

# **The Armagh Observatory and Planetarium**

## **Annual Report and Accounts For the year ended 31 March 2017**

*Laid before the Northern Ireland Assembly*

*under clause 8 of the Armagh Observatory and Planetarium (Northern Ireland) Order 1995,  
as amended by Schedule 1, clause 6 of the Audit and Accountability (Northern Ireland)*

*Order 2003, by the Department for Communities*

*on*

*24 October 2018*

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# The Armagh Observatory and Planetarium Annual Report and Accounts for the year ended 31 March 2017

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## The Trustees' Annual Report for the year ended 31 March 2017

The Board of Governors, who are the Trustees for the Armagh Observatory and Planetarium (AOP) has pleasure in presenting its annual report and financial statements for this charity for the year ended 31 March 2017. These financial statements have been prepared in accordance with the accounting policies set out in note 1 to the accounts, with the guidance issued by the Department of Finance on the form and contents of the Annual Reports and Accounts of Executive Non-Departmental Public Bodies, *The Armagh Observatory and Planetarium (Northern Ireland) Order 1995* and Accounting and Reporting by Charities: Statement of Recommended Practice (SORP) applicable to charities preparing their accounts in accordance with the Financial Reporting Standard applicable in the UK and Republic of Ireland published on 16 July 2014.

The sponsor Department for the Armagh Observatory and Planetarium was the Department for Culture, Arts and Leisure (DCAL) until May 2016 when this was superseded by the Department for Communities (DfC).

### Background to charitable status

Historically the Armagh Observatory and the Armagh Planetarium were treated as being distinct institutions; being two component divisions of a single statutory corporation and arms-length body (ALB), 'The Governors of the Armagh Observatory and Planetarium' as described in *The Armagh Observatory and Planetarium (Northern Ireland) Order 1995*. This 1995 Order superseded the original 1791 Act of the Irish Parliament entitled '*An Act for Settling and Preserving a Public Observatory and Museum in the City of Armagh For Ever*', and an Amendment of 1938 ('The University and Collegiate and Scientific Institutions Act [Northern Ireland], 1938').

The Armagh Observatory was a recognised charity (reference XN 46022). The principal function of the Observatory, founded in 1789 as part of Archbishop Richard Robinson's vision to see the creation of a university in the City of Armagh, is to undertake original research of a world-class academic standard that broadens and expands our understanding of astronomy and related sciences.

The Armagh Planetarium, which was also a recognised charity (reference XN 48022), was founded by Dr Eric Mervyn Lindsay, the seventh director of the Armagh Observatory, and was officially opened on 1 May 1968. The Planetarium's primary activity is to disseminate scientific and technical knowledge of a wide range of scientific and the Northern Ireland Executive's Science, Technology, Engineering and Mathematics (STEM) Strategy subjects, and to promote public understanding of astronomy and science through its programme of educational services for schools and the wider public.

From 1 April 2016 the Charity Commission for Northern Ireland has registered *The Governors of the Armagh Observatory and Planetarium* as a single charity. The 'unified' charity's reference number is NIC 103948.

### Objectives and Activities

The organisation's statutory functions are set out at Article 4 of *The Armagh Observatory and Planetarium (Northern Ireland) Order 1995*. The Order requires that '*the Governors shall, for the purpose of developing and improving the knowledge, appreciation and practice of astronomy and related sciences, maintain and manage the Armagh Observatory and Planetarium and may take such other action as the Governors may think proper for the purpose of acquiring or disseminating knowledge relating to astronomy and related sciences*'.

Armagh Observatory, established in 1790, is the oldest scientific institution in Northern Ireland, and the longest continuously operating astronomical research institute in the UK and Ireland. Armagh Planetarium, which was founded by Dr Eric Mervyn Lindsay, the seventh director of the Armagh Observatory and officially opened in 1968 is also the oldest operating planetarium in the UK and Ireland.

