FAS Newsletter

Federation of Astronomical Societies http://www.fedastro.org.uk

FAS Annual Convention 2017

The 2017 FAS Annual Convention and AGM will again be held in Birmingham.

The venue will be the University of Birmingham's Poynting Building. The Poynting Building remembers Sir John Henry Poynting the first professor of physics at the University of Birmingham. He seems to have been an interesting character, and worked out how to describe the direction and magnitude of electromagnetic waves with the "Poynting Vector", and was the first to work out an accurate determination of the mass of the Earth.

Directions & Map:

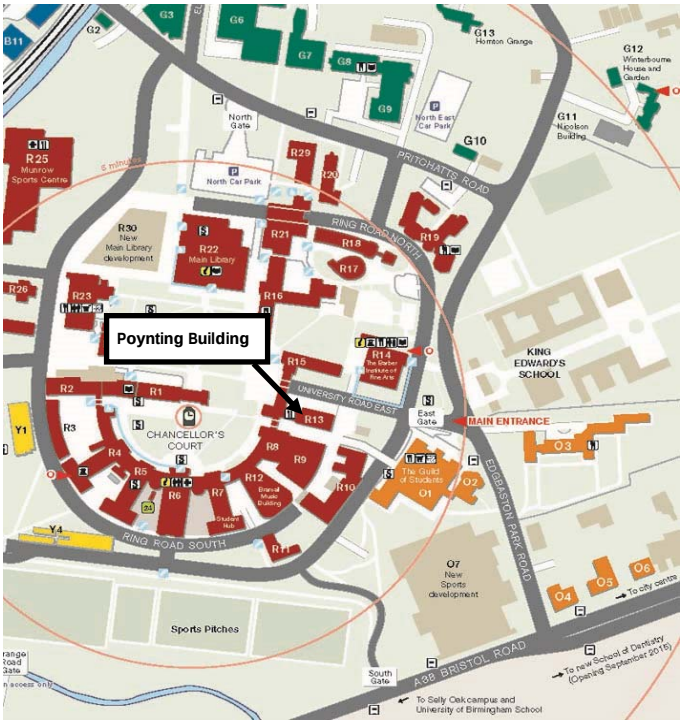
Venue address: Poynting Physics Building, University of Birmingham, Birmingham, B15 2TT.

The Poynting Physics Building is situated in the heart of the University of Birmingham's Edgbaston campus, R13 on the Campus map. Detailed directions, via public transport, bicycle, car and air can be found here:

http://www.birmingham.ac.uk/visit/maps-and-directions.aspx

Car parks in the University are free at weekends.

Please note that there are a few venues on site which sell food, such as a 'Spar' and 'Subway'. You are also welcome to bring your own packed lunch, and slightly further away (~10 minute walk, on the Bristol Road) there are a number of pubs which serve food.



The 2017 FAS Convention will take place on September 30th 2017 at the University of Birmingham, Birmingham. The convention will start at 9.30am.

Speaker lineup (at time of printing). Check the FAS website for further details.

- **Prof. John Zarneki** – *Europe in Space*
- **Prof. Ian Shipsey**—*From Quark to the Cosmos*
- **Prof Tim Greenshaw** – Exploring the Non-Thermal Universe: the Cherenkov Telescope
- **Prof Donald W Kurtz** - Planets and Pulsations: The New Keplerian Revolution
- **Prof Carl D Murray** - Cassini at Saturn: The End of an Era

There will be a number of traders, exhibitor and other organisations set up in the area of the talks, for your interest. Those established at the time of printing are:

- Birmingham AS
- nPAE Precision Astro Engineering

It is hoped that others will be secured by the time of the convention.

Tickets: £ 5 for FAS members, £ 7 for non-members, under 18 free

A little about the speakers

Professor John Zarneki

Profile:

John started life in Finchley, Middlesex where he attended Highgate School.

