CAPELLA

CAMBRIDGE ASTRONOMICAL ASSOCIATION

www.caa-cya.org

Newsletter 203 Mar - Apr 2020
Registered Charity 800782

The Aurora Borealis

Taken by David Davies

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CAA & CYA Who's who contact info. P8

Cambridge Astronomical Association & Cambridge Young Astronomers

Chairman's Comments

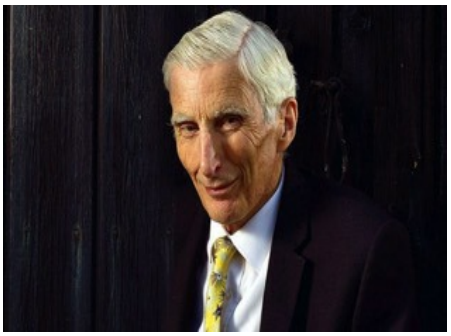
Hello everyone,

I'm glad to report that all is progressing well and we have a full program lined up of monthly meetings, with the Monday evening events now attracting a mixture of young and old, along with our regular Friday speakers. The Saturday CYA 7-11 group has been picking up, and several of us have been very active in trying to promote it - resulting in a short spot on the local TV news for a couple of our youngsters the other day. The IoA open afternoon is on March 21st (Saturday), and we will be doing our best there to attract new members with both activities for kids in the side room of the Hoyle building, and a planetarium show in the Kavli lecture room. That will mark the last week in the observing season for our Wednesday night activities, but we will soon go on to running the Introduction to Astronomy course - which has been extended again this year and now spans 12 weeks - so there will be no excuse for being bored on a Wednesday this summer! Plus we have steam driving to look forward too... As always, thanks to all those who help out at any of our events, in whatever way - the club would not work without you.

Paul

Speaker Meetings

The Michael Penston Lecture
"From Mars to the Multiverse"
MONDAY 23rd March 2020
Start time : 20:00
Speaker : Lord Martin Rees



In 1990 Michael Penston was due to give a talk to the CAA, but had to cancel because of illness. Sadly, Michael died soon afterwards. In March 1991 the CAA held a lecture in memory of Michael, and a collection was made for Cancer Research. By the following year a fund had been set up in his name, administered by the Royal Astronomical Society, to help up-and-coming astronomers establish themselves in their chosen profession. Each year, at the end of the lecture we have asked CAA members to make a donation to this fund.

Tonight we are very pleased to welcome The Lord Rees of Ludlow Martin Rees OM Kt HonFREng FRS to address the Association on the subject of "From Mars to the Multiverse"

Astronomers can trace the emergence of atoms, galaxies, black holes, and stars back to a mysterious 'beginning' about 13.8 billion years ago. And the discovery of exoplanets opens up a fascinating new field. These advances pose new questions: What determined the key parameters of our expanding universe - its geometry and its content? Is there life, even intelligent life, elsewhere? Are there other 'big bangs'?

The Lord Rees Martin Rees is a leading astrophysicist as well as a senior figure in UK science who has for most of his career been based in Cambridge. He has conducted influential theoretical work on subjects as diverse as black holes, gamma ray bursts, dark matter, and the formation of galaxies. A special interest has been what happens at the end of the so-called cosmic dark ages - a period before the first stars formed. As Astronomer Royal and a Past President of the Royal Society, Martin is a prominent scientific spokesperson and the author of nine books for general readers, the most recent being "On the Future. Prospects for Humanity". He knew Michael Penston from student days and attended CUAS meetings when Michael was its President.

"New insights from our closest Earth sized planet - Venus"
Friday 17th April 2020
Start time : 20:00
Speaker : Philippa Mason
Preceded by CAA-CYA Annual General Meeting **See page 4**

If viewed from another solar system, current technology would reveal two Earth-like planets around our Sun, yet Venus could not be more hostile to life. Why is Venus so different from Earth and what are the implications for Earth-sized exoplanets?