The Vision statement of the newly unified organisation is:

*'Armagh Observatory and Planetarium is renowned throughout the world as a unique Centre of Excellence for research, education, inspiration and outreach in space and science.'*

## **Mission**

The Mission of the Armagh Observatory and Planetarium is:

“To advance the knowledge and understanding of astronomy and related sciences through interactive engagement and the execution, promotion and dissemination of astronomical research nationally and internationally, in order to enrich the intellectual, economic, social and cultural life of all members of the community”

The principal charitable objective of the Armagh Observatory and Planetarium, which provides a significant public benefit, is to undertake original research of a world-class academic standard that broadens and expands our understanding of astronomy and related sciences. Important secondary functions include the organization's responsibilities to (i) promote, preserve and widen access to the heritage of astronomy at Armagh; (ii) maintain the continuity and precision of the unique more than 220-year long meteorological record at Armagh; and (iii) pursue a vibrant programme of Science in the Community in support of the Northern Ireland Executive's Science, Technology, Engineering and Mathematics (STEM) Strategy and the strategic goals of the Department for Communities learning strategy.

As part of the programme of Science in the Community, there are undertaken a wide range of community service programmes in astronomy and related sciences and represents Northern Ireland on the national and international stage. Taken together, these activities feed into many areas of government policy, particularly those directed towards improving the economy, education and lifelong learning, and enhancing the attractiveness of Northern Ireland to national and international visitors.

At the end of 2016/17 there were 23 employees, 3 temporary staff and 13 PhD students, which included the Director, 7 Research Astronomers, 2 PDRAs and 6 Education Support Officers, together with support and administration staff. There were also 6 external research associates and academic visitors. There is an active visitors programme, each year hosting typically between 10 and 20 temporary academic visitors from abroad, people who visit Armagh for periods ranging from one day up to several weeks at a time.

The organisation operates on the international stage and is underpinned by core funding from DfC (the Department) and the receipt of external grants from the UK Science and Technology Facilities Council (STFC), the Leverhulme Trust and other grant-awarding bodies.

It is noteworthy that the use by Armagh Observatory and Planetarium staff of UK and international facilities located abroad or in space, which are paid for by the STFC from central UK government funds, corresponds to a further very significant element of external income 'in kind'. Thus, by operating on the international stage, the Armagh Observatory and Planetarium provides a very high rate of return per pound on the Department's and the NI Executive's support for astronomy at Armagh.

## **Public Benefits**

The Trustees of Armagh Observatory and Planetarium confirm that they have complied with their duty to have regard to the guidance on Public Benefit produced by the Charities Commission of Northern Ireland under section 4(b) of the Charities Act (the public benefit requirement statutory guidance) and that this has informed the activities of the organisation in the year to 31 March 2017. This is demonstrated in the following summary of Principal Activities which provides detail on how the organisation has delivered against its objectives and the public benefit which has flowed from this.

## Principal Activities

### Research

The Armagh Observatory and Planetarium carries out front-line astronomical research in three key areas of astrophysics, namely: Solar-System Science, Solar Physics, and Stellar and Galactic Astrophysics. Solar-System research encompasses the dynamical structure, evolution and origin of objects in the inner and outer solar system and comparative planetology and meteor physics. Solar Physics research uses data from spacecraft (for example SoHO [Solar and Heliospheric Observatory], Hinode, Stereo and SDO [Solar Dynamics Observatory]) and ground-based facilities (for example the Dunn Solar Telescope at Sacramento Peak Observatory and the New Solar Telescope at Big Bear Solar Observatory) to study fundamental questions such as how the Sun's outer atmosphere is heated, what drives the solar wind and the Sun's variable magnetic activity and its resulting effect on the Earth's climate. Stellar and Galactic research includes a wide range of investigations into the formation and evolution of stars. This takes into account factors such as a star's mass and evolutionary stage (from birth to the end of a star's lifetime); the interactions between stars; stellar mass loss through stellar winds; stellar oscillations and what they tell us about a star's interior structure; stellar magnetic fields; extreme chemical abundances; the details of accretion physics; and wide-field surveys to discover a diverse range of astrophysically important short-period variable stars. Staff also carry out research on exoplanets and on objects called brown dwarfs, which are intermediate in mass between the largest planets and the smallest stars.