His early interest in Astronomy and Space 'rocketed' when, in 1961, he was allowed time from school to see Yuri Gagarin, the first man in space, visit Karl Marx' tomb in Highgate Cemetary.

After graduating from Queen's College, Cambridge with a physics degree and obtaining a doctorate in the field of X-Ray astronomy at MSSL he moved on to work for British Aerospace on the Faint Object Camera for the Hubble Space Telescope.

Since then his 45-year career (and still going strong!) has involved him at a high level with many spacecraft and their missions – which is the subject of his talk tonight!

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In 1981 he moved to the University of Kent working on the Giotto mission to Halley's comet.
From 2004-2013 he was Professor of Space Science (now Emeritus) at the Open University, having previously been a professor and researcher at the University of Kent.
Between 2007 and 2009 he was the Director of the Centre for Earth, Planetary, Space & Astronomical Research (CEPSAR) at the Open University.
Since 2013 he has been a Director of the International Space Science Institute in Berne, Switzerland.
He has received many awards over the years, amongst them:
- In 2005, for his work on the Huygens probe, he won the Sir Arthur Clarke Award for individual achievement.
- He was awarded the Gold Medal of the Royal Astronomical Society in 2014
- In September 2014 he was awarded foreign membership of the Polish Academy of Arts and Sciences for his significant contributions to Polish science.

Vice-President of RAS from 2009 to 2011
President of the RAS since May last year
Passionate supporter of Crystal Palace Football Club.

Prof Ian Shippey

Profile:

Henry Moseley Centenary Professor of Experimental Physics at the University of Oxford.
A particle physicist, he develops cameras that enable new ways of seeing the world. One glimpsed the Higgs Boson for the first time in 2012 at the CMS experiment at the Large Hadron Collider at CERN, another currently being built will be attached to the Large Synoptic Survey Telescope (LSST) in 2022 to make the first movie of the cosmos and the most precise measurement of the mysterious dark energy that accounts for 75% of the mass-energy of the universe.
In 2012 Ian was elected Chairperson of CMS. He led the internal CMS reviews of the Higgs Boson searches in 2011.
He was chosen by the US Department of Energy to lead the 50-university LHC Physics Center at Fermilab, USA (2009-2012) and earlier was the leader of the CLEO experiment at Cornell University, USA (2001-2004). He was a Director of LSST (2008-2012) and was the elected chair of the American Physical Society, Division of Particles and Fields the US professional organization of particle physicists in 2014.
He is an expert on heavy quarks. With CLEO he made the most precise measurements of the strength of four of the nine ways a quark can disintegrate in nature. At the LHC he was the first to observe beauty quark production, and used beauty quarks to provide one of several lines of evidence for the quark gluon plasma a new type of matter.
He joined Oxford in late 2013 and joined the ATLAS experiment in mid-2015.
He is a Fellow of the American Physical Society and the American Association for the Advancement of Science.
Ian is profoundly deaf. He has given almost one hundred colloquia and talks to the public on bionic hearing and perception since the miracle of a cochlear implant restored his hearing in 2003.

Prof Tim Greenshaw

Whitehaven Grammar School
1982, BSc Physics, U. Durham
1985, PhD Elementary Particle Physics, U. Manchester
Current research on High-Energy Particle Physics
Collaborations with: ATLAS Collaboration, Cockroft Institute, High-Energy Physics group
PhD External Examiner for Oxford, Glasgow, Imperial College, Bristol, Hamburg (Germany)
Invited to speak at many major international conferences
Authored or co-Authored nearly 400 research papers
Fellow of the RAS
Member of IoP
Member of Institute of Electrical and Electronics Engineers (IEEE)
Member of American Association for the Advancement of Science
May 2013, On expert panel of Melvyn Bragg's 'In Our Time', Cosmic Rays

Prof Donald Kutrz

Born in San Diego, California.
1970: BSc from San Diego University
1972: MA from the University of Texas
1976: PhD also from the University of Texas and then returned to San Diego State University as Assistant Professor
1977: Moved to the University of Cape Town, South Africa as a postdoctoral fellow and, by 1988, he'd risen to the position of Associate Professor.
After 25 years in South Africa, Don moved to the UK where he's now Professor of Astrophysics at the University of Central Lancashire.
His research is in Asteroseismology and Magnetic stars and he teaches the undergraduate introductory astrophysics course,

What Next for FAS?