Inferences of volcanic activity from the Venus Express spacecraft have driven a reanalysis of Magellan and Venera data to transform our understanding of both Venus and Earth.

This talk will summarise our new insights and outline plans for a comprehensive investigation of our enigmatic neighbour.

This talk will summarise our new insights and outline plans for a comprehensive investigation of our enigmatic neighbour.

These speaker meetings will be in the Hoyle building of the Institute of Astronomy, Madingley Road, Cambridge. Doors will open at 7:30 p.m. and the talks will begin at 8:00 p.m. For security reasons, entry will not be possible after 8:10 p.m. As usual, the library will be open before and after the lecture and refreshments will be available after the lecture. These meeting are free to members. Non-members are charged £1.

Member's Contribution

Annual General Meeting

Friday 17th April

Start time 19:30pm

Annual General Meeting

Also note that it will be our short but sweet AGM at 19:30 which will cover

* Chairman's Report
* Treasurer's Report
* (re)-Election of Committee Members
* (re)-Election of Officers
* AOB

Member's Contributions

A review of John Wills excellent Presentation

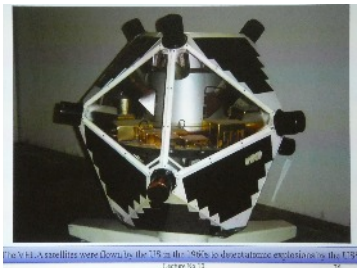
Multi-messenger Astronomy

Review by your Editor Richard White

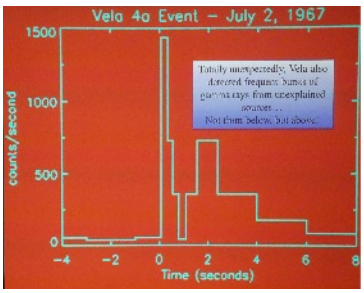
We were enthralled to see a presentation by John Wills on the 21st February. John originally worked as an electrical engineer and as he saw retirement approaching, he took an honours degree in Natural Sciences, focusing on astrophysics. His final dissertation was a literature survey on gamma ray bursts, for which no text book was then available. John completed his degree in 2006 and many of the trends that he identified then have continued and lead directly to the present developments in multi-messenger astronomy.

John explained that new detectors for energy particles and gravitational waves are producing much more information. By linking all this data we are able to see a bigger picture in our results. So we are able to combine information from cosmic rays, neutrinos, gravitational waves and gamma rays. Cosmic rays are very highly charged energy particles, mostly protons. They are affected by magnetic and electrical fields so their source is obscured. Most cosmic rays are thought to originate from supernova explosions. The particles become accelerated gaining enough energy to escape into space. The charged particles we can detect on earth are what we call cosmic rays.

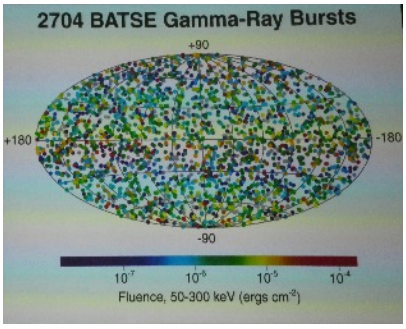
John expounded some amazing information. We are now detecting all the way to powerful gamma ray bursts. Then he discussed neutrinos that have no electrical charge, are not deflected by electrical or magnetic fields and travel at the speed of light. Neutrino observatories were developed to observe the flood of neutrinos emitting from the Sun. But in 1987 they accidentally detected neutrinos from another far distant source, a **Type 2 supernova in the Large Magellanic Cloud.** The new observatories are buried 2Km below the earths surface. Here are four of the supporting slides from the seminar.