The breadth of these research themes illustrates the primary long-term research function. The projects are often funded by external (i.e. non-Department) funding agencies with lead times of typically one or two years; they are normally led by an individual Research Astronomer and often require up to 3–5 years for completion.

### Science Highlights

Some research highlights are described below. A listing of scientific publications in 2016/17 is provided as an Appendix, together with a list of all seminars and public talks delivered by members of the Armagh Observatory and Planetarium.

#### *Ultra-Cool Dwarfs*

Radio observations are entering a new era with the improvement of existing radio arrays which allow the monitoring of single sources over a much wider wave-band and temporal resolution than was previously possible. This is especially important for studies of ultra-cool dwarfs (later than M8) where the radio burst/pulse can be of short duration and can change frequency over a short timescale. Armagh astronomers have carried out observations of six UCDs using the JVLA and found that five out of six sources were detected at a significant level. Using simulations, we have come up with a possible model that fits the observed characteristics of the emission region, including the frequency drifts. We can match our observations with emission coming from a narrow sector of active longitudes and the dwarf's magnetic field of a tilted dipole. The variable height of the radio-emitting region can be explained by different reasons, for example, if the magnetic dipole is not only tilted relative to the dwarf rotation axis, but also offset relative to the dwarf centre (like, e.g., at Neptune). We believe this emission is auroral-like.

#### *Solar*

The interplay between convection and the magnetic field near the Sun's surface leads to energisation of the outer solar atmosphere and inner heliosphere. One signature of this energy deposition is the presence of jets in the chromosphere, transition region, and corona at diverse spatio-temporal scales. The most ubiquitous jets in the solar chromosphere are spicules. Spicules are considered to produce propagating heating events while many other chromospheric features (e.g. fibrils) are the aftermath, i.e. contrails (similar to airplane contrails with result from water re-condensation following sudden heating by the jet engines), H $\alpha$  contrails are hydrogen recombination features following sudden heating by jet-like features, e.g. spicules. In recent observations we observed directly, for the first time, the ubiquitous presence of high frequency (12–42 mHz) torsional oscillations from spicular-like structures. With the aid of simulations, these observations were interpreted as torsional Alfvén waves associated with high frequency drivers transferring energy into the overlying corona.

#### *Symbiotic Binaries*

In June 2015 an object in the constellation of Pegasus went into outburst for the first time since Victorian times. AG Peg is a binary system containing a white dwarf and a red giant star and is a 'Symbiotic Binary' since the white dwarf 'feeds' off the red giant. Armagh astronomers managed to obtain observations of AG Peg using NASA's Swift satellite, which is sensitive to X-rays and UV light, on a regular basis for 6 months. AG Peg changed its brightness dramatically for the first two months indicating an interaction between the X-rays and material from the last outburst in 1850. The 2015 outburst was a much shorter duration and less bright than the previous outburst suggesting different physical processes occurred on the white dwarf.

#### *Compact Binaries*

The aim of the OmegaWhite project is to detect new ultra compact binaries. These are binaries containing two white dwarfs orbiting around a common centre of gravity on a timescale shorter than 1 hour. They are predicted to be strong sources of gravitational waves. Observations are made remotely from a telescope in Chile, part of the European Southern Observatory. The project has been ongoing since 2011 and changes in the brightness of tens of

millions of stars have been recorded. This has allowed us to detect many new interesting objects including one ultra compact binary with an orbital period of 44 min.