As I mentioned in my May email update to All FAS Societies there will be a number of positions vacant at the AGM. There have been no expressions of interest and at our last Council Meeting, we discussed what we should do.

I myself am standing down as I was invited to stand for BAA President in its next session. Shaun O'Dell is standing down from Secretary - Shaun has been a stalwart of the Federation for many, many years and will be sorly missed. Mike Pritchard (Membership Secretary) has been doing his role for many years, and has made a great contribution. Also Sean Elvidge our website manager has too many commitments to give the role the attention it needs - but again we really do appreciate all the work he has done in this role and in helping to organise the annual convention.

So we will be without President, Vice-President, Secretary and Membership Secretary - these are all 'executive officer' positions which leaves just two in post (Treasurer and PLI Secretary). And our Website Manager position will also become vacant at the AGM.

Without people in these positions, it is very difficult for the FAS to continue. I remember a couple of years back at the AGM Frank Johns raised this issue then, and to use a rugby analogy the future was 'use it or lose it'.

At the council meeting, one member raised the interesting questions 'should the FAS continue? and can the FAS continue?' We did not have much time to discuss the 'should' question - but the landscape of astronomical societies in the internet age has changed a lot since the inception of the FAS in 1974.

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FAS to FOLD March 2019?

At the last council meeting it was felt that due to the lack of input from member societies that the council will recommend the closure of the FAS at the end of the PLI year March 2019. if there are insufficient volunteers for posts to come forward. Currently we are looking for the following executive members President, Vice President, Membership Secretary, Secretary and webmaster, all of the current holders are standing down. Over the last few years the FAS has struggled to get members onto its council and the feeling was that with the exception of the PLI we are not offering much to our members, for example there are no contributions to the newsletter at all. If the membership votes for this option at the AGM then the majority of the current committee will stay on for a transitional period (yes it is like Brexit) and will work to try and find some other group to take over the PLI coverage .

The only other option is for enough new blood to come forward and take on the the FAS roles that are open. If the membership does not vote for this and there are no people standing for the positions then the FAS will fold at the 2017 AGM effectively.

SHA 2017 Spring Conference

A warm spring day greeted the attendees of the Society for the History of Astronomy annual spring conference at The Institute of Astronomy, Cambridge on the 22nd April 2017. Attendees were given a warm greeting by the SHA meetings organiser Dennis Osborne and members were presented with their new SHA lapel badge.

After a brief welcoming talk by Bob Bower, the Society's Chairperson, the first talk of the day was given by Howard Carlton. Its title was "John Pringle Nichol, the Nebula Hypotheses, and Nineteenth Century Cosmogony". Howard explained how Nichol, a Scottish professor of astronomy at Glasgow university, was one of the first people to support the nebula hypothesis. Nichol was an accomplished speaker and his enthusiasm for the theory was evident in the lectures he held as well as the books he wrote on the subject. This was a theory that was in its development, and objections and alternate ideas were being fronted by people such as theologian Thomas Chalmers. Chalmers had argued that the universe was born fully formed. Criticism also came in the form of observational evidence. This was particularly evident from the observations made at the Leviathan telescope at Birr Castle in Ireland. This was the largest telescope in the world in the mid-nineteenth century. It was hoped these observations would give a definitive answer on the theories involved. The conclusion was that that some nebulae could be resolved into individual stars. The Revd T. R. Robinson, working with Lord Rosse, declared that both M1 and M42 were resolvable. They invited Nichol to see the evidence for himself, which he did in 1845. The resolvability of the Orion nebula was a problem for the hypothesis, but Nichol refused to give up the nebula hypothesis and he gradually challenged the observations made – which, of course, we now know were false.