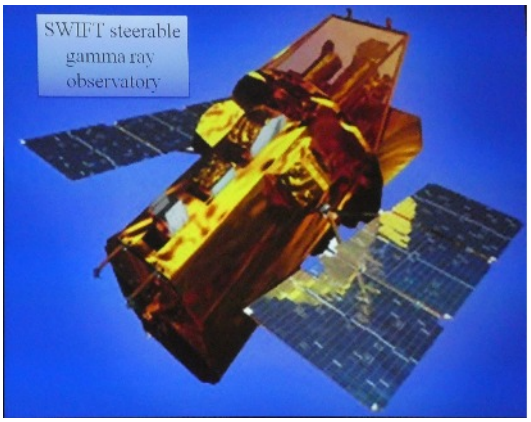
Vela Satellites used in 1960's to detect Atomic Bomb blasts.



Vela detected busts of gamma rays from unknown sources.



2704 BATSE of gamma ray bursts.



The new SWIFT steerable GR Observatory.

Member's Contribution

…….Continued from the previous page

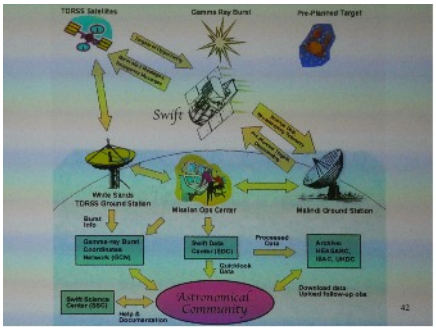
John then continued to discuss SWIFT. Its observation process of X-ray spectra which is distributed to the GCN in minutes and the UVOT filters transmit their data after 2hrs. What is important is that each GCN observatory adds its own data expanding the information available. GCN is now linked to the Astrophysical Multi-Messenger observatory network. (AMON).

Gamma ray bursts and pre planned targets link to TDRSS Satellites which link to Swift and White Sands TDRSS. As well as Malindi Ground Station which all are managed by Mission Ops Centre as in the 1st slide below. SWIFT and Fermi observed the GRB 180720B. HESS saw this after 10hrs after which a new source of gamma rays was detected at the same position. Slide 2.

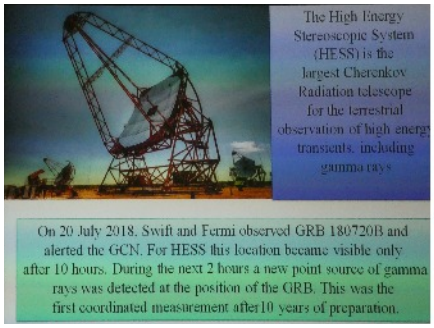
John then carried the presentation on to neutrinos which have been detected in heavy water where a particle is created by a photon of blue light known as Cherenkov Radiation. Slide 5 demonstrates A Type 2 Supernova which is re-invigorated by neutrino interaction becoming a neutron star. Slide 8 shows the path of a high energy neutrino through IceCube on 13th Jul;y 2018.

Slide 9 shows the first gravitational wave detected with GRB 170817A detected by Fermi, (detected GR to 300 KeV) LIGO-Virgo (GW) and INTEGRAL GR (100 KeV and higher).

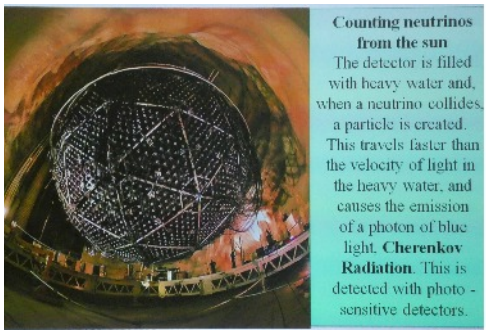
The final slide shown here from John's seminar looks at LISA which will be a large-scale space mission designed to detect the most elusive phenomena in astronomy - gravitational waves. With LISA pathfinder which was launched in 3rd Dec 2015 and proved the way for the full LISA mission. LISA is a space-borne gravitational wave Observatory with an arm-length of 2.5 Million km, compared to the few km's of the ground-based observatories. LISA will enable us to discover the parts of the universe that are invisible by other means, such as black holes, the Big Bang, and other, as yet unknown, objects. LISA will enhance our knowledge about the beginning, evolution and structure of our universe. We will be able to observe the entire universe directly with gravitational waves, learning about the formation of structure and galaxies, stellar evolution, the early universe, and the structure and nature of spacetime itself.