### *Solar System Astronomy during the Maya Civilization*

The Classic Period of ancient Maya civilization in Mesoamerica lasted for much of the first millennium AD. The Maya are known to have had detailed knowledge of the timings of solar and lunar eclipses, and cycles of the moon and planets. Current research aims to determine whether the Maya observed spectacular meteor displays and recorded their dates in their hieroglyphic script. The first phase of this research has computed the times of historical meteor displays related to Halley's Comet, comparing these to dates in the corpus of recorded Maya events.

### *Asteroids controlled by Mars Gravity*

In early 2016 Armagh astronomers obtained spectra of asteroids with the X-SHOOTER spectrograph mounted on the "Kueyen" 8m telescope at the European Southern Observatory's Very Large Telescope facility in Chile. We found that the spectra are remarkably similar, indicating a common surface composition for the family asteroids. This type of asteroid is quite rare in the Main Asteroid Belt. The spectral profile is characteristic of olivine, a mineral that typically forms within much larger objects under conditions of high pressure and temperature. The implication is that these objects are likely relict mantle material from within mini-planets or "planetesimals" which, like the Earth, developed a crust, mantle and core through the process of differentiation but have long since been destroyed by collisions. It also marks a significant "first" for asteroid studies as no other olivine-rich group have been observed.

### *The First Stars*

In trying to understand the Early Universe, our aim is to study local galaxies of low metal content to unearth clues about the First Stars. The closest local template to the Early Universe is the Small Magellanic Cloud (SMC) at ~20% solar metallicity. In addition to trying to understand the nature of the First Stars and cosmic reionization, Armagh astronomers also attempt to identify the progenitors of long gamma-ray bursts and super-luminous supernovae. About a decade ago we suggested that Luminous blue variables (LBVs) be the direct progenitors of transitional supernovae, with enhanced mass loss prior to explosion. However, the mechanism of this mass loss has not yet been known. This year we investigated the mass loss behaviour of massive stars in close proximity to the Eddington limit. When the combined effects of the so-called "second" bi-stability and the Eddington limit are accounted for, we found a dramatic increase in the mass-loss rate by a factor of 30! Our results will have dramatic consequences for massive star evolution prior to explosion.

### *Life Cycles of Stars*

The spectrum of a star tells us about its surface, and something about its history. Light at particular wavelengths is absorbed by atoms and ions, creating lines in the spectrum. These lines carry unique information about temperature, density and chemistry. Stellar pulsations are simply natural vibrations excited inside a star; they become visible when they cause the surface brightness of the star to vary. The pattern of pulsation periods seen at the surface reflects the internal structure — just as pitch and tone reflect the size and shape of a ringing bell. These observational properties need to be interpreted using detailed models of the interior, surface structure, evolution and pulsations in these stars. Getting observations and models to agree helps us test fundamental physics of the universe. When all the hydrogen in the core of stars like the Sun is used up, helium starts to burn. However, the chemistry of the surface remains almost unchanged, even in rare cases when the surface hydrogen has been stripped away to leave less than 1% of the original star. Such stripped helium-burning stars are small, being about half the mass and one tenth the size of the Sun — but having surfaces five times hotter and 25 times brighter than the Sun. They are known as "hot sub-dwarfs".

Armagh astronomers have discovered a hot sub-dwarf called UVO 0825+15 which has a surface extremely rich in lead and other heavy metals and varies in brightness by up to 1% every eleven hours. The new discovery was made during a search for pulsating hot sub-dwarfs using NASA's planet-hunting Kepler spacecraft. Serendipitously, the same star was also observed in a search for chemically peculiar stars using Japan's 8-m Subaru telescope on Hawaii. These observations of UVO 0825+15 revealed the signature of triply-ionized lead, implying that the star's surface contains 5,000 times more lead than the Sun. Yttrium and germanium are also enriched by factors of several thousand. The chemistry is thought to be due to intense ultraviolet light, produced by the high surface temperature and brightness. Being only the fourth "heavy-metal sub-dwarf" discovered, and the second to be variable, the new star raises major questions.