We thank Howard for a fascinating talk.

The second talk was given by Dr James Hannam titled "Dancing to the Music of the Spheres: Medieval Visions of the Heavens." James' enthusiasm for this period was evident. He announced that he was to put right to rest the misconceptions that no astronomical advances were made during the medieval period in western Europe. The ideas being formed in that period were not just a rehashing of ideas from the ancient Greeks. Important advances included the design and manufacture of astrolabes. Although these are difficult to date, a number of them were made and the design was perfected in this period. The escapement and mechanical clock were also invented in the thirteenth century. Astronomical tables were calculated, these were used not only for the determination of the calendar, but also in astrology and medical fields. James went on to discuss the position of astronomy within the curriculum at universities, the earliest examples being from Oxford, Bologna and Paris. This was a wonderful introductory look at the role astronomy played in the medieval period. More information can be found within James' book "God's Philosophers".

During the break for lunch, we were lucky enough to be given a guided tour by Mark Hurn, the Institute's librarian, of the grounds and the historic Northumberland and Thorrowgood telescopes. Mark took the time to regale us with stories from their past history, including the infamous search for the planet Neptune by Challis, using the Northumberland telescope in 1846. A raffle was held during the lunch break. It was well received - a number of books and prizes were on offer.

The afternoon talks started with Dr Simon Mitton, who spoke about the "History of Planetary Science - Discovering the Dynamic Planet Beneath our Feet". This story was focused on the Earth, with many of the discoveries in this field made by geologists and Earth scientists. Simon's fascinating talk took us on a journey of discovery with the important historic characters of this field. He spoke about the accomplishments of William Gilbert, Robert Hooke and Adam Sedgwick to name a few. It has been only during the latter part of the 20th century that planetary science has seen significant developments. Many of the processes found on the Earth are starting to be seen replicated throughout the solar system. Simon's current research is within this field.

Following this was Dr Stewart Moore's well researched and highly topical look at the life and achievements of Charles Messier. Messier was never considered an academic astronomer, which makes his achievements all the more impressive. Born in Batonvillier on the 26th June 1730, his move to Paris came with the need to search for work. He originally worked as a clerk, but had been inspired at a young age by the impressive Comet de Chéseaux in 1744. He became an astronomer working at the Paris observatory of Joseph Nicolas Delisle. He discovered 43 of the items from the Messier catalogue,

The afternoon break gave the attendees their final opportunity to look around the book sale that James Dawson, the SHA librarian, had organised. There were a large number of books for sale, all from the field of astronomy, with many of them about the history of astronomy. This was a well received and great addition to the spring conference.

The final talk of the day was by Mark Robinson. This was a talk which looked at the life of George Henry With, mirror maker. Mark's depth of knowledge in the topic shone through, with the discussion of With's life, his mirror making abilities and friendships made within the astronomical community all discussed. We were also fortunate that Mark brought along with him many diagrams of the processes involved and an example of a George Henry With mirror.

The SHA would like to thank all the speakers for their informative and extremely enjoyable talks. It was lovely to catch up with lots of familiar faces and also to welcome 4 new members who signed up on the day. We look forward to seeing you all again at the summer picnic on the 1st July in Liverpool.

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as well as other courses.
Don is best known for his research discovering oscillations in what are now known as rapidly-oscillating, peculiar A-type stars but he's made *many* contributions to the study of oscillating stars and is a former President of the International Astronomical Union Commission on Variable Stars.
He's a Fellow (and former Council member) of the Royal Astronomical Society, belongs to the Japan Society for the Promotion of Science and is a member of the International Astronomical Union
He's a member of the steering committee of the Kepler Asteroseismic Science Consortium and is co-author of the fundamental textbook, "Asteroseismology".
Don has authored or co-authored over 470 professional papers.
In his free time Don is an outdoorsman and he and his wife enjoy Fell walking.