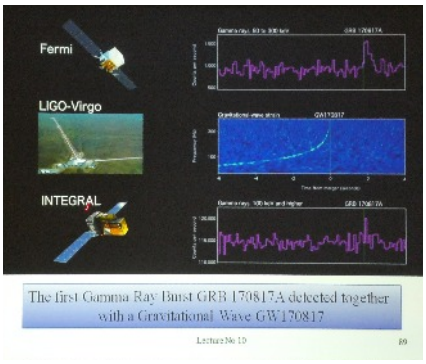
The Multi-messenger community.



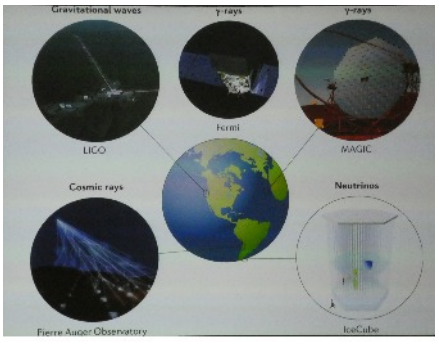
The Cherenkov radiation telescope for terrestrial high energy observation.



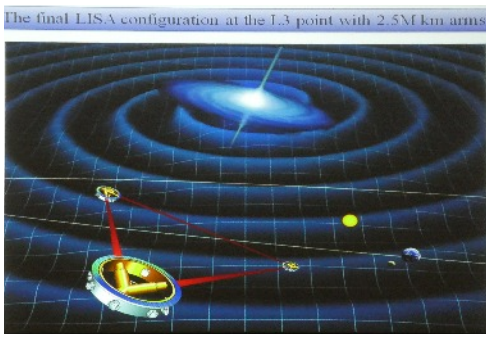
Counting neutrinos from the Sun. When a neutrino collides with heavy water a new particle is created.



The first GRB detected with a gravitational wave GW 170817.



The full Multi-Messenger astronomy picture of Gravitation waves, Y-rays, Cosmic rays and Neutrinos seen by LIGO, Fermi, Magic Pierre Auger and IceCube.



Where next? The launch of LISA which will be a large scale space mission set to 2.5 M km arms triangulated by laser giving us the largest Gravitational wave space observatory.

Member's Contributions

David Davies

UGC 3697, The Integral Sign Galaxy

Taken with a new QSI 683 camera with an 8 position Filter

This hobby of astronomy can be costly in terms of equipment and imaging can very expensive indeed. It comes as something of a shock, therefore, when my treasured astronomy camera started to show signs of age. I became very concerned, therefore, when last November one of the cooling fans on my QSI 583 cooled mono camera stopped working.
The camera was made by QSI (Quantum Scientific Imaging), an American company set up on the farm premises of the founder Neal Barry. Unfortunately, Neal died unexpectedly in September 2017, and the company was put up for sale. The company was bought by Atik, in Norwich, and they are now continuing the development and maintenance of QSI cameras. So, I contacted Atik for help with my problem camera. It came as a bit of a shock to hear that when Atik took over QSI, they could recover very little design documentation on the 583 camera, and many of the electronic components were now obsolete. Moreover, dismantling the camera is very tricky, needing care and skill. Atik, therefore, had decided, as a policy, not to service the 583 camera. However, they suggested that if I could buy a replacement fan, then I should be able to cut the wires on the old fan and solder the new one to them. This, I did, and the new fan worked. However, sometime later, I noticed that both fans were no longer working, and the camera was running hot. I clearly had a more serious problem and was seriously thinking I would have to dismantle the camera to try and determine what was wrong. I was approaching the point of not having a working camera.