### *Magnetic Fields*

Magnetic fields play a crucial role in all stages of the stellar life, from the time when the interstellar medium collapses and the process of star formation begins, up to the latest stages of stellar evolution, when the star ends its life as a white dwarf or exploding as a supernova. Our Sun exhibits a very complex magnetic field, but astronomers are routinely detecting and studying the magnetic fields of many other kinds of star. But are stellar magnetic fields of our Galaxy representative of those elsewhere in the Universe, i.e. in galaxies other than our Milky Way? Armagh astronomers have used the largest optical telescopes in the world to observe five massive stars in the Magellanic Clouds, the galaxies that are closest to our Milky Way. One target in the Small Magellanic Cloud, with the exotic name of SMC 159-2, seems to possess a strong magnetic field. If future observations confirm these preliminary results, SMC 159-2 will become the first extragalactic star to be discovered as a magnetic one.

### *Polarimetry*

Polarimetry is a technique that measures certain properties of the way light propagates. These polarimetric properties are determined by several physical phenomena, for instance by the reflection from a surface. By measuring the polarisation of the light reflected by planets, comets, or asteroids, astronomers may determine various characteristics of the bodies of our solar system. Armagh has participated in the successful commissioning of a new polarimeter, 'ToPol', that was installed on a telescope in Calern, France. We plan to participate in numerous studies of planets and asteroids based on measurements obtained with ToPol.

### *The Milky Way*

Armagh astronomers lead a new survey mapping the molecular gas along the southern Milky Way using the 22m diameter Mopra radio telescope in Australia. The programme is obtaining a new 3D map of the distribution of the molecular clouds where stars are born across the central regions of our Galaxy. The map provides an order of magnitude improvement in both the spatial and the spectral resolution over the previous generation map, i.e. 0.6 arcminute and 0.1 km/s, using the CO molecule as a tracer of the distribution of molecular hydrogen. The survey aims to cover around 200 square degrees of the Galactic plane, and at the end of 2016 was approximately three-quarters complete. The survey is also being used to support Armagh's involvement in the next generation gamma-ray telescope, the Cherenkov Telescope Array. This is because much of the gamma ray emission from our Galaxy is produced by the interaction of ultra-high energy cosmic rays with the nuclei of molecules found in star forming regions of the Galactic Plane.

### **International Standing**

The Armagh Observatory and Planetarium provides a strong, positive image of Northern Ireland on the international stage. Members of staff play a full role in the international astronomical community, for example serving on committees of bodies such as the Science and Technology Facilities Council (STFC), the Royal Astronomical Society, the Royal Irish Academy, and the International Astronomical Union (IAU); assessing grant and research proposals on behalf of external funding agencies; and reviewing scientific papers and editing international academic journals.

In addition, staff have access to world-class international facilities provided through STFC and UK Government subscriptions and bilateral agreements and collaborations involving individual researchers. Staff regularly obtain telescope time on national and international facilities such as the ESO Very Large Telescope and various spacecraft missions (such as SoHO, SDO, Hinode, Stereo, Swift, XMM-Newton, and the Hubble Space Telescope).

Academic staff obtain research grants from a wide range of grant awarding bodies (e.g. the STFC, the Royal Society, the Leverhulme Trust, British Council etc.), and through the organisation's membership of the UK SALT Consortium (UKSC) have access to the 11-metre diameter Southern African Large Telescope (SALT) located at the Sutherland Observatory, South Africa. Complementing these international facilities, restoration of the Observatory's historic telescopes has brought opportunities to reintroduce some visual observing from Armagh, while new computer and camera technology has enabled a variety of new automatic observational programmes to be introduced from Armagh, recording data autonomously whenever the sky is clear.