However we spent much more time on the 'can' question - there has been difficulty attracting people to serve on council and attempts to make this easier (such as using Skype instead of face -to-face meetings) has not helped much. With a need to attract at least three executive officers plus the website manager (an essential position these days), and with the unlikely-hood of this, we had to give realistic consideration to the possibility of winding up the FAS. There is provision in the Constitution for this, though not much in the way of process to achieve this. Probably the key service the FAS provides to members is the Public Liability Insurance (PLI) - so with any winding up of the FAS we would want to ensure that PLI continued in the short term, and there was a home for this in the future, and there would be a smooth transition. It is also important for societies to express their opinion on the proposition, and so it would be intended to ballot societies.

This is not a decision the FAS council has made lightly - and to some extent this is a backup position. However, if there are no volunteers to take on the executive officers vacant posts, the FAS will have to close.

Callum Potter

Acting President

AstroCalendars 2017/2018

It is hope that the 2017/2018 Astrocalendars will be available at the end of October 2017. There were issues with the 2016/2017 calendars as the format was not the same as before and it provd to be not as popular. Taking this into account the format of the calendars for this year will revert to the format of before. Example formats of the calendar are given below. Hopefully this should reassure people that the old ways are back :-)

October 2017	all times based on Greenwich				
SUN	**1st**	**8th**	**15th**	**22nd**	**29th**
Sunrise	0608	0620	0633	0645	0658
Sunset	1744	1728	1712	1657	1643

MOONPHASE	**Full**	**Third Quarter**	**New**	**First Quarter**
	5th	12th	19th	27th

General Highlights of Month

Apart from Uranus and Neptune, planetary observers will need to be early birds this month, and for a while after, as there will little activity in the evening time.

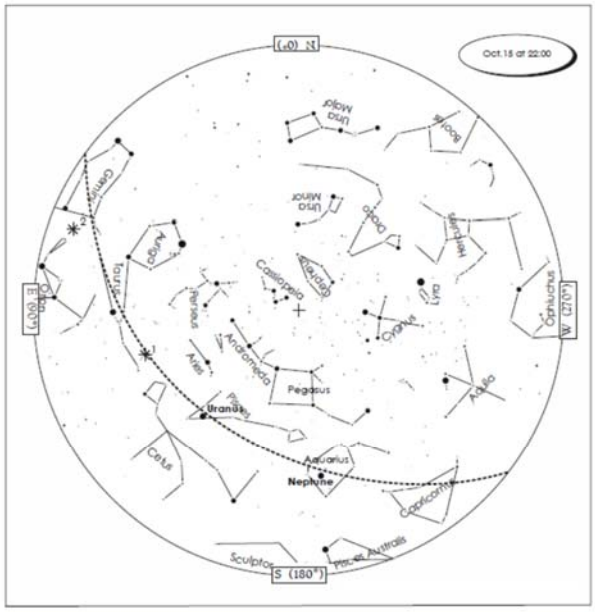
The month opens with Venus (-3.9mag and 90% lit) rising just before Mars (1.8mag) during the first stages of dawn. On the mornings of 4/5th these two planets will be very close together, only separated by about 0.5°, but only those with a low easterly horizon are likely to be able to observe this.

As the month progresses Venus gets nearer to the horizon in the breaking dawn and by 13th will be unobservable from most parts of the UK, whilst Mars, at this hour, remains low in the east all month.

Uranus reaches Opposition on the 19th and should reach an elevation of almost 50°. The blue-green planet will be at its closest approach to Earth and its face will be fully illuminated by the Sun. It will be brighter than any other time of the year and will be visible all night long. This is the best time to view Uranus. Due to its distance, it will only appear as a tiny blue-green dot in all but the most powerful telescopes.

Of the deep sky objects M31, the Andromeda Galaxy will be prominent all month and with an elevation of almost 80° around midnight, it will be perfectly placed for both visual and photographic observation. M45, The Pleiades, will be rising in the later evening. Seeing The Pleiades, of course, means that Orion will soon be coming into the evening sky.

