not published until much later.

The first southern star catalogue was published by Frederick de Houtman (1571-1627, see Fig. 2) but probably Pieter Dirkszoon Keyser (1540-1596) made most of the observations. The latter died during the voyage on which the measurements were made – the 'Eerste schipvaart' (first voyage) that the Dutch made to the East Indies.

Edmund Halley made a small and somewhat improved catalogue of southern stars from the island of St Helena but he had to refer his positions to stars observed by Tycho because of limits imposed by the poor weather he encountered.

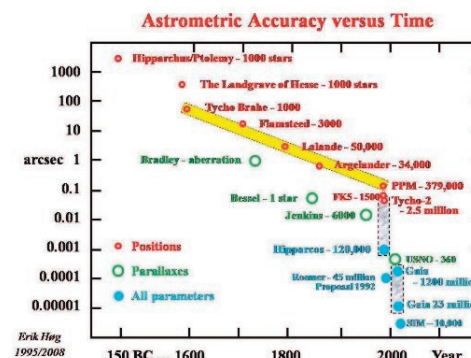


Fig. 1 The progress of astrometric precision over the centuries.

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The above is an extract from the Department of Science and technology's "Development of the Long-Term Strategic Plan for Astronomy in South Africa" compiled by the Editor. Full details available at: <https://sites.google.com/site/decadalplanforastronomy/> ☆

A Bright Nova in Delphinus (the Dolphin)

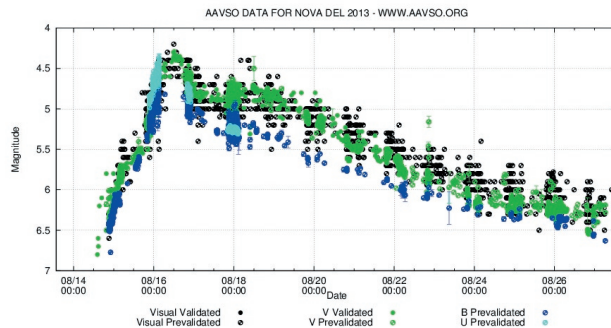
Brian Fraser

A nova is the sudden brightening of a star. Novae are thought to occur when a white dwarf star in a binary system explodes. The binary system usually consists of a white dwarf and a red giant star. If these two stars are close enough, material from the red giant star can be pulled off its surface and onto the white dwarf. This results in unhappiness for the white dwarf and it partially "explodes", brightening by 12 magnitudes or more (a factor of 10 000). Such stars may go through the nova phase many times, with outbursts separated by decades.

Nova Del was discovered by Koichi Itagaki of Yamagata, Japan, using 0.18-m reflector,

fitted with an unfiltered CCD. The Nova was confirmed on frames taken on August 14.750 UT using a 0.60-m f/5.7 reflector and unfiltered CCD.

At the time of discovery, the Nova's CCD magnitude was 6.8. Nothing was visible at this location on Itagaki's past frames (limiting mag.= 13.0), taken on 2013 August 13.565 UT. It gradually brightened over the following 2-3 days and reached magnitude 4.4 visual. Nova Del is eligible for the nova Hall of Fame. There are only 29 recorded novae that have peaked brighter than this. The AAVSO light curve (see picture) shows how the brightness peaked around August 16.5 and how it gradually declined.



The CCD images were taken with an SBIG CCD ST7XME camera on a 12-inch Meade LX200 SCT, each with a two second exposure (see cover picture). ☆

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Decadal Astronomy Plan for South Africa

Background and overall objectives

The need for a long-term strategy for astronomy in South Africa has been identified in a number of reviews conducted by the National Research Foundation (NRF). The reviews point toward the need for a national astronomy strategy for South Africa to obtain maximum return on the large investment made into the discipline, and for the country to become a global competitor in the field.

The Astronomy Desk (AD) has been facilitating the process of developing the long-term strategic plan for astronomy as part of its mandate to the Department of Sci-

ence and Technology (DST). In this regard, the work of the AD has included a study of the main international decadal plans (Australia, Europe and the United States of America) in astronomy and astrophysics to assist with the development of South Africa's long-term strategic plan. Further work by the AD includes the drafting of a defining framework to serve as a platform for the development of the detailed sub-strategic plans while considering the unique needs of astronomy in South Africa.

The studies carried out by the AD have led to the identification of the core components of a multi-wavelength strategy for

the advancement of astronomy and astrophysics in South Africa. These are:

1. Excellence in Research: Research niche thematic areas
2. Human Capital Development
3. Astronomy Education/Outreach/Science and Mathematics Awareness
4. Astronomy Technology Development
5. National Partnerships
6. International Partnerships
7. A Supporting Infrastructure for Astronomy Research and Development

The seven components will form the basis of the long-term strategic plan for astronomy drawing in expertise from the South African community in each of the prioritization areas. The members of the seven panels include relevant experts from the higher education institutions, national facilities and science centres from all over the country, who were nominated by the AD working group to serve on one or more of the seven panels. The 54 members constituting the seven panels for developing the long-term strategic plan for Astronomy are shown below.