### **Education and Community Outreach**

#### **Planetarium**

The Planetarium's primary activity is to disseminate scientific and technical knowledge of a wide range of scientific and STEM subjects, and to promote public understanding of astronomy and science through its programme of educational services for schools and the wider public.

Armagh Planetarium brings the exciting world of astronomy to audiences of all ages from nursery to seniors. Since opening in 1968 the Planetarium has stayed in the forefront of science education by adapting to the needs of our audiences, offering content that is both up to date and stimulating. The educational programme not only covers curriculum material but also introduces a broader range of fascinating topics to promote a deeper understanding of basic astronomy. Interactive learning experiences of astronomy are encouraged for all members of the community, and especially visiting school groups. Resources are provided for teachers on our website, including factsheets, videos and informed commentary on the latest astronomical news in our Astronotes blog. From inception, we have responded to a steady stream of astronomical queries from the public and media. Armagh Planetarium is world-renowned as an innovative centre of excellence in promoting the public understanding of science.

Staff deliver interactive presentations using the latest projection and information technology to all age groups and abilities on a wide range of astronomical and scientific topics, including meteorite impacts, the planets, current astronomical phenomena and Earth sciences. Through the large number of visitors coming through its doors the Planetarium also plays a key role in promoting and enhancing tourism within Armagh City and District, now the wider council area known as the Armagh City, Banbridge and Craigavon Borough Council.

We aim to make our organisation the destination where every primary school level child in Northern Ireland experiences the mysteries of cosmos through our Digital Theatre shows, exhibitions and lectures. This accords with

the strategic focus of the Department whose overall vision is for 'a confident, creative, informed, and vibrant community.' Blending these statements together has led to the Planetarium positioning itself as a place where impressionable young minds can be encouraged to tackle the challenges and rewards of careers in Science, Technology, Engineering and Mathematics (STEM). This STEM agenda is being embraced and promoted all over the world by those governments that are aware of the impelling need to enhance the competitiveness of their workforce in a technologically sophisticated business environment.

#### *Programme of Events*

Armagh Observatory and Planetarium delivered a year-long programme of public engagement activities through the Planetarium, attracting more than 48,000 visitors. Many of these visitors come for the immersive digital theatre experience offered by the full dome of the Planetarium. However, an equally important element of the 'jigsaw' is the annual programme of events.

The programme included everything from 'Alien Catwalk' to Jurassic Week and Rex The Dinosaur (looking at the role that a meteorite may have played in their demise!). One of our most popular events was Minecraft – an online and interactive design games that enables children and young people to develop basic programming and virtual world building and design skills.

Our annual events programme also involved more 'traditional' activities such as 'Life as an Astronaut', Star Tracker Open Nights and a range of presentations and talks by our research astronomers and PhD students.

A total of 374 school groups visited the Planetarium during the year.

During the year staff also maintained an active programme of science in the community, for example by providing guided tours of the Observatory and Astropark, holding special public lectures and exhibitions, delivering an outreach programme to schools, and supervising school children and undergraduates on a variety of work-experience programmes and summer research projects. The Astropark is maintained as a unique facility to enrich the lives of visitors to Armagh and residents alike.

In addition, there are more formal education programmes associated with work experience, student and teacher training, and engagement with the local community, elements of which draw on the professional knowledge and expertise of research astronomers at Armagh. The innovative programme of Science in the Community helps to explain to a wide audience the results of modern astronomy and the benefits of carrying out international-level astronomy, particularly for education, learning and training in the 'STEM' subjects (Science, Technology, Engineering and Mathematics) that are of such importance for our knowledge-based economy.

#### **External Events**

During the course of 2016/17, the Armagh Observatory and Planetarium engaged with the Department for Communities to strengthen its community outreach activities, aligned to 'Promoting Equality, Tackling Poverty and Social Exclusion (PETPSE). This work included a number of innovative outreach activities such as Skype conferences with primary and post-primary schools (Glenraig PS, and De La Salle High School).