Occulations
There are no major occultations in October 2017



Meteors	
Draconids	On the 8th - a nearly full Moon will make viewing this very challenging.
Piscids	On the 13th - a waxing Moon will make viewing this shower challenging
Orionids	21st/22nd - a crescent Moon will set early evening making for good viewing conditions

Comets
24P/Schaumasse : See this website for up-to-date information : https://www.ast.cam.ac.uk/~jds/future.htm

Editorial

This is my first attempt at doing the FAS Newsletter so I hope that you will excuse the teething errors that comes with both editing this in a time of strife and also trying to learn a new desktop publishing package along the way. I also apologise for the lack of newsletters. This is entirely due to lack of material. I have had no contributions for the newsletter apart from one. Unfortunately this is not a sustainable situation and along with the other factors impacting the FAS is one of the reasons that its future is under discussion. The FAS newsletter as I understand it is both to bring information about FAS activities to the wider membership but also to provide a way of societies interacting with each other. Unfortunately I neither have the time nor contacts to search through society records to try and get this information so I am reliant on socities passing me information. I understand form another magazine that I edit that is more international in flavour that the world of dead tree publications is almost over and pretty much everything now is done via social media or for a. Most people get their information from websites or the vast ocean of truths and untruths that are out there and it is true that it is he/she that shouts loudest that is heard, not necessarily those who are right. However if you have reports of conventions you have visited or places you have been on holiday to do astronomy (as long as they are not obviously advertising pieces for those places) all of these would be suitable for the newsletter along with any reviews of books or equipment that you might have. As mentioned above though if I do not get content there is no newsletter. I suspect that I may end up with a solar eclipse version given the number of people leaving for the US eclipse.

Interestingly there have been a number of issues that are coming before the FAS that are more of interest to the community. As perhaps noted the government is looking to legislate on green laser pens because of the increase on misuse of those items. They are going to be consulting interested bodies first and the FAS will have some input on this as one astronomical body. It is fair to say that at public star parties green laser pens are very useful when pointing out objects in the sky. I am personally not so in favour of them being used as sighting tools for telescopes however. As this consultation will be over the next year what ever happens the FAS should be able to co-ordinate the views of amateur astronomers for this program.

The Dark Sky Discovery scheme run by the STFC also appears to be moving again. Note this is not the same as the IDA schemes to designate dark sky reserves but more about local places. The URL for this is http://www.darkskydiscovery.org.uk/. The FAS has been asked to look at reviewing the new direction. Most of you hopefully will have noted that Bodmin Moor has now joined the IDA list of dark sky landscapes. It is hoped that this will allow the Beast of Bodmin more dark time to select lambs :-)

Speaking of dark skies Exmoor Dark Sky Reserve is hosting an interesting set of talks and events as part of their Dark Sky Festival on the 19th-29th Oct 2017. More information at http://www.exmoor-nationalpark.gov.uk/enjoying/stargazing/dark-skies-festival.

Nexus DSC

Traditionally in the digital setting circle market there have been two modern contenders—the Argo Navis system by Wildcard and the venerable Sky Commander XP4 from Sky engineering.