The first workshop for all panel members for the development of the long-term strategic plan for astronomy took place at the Premier Hotel Cape Manor in Cape Town on 06-07 June 2013. The objective of the first workshop was to officially initiate the engagement of panel members who will contribute to the seven components forming the body of the strategic plan document.

The AD extended an invitation to the Minister of Science and Technology to participate in the workshop by delivering the opening address on the evening of 06 June 2013.

Following this first workshop, the various panels actively engage in discussions in formulating the individual panel strategy reports over the next couple of months. Together these reports will form the decadal strategy document for Astronomy in South Africa with the completion of the first draft expected in November 2013. A final workshop for all panel members will be held at the end of November to discuss the first draft of the decadal strategy. It is expected, that the final strategy document will be submitted to the DST in February 2014.

Panel 1: Excellence in Research – Research niche thematic areas

- Chair: Prof George Ellis (UCT)
- Prof Ted Williams (SAAO)
 - Prof Sergio Colafrancesco (Wits)
 - Prof Roy Maartens (UWC)
 - Prof Kavilan Moodley (UKZN)
 - Prof Tom Jarrett (UCT)
 - Prof Renée Kraan-Korteweg (UCT)
 - Dr Darragh O'Donoghue (SALT)
 - Prof Lerethodi Leeuw (UNISA)
 - Prof Romeel Davé (UWC/SAAO/AIMS)
 - Prof Bruce Bassett (SAAO/UCT/AIMS)
 - Prof Markus Boettcher (NWU)
 - Dr Sharmila Goedhart (SKA SA)
 - Prof Matt Jarvis (Oxford/UWC)
 - Dr Mike Gaylard (HartRAO)
 - Dr Bernie Fanaroff (SKA)

Panel 2: Human Capital Development

- Chair: Prof Kavilan Moodley (UKZN),
- Prof Thebe Medupe (NWU)
 - Prof Lerethodi Leeuw (UNISA)
 - Ms Kim de Boer (SKA SA)
 - Ms Daphne Legkwathi (SKA SA))
 - Dr Vanessa McBride (SAAO/UCT)
 - Prof Peter Dunsby (UCT)

Panel 3: Astronomy Education/Outreach/Science and Mathematics Awareness

- Chair: Mr Kevin Govender (IAU OAD), Co-Chair: Prof Thebe Medupe (NWU),
- Mr Derek Fish (UNIZUL Science Centre)
 - Dr Claire Flanagan (Wits Planetarium)
 - Mr Sivuyile Manxoyi (SAAO)
 - Ms Elisa Fraser (SANSA)
 - Mr Shadrack Mkansi (SAASTA)
 - Dr Ramotholo Sefako (SAAO)
 - Prof Bruce Bassett (SAAO/UCT/AIMS)
 - Mr Sam Rametse (SKA SA)
 - Dr Carolina Ödman-Govender (SKA SA)

Panel 4: Astronomy Technology Development

- Chair: Prof Ted Williams (SAAO)
- Prof David Davidson (US)
 - Dr Jasper Horrell (SKA)
 - Dr David Buckley (SALT)
 - Dr Darragh O'Donoghue (SALT)
 - Prof Oleg Smirnov (Rhodes)
 - Prof Claude Carignan (UCT)
 - Dr Mike Gaylard (HartRAO)
 - Dr Paulus Krüger, (NWU)
 - Dr Cynthia Chiang (UKZN)

Panel 5: National Partnerships

- Chair: Prof Sergio Colafrancesco (Wits),
- Dr Catherine Cress (CHPC)
 - Dr Enrico Olivier (UWC)
 - Prof Johan van der Walt (NWU)
 - Prof Lerethodi Leeuw (UNISA)
 - Dr Mike Gaylard (HartRAO)
 - Dr Kurt van der Heyden (UCT)
 - Prof Howard Reader (US)
 - Prof Sunil Maharaj (UKZN)
 - Dr Chris Engelbrecht (UI)
 - Dr Pieter Meintjes (UFS)
 - Prof Ted Williams (SAAO)
 - Dr Lindsay Magnus (SKA SA)
 - Prof Nigel Bishop (RU)

Panel 6: International Partnerships

- Chair: Prof Renee Kraan-Korteweg (UCT),
- Prof Roy Maartens (UWC)
 - Prof Sergio Colafrancesco (Wits)
 - Prof Ted Williams (SAAO)
 - Prof Kavilan Moodley (UKZN)
 - Prof Bruce Bassett (SAAO/UCT/AIMS)
 - Prof Lerethodi Leeuw (UNISA)
 - Dr Mike Gaylard (HartRAO)
 - Dr Bernie Fanaroff (SKA)
 - Dr David Buckley (SALT)
 - Prof Tom Jarrett (UCT)
 - Prof Markus Boettcher (NWU)
 - Prof Matt Jarvis (Oxford/UWC)

Panel 7: A Supportive Infrastructure for Astronomy Research & Development

- Chair: Mr Jeremy Main (SKA SA IT Manager)
- Dr Sudhanshu Barway (SAAO)
 - Dr Steve Crawford (SAAO)
 - Dr Jonathan Sievers (UKZN)