Staff also supported a number of high profile public engagement and outreach activities in partnership with the Royal Belfast Hospital for Sick Children (RBHSC), W5 and the Ulster Museum. These projects enabled staff to promote awareness of STEM and improve young peoples' engagement with popular events such as World Space Week and the NI Science Festival.

We worked with both the Ulster University and Queen's University Belfast in the Sentinus project, raising awareness of the role of STEM in developing essential life skills among children and young people. We also worked with Queen's University Belfast to provide an accredited course in astronomy for teachers and adults.

## **History and Heritage**

### **Heritage Policy**

The heritage policy is to progressively restore the historic buildings, scientific instruments, and historic books and other archives in its possession, placing the restored material where possible on display, or close to, its original location in the main Georgian Grade A listed Observatory building. The objective is to maintain the integrity of the Library, Archives and Historic Scientific Instruments as a coherent collection for future generations in the City of Armagh and to preserve this historic material and improve the environmental conditions in which it is held. We seek to widen access to this material where possible so that researchers, or visitors will be able to use the material for individual research projects and appreciate more clearly the context in which the historic material was first acquired and then transferred into the 'museum' collection. As part of widening access we have installed eleven 'Virtual Visits' on our website, and is available online.

### **Library and Archives**

The Observatory's suite of technical equipment is complemented by a Library and Archives which together represent one of the premier specialist collections of their kind in the world. The Library, Archives and Historic Scientific Instruments collection contain a unique collection of historic books and manuscripts, as well as a growing collection of images, photographic plates, scientific instruments, clocks and other artefacts concerning the development of modern astronomy from the Age of Enlightenment up to the present day, with specific reference to the important discoveries and scientific contributions made by the international research community at Armagh. In recent years more than 25,000 records have been added to the online, publicly accessible archives and library database, with many linking to associated images or digitized documents. The library catalogue with over 3,000 entries is also online.

### **Meteorological Record**

As part of the organisation's primary research role, staff take daily readings of a wide range of meteorological parameters at Armagh and maintain a unique 220-year long meteorological record and data-bank. This is believed to be the longest daily climate series in the UK and Ireland from a single site and one of the longest in the world. The climate station has been continuously maintained since 1794 December, with readings currently taken every day at 09:00 (GMT).

Calibration of these data has enabled researchers and government agencies to use the Armagh series for reports and research into global warming, and the data are released to the general public on a monthly basis through press releases and on our climate website (<http://climate.arm.ac.uk>), whilst also contributing to the UK Meteorological Office's main climate database. Climate change is a subject of strategic importance for Northern Ireland as we move into an era of rapid climate variability, and the Armagh Observatory's unique climate record provides an exceptionally long historical baseline, enabling better informed judgements to be made as to how Northern Ireland's climate has responded and is responding to climate change world-wide.

## Support

### Research Computer Facilities

The comprehensive research computer facilities are used primarily for numerical analysis, computer modelling and data reduction. The computers and peripherals are largely funded by the Department, but occasionally by external research grants, for example those funded by the STFC, the Leverhulme Trust and various EU grants. Staff require access to high-end iMac and Linux workstations, and also have access to the Stokes supercomputer at the Irish Centre for High-End Computing (ICHEC), and through this facility to occasional advanced computer training programmes.

There are four high-performance computer systems, namely: 'Polar', with 4 x 64-bit AMD Opteron processors each having 16 cores giving a total of 64 processing units and with 128GB RAM; 'Polar2', with 4 x 64-bit AMD Opteron processors each having 16 cores giving a total of 64 processing units and with 128GB RAM; 'Eddington', with 2 x 64-bit Intel Xeon processors each having 8 cores giving a total of 16 processing units and with 132GB RAM; and 'm15', with 2 x 64 bit Intel Xeon processors each having 8 cores giving a total of 16 processing units and with 48 GB RAM.