The Nexus DSC is a new entrant (also perhaps surprisingly from Australia like the Argo Navis) that combines both the traditional DSC component with the option to have a wireless setup so you can combine your circles with a tablet or phone (or laptop) to guide your telescope. The system does have much of the functionality of the Argo Navis including the ability to load comet ephemerides as the Argo, although this is done is a perhaps more tricky fashion by reading them onto a MicroSD card and then putting that in the system. I originally bought the non wireless system and, although this can be upgraded, I would think for the future proofing I would look at buying the wireless model straight off given the small difference in price. The system is mid way in size between the Argo and the XP4 and comes with a rechargeable battery built in, although it can also be powered from a 12V. I have found that the system does last a very long time on one charge. Over the last year or so there have been a number of firmware and catalogue updates but this is easy to do as the firmware is loaded onto a USB (FAT32) stick and then the systems is flashed that way. I liked the option to have multiple telescope configurations in the system and this bit was certainly much easier to do than the Argo Navis. The menus are easily laid out and have all the features that you might want including an encoder test function that is very useful to check your system works before you go out on the stars. I use mine on a Dobsonian and the alignment process on the two stars is very easy. If you use it on a more permanent system then it comes with a telescope modelling function that allows you to model the errors in the system and achieve better pointing accuracy. The catalogues which are the core of the system are wide and varied and although at this time there is no option to add your own catalogues you can load observing lists in SkySafari format into the system via the MicroSD card. The only restriction here is that the objects must already be in the Nexus catalogue database as the SkySafari format does not allow positional information. Most planning programs however will out put their plans in this format. The systems author is very responsive in terms of adding new material/catalogues so if there is one that you need then you can ask him to add it. The advantage of using the SD cards for these is that you have a huge amount of space to add new catalogues. I found the system was very light and pretty easy to use. When I did use it to find comets I found it was very accurate and the comet was where it should have been. I find the system pretty easy to use and certainly much more powerful than the XP4. When you first receive the system you need to add your telescope configuration into it which includes the encoder settings and the initial alignment postion (vertical or horizontal). You can name the telescopes so you know which system is which if you have multiple configurations. You will also need to set the time and date. This is saved between sessions. The system also includes a GPS receiver so it knows where it is. Like the Argo Navis it has a search function as well as a tour function so you can say select all planetary nebulae in say Cygnus, which is a useful function if you know an object type but have forgotten the number. You also have the ability to try and identify an unknown object in the field. The practicality of that option will depend on how well setup your system is in terms of alignment/precision as you may find that it cannot find the object precisely if there are many objects in the area. This is quite important as the most likely use of this function would be in a field of galaxies and you are trying to determine which one you are looking at. This is not a criticism of the system merely a reflection on the way these systems work. The system will also work with normal Alt-Az systems as well as GEM and systems mounted on a tracking platform. I noted that it will also work with a ServoCat driven system although I have not had the opportunity to see how that works. There is a very close connection between Wildcard (the makers of the ArgoNavis system) and ServoCat so I suspect that the Argo may have more functionality in that area. The system when mounted on a telescope I found was light enough to hold with Velcro, something you certainly would not want to try with an Argo. In general I use mine mounted on a stalk because even with the vast range of brightness supported by the display having anything distracting near the eyepiece I find annoying.

If you are going to use it is wireless mode then it can work either by having its own network and connecting to that or it has the option to join and existing network and then you just connect via the IP address it gets. I have not tried this as I bought the original system without the wireless card but am awaiting that so I can try and upgrade the system.

Although I bought mine direct from Australia there is now a UK dealer for AstroDevices products in AstroGraph (astrograph.net). Pricewise the system falls between the XP4 and the ArgoNavis. I think this system is a valuable addition to the market for those looking to move beyond visual sighting.

If I had one criticism it is the use of the SkySafari format for observing lists as this is still very restrictive if you wish to really push the limits however for 95% or users this will not be a problem. A full review of the capabilities would take many pages but if you are in the market for this type of device it is one worth looking at .

More information can be found at http://www.astrodevices.com/

Meetings Calendar

There are unfortunately a lot of meetings and it is difficult to fit them all in the calendar. This also applies to Star parties as well. Below are some of the major events for the Autumn of 2017. If people are holding conventions /star parties and wish to include these then please let me know information and dates and I can try and publicise them. I understand that many people are not into the observing side but this is what I have.

European Dark Spaces conference Galloway 20-22nd Sept 2017 for more information see http://eudarkskiesconference.com/

Kelling Equinox Star Camp— 22nd-24th September 2017 (although many people come for days either side of the main weekend dates. On the Saturday there are traders as well as talks. The main weekend may be fully booked but check with Kelling Heath

23rd—26th Sept Astrocamp in Wales see http://astrocamp.awesomeastronomy.com/
For more details.