I was rescued by Ian King, with whom I shared a curry one evening in January. He told me that the old QSI company used the services of a UK-based engineer to do their European servicing. Therefore, I visited this person, and he suspected that the power/cooling board was faulty, and he had just two spare boards left. He offered to repair my camera and gave me a price (not cheap). On the other hand, he said, you might be interested in this, handing me a nearly new QSI 683 camera complete with an 8-position filter wheel. Ah! Now my 583 camera had a 5-position filter wheel, so every time I changed from RGB imaging to narrowband imaging I had to open the camera to change the filter wheel, a job I never liked doing. A camera with an 8-position wheel would solve all that. So I bought the 683 camera, and my troubled 583 camera was accepted in part exchange.

I have to say that I'm happy with the new camera and this image, to the right, was something of a test to see how it performs. I deliberately chose something that was small and faint.

QSI 683

The image is of UGC 3697, The Integral Sign Galaxy. This is a mag 13.68 galaxy in Camelopardalis. UGC 3697 is an edge-on spiral 'super-thin' galaxy with warped arms located approximately 151 million light-years away. Scientists believe the warping is the result of interaction with the dwarf galaxy UGC 3714, the (mag 12.6) round spiral galaxy below and to the left (east) of UGC 3697.

One of the challenges in capturing and processing this image is the presence of the two, bright orange stars. HD54070, to the left, is an orange star (B-V 1.1) of magnitude 6.3, and HD52762 is a magnitude 7 star of a slightly deeper orange hue (B-V 1.3). By comparison, the three blue-white stars to the left of UGC 3697 are magnitude 10 to 11.

Image data were captured on the evenings of 17th to 27th February 2020. The data comprise 24 x 5-minutes luminance and 6 x 10-minutes each of RGB.

Equipment:Telescope: 8-inch Ritchey Chretien
Camera: QSI 683 with Astrodon filters
Mount: Skywatcher EQ8
Image processing was done with PixInsight and Photoshop.

CAA/CYA News

More Diary Dates ***See the CAA-CYA website for more details.***

Monday	**2nd**	**March**	**CYA 11+ Group**	**Pirate Astronomy**	**CAA**
Saturday	**21st**	**March**	**IOA**	**OPEN AFTERNOON**	
Monday	**23rd**	**March**	**Speaker Meeting**	**From Mars to Multiverse**	**Lord Martin Rees**
			The Michael Penston Lecture		
Wednesday	**25th**	**March**	**Public Observing Ends**		
Saturday	**28th**	**March**	**CYA 7 to 11 Group plus Hubble Space Telescope 30th birthday**		
Monday	**6th**	**April**	**CYA 11+ Group +** ***Adults***	**"The Gas Giants" CAA**	
Friday	**17th**	**April**	**Annual General Meeting**		
Friday	**17th**	**April**	**Speaker meeting**	**New insights from Venus**	**Phillippa Mason**
Wednesday	**22nd**	**April**	**Introduction to Astronomy by the CAA**		**Course starts**
Saturday	**25th**	**April**	**IMAX film**	**and CYA Birthday**	
Monday	**4th**	**May**	**CYA 11+ Group +** ***Adults***	**To be announced**	
Monday	**11th**	**May**	**CAA/CYA**	**Steam Driving Day GCR**	
Friday	**15th**	**May**	**Speaker Meeting**	**Hubble Distant Galaxies & JWST**	**Steven Wilkins**
Saturday	**30th**	**May**	**CYA 7 to 11 Group**	**To be announced**	
Monday	**1st**	**June**	**CYA 11+ Group +** ***Adults***	**To be announced**	
Friday	**19th**	**June**	**Speaker Meeting**	**Solar Storms - effect on the ground**	**Mark Clilverd**
Saturday	**27th**	**June**	**CYA 7 to 11 Group**	**To be announced**	
Monday	**6th**	**July**	**CYA 11+ Group +** ***Adults***	**To be announced**	
Wednesday	**8th**	**July**	**Introduction to Astronomy course ends**		
Friday	**17th**	**July**	**Speaker Meeting**	**Are we dust - or nuclear waste?**	**Robin Catchpole**

Anybody with other astronomical event information suitable to notify the membership,

Please contact Richard White Editor of Capella ***jazzyrjw@gmail.com*** *with details for inclusion in this list if acceptable to the committee.*

Display table

At our speaker meetings, we will put out one or two tables for members to display their photographs, bring along laptops to present their work or even show objects of interest. Please contact Paul or Brian to make sure it is not already booked in advance.