30th Sept FAS Annual Convention and AGM

13/14th October IAS at Coventry details at http://www.ukastroshow.com/

Haw Wood Star party 13-15th Oct—details see Breckland Astronomy Society

SGL star party 13-15th Oct 2017—see StarGazers Lounge forum for bookings and details.

Kielder Auumn Star party 18-23rd October see http://www.sunderlandastro.com/star-camp/ for more information

Galloway Star Party 15-20th November 2017 see StarGazers Lounge for more information.

WinterFest Astro Star Party 16-19th November 2017—Birmingham Astronomical Society/Kelling Heath

9-10th February 2018 Astrofest London.

2nd June 2018 Webb Society meeting IOA Cambridge

Talks Precis for Convention

Prof Ian Shipsey
Title: From Quark to the Cosmos
Précis:

Major advances are being made in understanding the nature of matter, energy, space, and time and in understanding the universe as a whole. This talk will give a brief review of recent progress in both particle physics and cosmology and the major outstanding questions which we optimistically anticipate will be answered by 2070.

Speaker: Prof Tim Greenshaw
Title: Exploring the Non-Thermal Universe: the Cherenkov Telescope Array
Précis:

Most images of the Universe are made using thermal radiation of a large range of wavelengths, corresponding to different temperatures. These give us information about the current state of the Cosmos and how it evolved. Studying non-thermal radiation with current and future instruments will allow us to extend our understanding to the most violent events occurring in the Universe and will give us insight into some fascinating problems. For example, the origin of the cosmic rays that bombard the Earth's atmosphere with energies orders of magnitude higher than we are able to produce on Earth will be revealed, as will perhaps the nature of Dark Matter, the major component of the material in the Universe which so far we have only seen through its gravitational interactions.

This talk will discuss some of the physics that will be made accessible with the Cherenkov Telescope Array, which will produce images of the Cosmos using photons in the energy range from a few tens of GeV to over 100 TeV. The instruments under construction for the Array will be described and the current status of the project presented.

Speaker: Prof Donald W Kurtz
Title: Planets and Pulsations: The New Keplerian Revolution
Précis:

One of the biggest questions humans can ask is, "Are we alone?" Does Earth harbour the only life in the universe? Everyone has an opinion on this question, but as scientists, we want to know. A first step is to find other planets like the Earth, planets with rocky surfaces and liquid water where conditions are similar to home. The Kepler Space Mission has done this. With the discovery of nearly 5000 planets orbiting other stars Kepler has revolutionised our view. It has found entire solar systems orbiting other stars and it has even found planets orbiting double stars: Yes, Luke Skywalker's fictional home planet Tatooine really does exist out there. The Kepler mission measured the brightnesses of 200,000 stars for four years, giving us a view of the stars 100 times more precise than is possible from the ground. From this a jewel box, exotic stars have been discovered, and astrophysics that used to be purely theoretical is now also observational. This talk introduces the concepts of asteroseismology and shows a selection of exciting results from the Kepler mission in a multi-media performance of science, animations and the physics of music and the stars. The speaker is a co-author of the fundamental textbook, "Asteroseismology" and (past) Vice-President of the Royal Astronomical Society.

Speaker: Prof Carl D Murray
Title: Cassini at Saturn: The End of an Era
Précis:

The Cassini-Huygens mission to the Saturn system was launched in 1997 and entered orbit around the ringed planet in 2004. After the ESA-led Huygens probe landed on the moon Titan in January 2005, the NASA-led Cassini spacecraft continued to orbit the planet until its planned demise on 15 September 2017. Carl Murray is the only UK member of the Imaging Team on Cassini and has worked on the project for 27 years. He will describe some of the major scientific achievements of the mission, the progress on understanding Saturn's spectacular ring system and its retinue of moons. The talk will conclude with a description of the final observations and a look forward to some of the remaining problems to be tackled.