Loan Telescopes.

Our four existing loan telescopes are easy to use and easy to transport, and usually with no long waiting periods so why not give it a try.

We have new loan telescopes we have now added to the existing loan stock. There will always be one that is available to try.

Visit our website **(www.caa-cya.org)** and click to book an Instrument.

Alternatively please ring Mickey Pallett on 01480 493045

Capella *Editor's notes.*

A special thank you to all the new contributors for all the interesting articles and pictures you sent for this edition.

But don't stop there. Anything interesting astronomy related can be submitted as long as i*t is entirely your own work.*

Please remember to credit the owner of any picture or article if you have incorporated it into your story. It can even be an interesting book or video that you want to recommend to others or as I have done in this edition, a review of a lecture..

I would ask that any information you wish to include in Capella must be in a **standard text or word format** document. Any embedded pictures you have used in your story should be also sent as separate JPG's. You can contact me by email on any content or publication issue at **jazzyrjw@gmail.com or phone 07943 945222**

CYA Meeting
7-11 Year Group

CYA and HST 30th Birthday
Saturday 28th March 2020
Start time : 10:00

The CYA and HST group celebrate their 30th Birthdays. On the 24th April 1990 the Hubble Space Telescope was launched, and just 4 days later the Cambridge Young Astronomers was also launched. The HST didn't start its observing career too well because of a wonky main mirror, and likewise the CYA start was a bit dodgy with only 2 youngsters turning up for the first meeting. But both were fixed. After several repair and up-grades mission the Space Telescope is now performing better than ever. The number of members attending the CYA improved and now we are the only young astronomers group in the world (and probably the galaxy!) that have regular meetings all year round and have been running successfully for 30 years.

Saturday 25th April 2020
"To be advised"
Start time : 10:00

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11 + Group Meetings

"The Gas Giants"
Monday 6th April 2020
Start time : 19:15
Speaker : CAA

This time we will looking at the large outer members of our solar system – Jupiter, Saturn, Uranus and Neptune, these gas giant planets are all very different from each other.

We welcome all CAA visitors come and join in the Monday and Saturday seminars to the CYA. The subjects are as interesting as they are diverse. You would be amazed at what you might learn.

Meetings for the 11+ Group will be held in the Hoyle Building at the Institute of Astronomy, Madingley Road from 7.15pm to 8.45pm. Free to CAA and CYA members; for non-members there is a £1.00 fee.

Chairman : Paul Fellows
Vice Chairman : Brian Lister
Treasurer & Membership Secretary : Mickey Pallett
Secretary : John Hodson
Events Secretary : Jonathan Clough

Capella Editor and DTP Setter : Richard White jazzyrjw@gmail.com
Members should send stories for inclusion where possible by email to Richard or send them to Brian Lister Tel: 01223 420954 (evenings) or email btlister@btinternet.com
Please make sure that article text contributions are sent as standard Word files and images as .jpg's wherever possible.

President : Jim Hysom
Vice President : Carolin Crawford
Committee : Dave Allen, Kevin Black, Paul Drake, Barry Warman, Richard White, Brenda Field, Jonathan Clough
Cambridge Young Astronomers : (both groups): Brian Lister Tel: (evenings) 01223 420954 or em ail btlister@btinternet.com
Telescopes for hire to members : Mickey Pallett Tel: 01480 493045 or book on line.
Loan Telescope maintenance : Dave Allen, email day.vid@hotmail.co.uk
Library : Kevin Black Tel: 01223 473121
Webmaster : Paul Fellows: email paul.fellows@gmail.com

Website: www.caa-cya.org