These computing resources are used mainly for computationally intensive research projects in observational and theoretical astrophysics (including data reduction and modelling) in areas such as solar physics, stellar atmospheres and polarimetry, stellar winds, radiation hydrodynamics, numerical magneto-hydrodynamics, and solar system dynamics. In addition, there is over 130TB of on-line storage capacity. The internal network is a 1 Gbps backbone ethernet linked with switched hubs and the external connection to the Internet is via a commercial ISP, Atlas, and operates at 100Mbps both upstream and downstream.

### Disabled Access

The Armagh Observatory and Planetarium has implemented reasonable adjustments necessary to widen access to its facilities by people with disabilities, whether visiting the Observatory, Planetarium or the Grounds and Astropark. These include (a) wheelchair access and the installation of additional seating in and around the Astropark; (b) the provision of ramps and other adjustments to the rear of the main Observatory building to facilitate wheelchair access; and (c) the installation of a disabled toilet in the Library. As part of widening access we maintain a rich website which contains a wealth of information regarding the organization and astronomy and related sciences more generally, including eleven 'Virtual Visits'.

The Planetarium has implemented reasonable adjustments necessary to widen access to its facilities by people with disabilities. This includes a ramp at the front entrance for admission and throughout the exhibition space with ramps and double door access. A lift is available to the upper level where the theatre is located. Wheelchair bays along with a loop system are installed in the theatre. Disabled toilets are located on both the lower and upper levels and in the event of an emergency, ramps outside will aid exit from the upper level. In addition, the Planetarium has braille on their signage inside the building.

### Equal Opportunities

The corporation is an equal opportunities employer, committed to ensuring that the talents and resources of all members of the corporation are utilised to the full. The corporation does not discriminate directly or indirectly on the grounds of religious belief, political opinion, trade union membership, gender, marital status, sexual orientation, age, disability, race, colour or ethnic origin, against any member of staff, full-time or part-time, or job applicant, actual or potential, in any aspect of the corporation's activities, including matters of recruitment, training, promotion, appointment, nomination or selection for any position, job transfer or redundancy.

### Payment of Suppliers

The corporation is committed to the payment of all invoices not in dispute within agreed contractual terms. The corporation also recognizes the importance of paying invoices received as soon as possible and does everything practically possible to meet the 10-day prompt payment target in the Accounting Officer guidance of DAO 12/08 issued by the former Department of Finance and Personnel.

### Employee Information and Consultation

The corporation takes every opportunity to inform and consult with all members of the organisation on the corporation's activities and plans for the future through the dissemination of annual reports and operational plans, the provision of the latest information on research, educational and other activities through the web-sites, regular formal and informal briefing and discussion meetings, and consultations with staff representatives on employment-related and operational policies and procedures.

## Achievements and Performance

The targets set for the Armagh Observatory and Planetarium in the 2016/17 Business plan are shown in the Table below. The actual performance achieved is shown along with the corresponding achievement for the previous financial year.

The only significant area where the target was not fully achieved was in relation to organisational change and the progress to date is shown in greater detail in this section.

Area		Description	Target	Actual as at 31 Mar 2017	Progress	As at 31 Mar 2016	Comments
Visitors	1	Total number of visitors to the Planetarium by 31 March 2017	40,000	48,535	121%	52,504	
	2	Percentage of visitors to the Planetarium from schools on the Extended Schools Register or with high proportion of Free School Meals by 31 March 2017 (PETPSE)	25%	27%	110%	26%	% of pupils from schools on Extended Schools Register. These change depending on which schools have visited.
			25%	51%	204%	50%	% of pupils with FSM % > 20%
	3	Number of visitors to the Observatory's websites by 31 March 2017 (million hits)	18	14	79%	18	Largely dictated by automated bots.
	4	Number of visitors to www.armaghplanet.com by 31 March 2017 (million page views)	1	2.0	196%	2.8	
	5	Number of participants in STEM/STEAM programmes at the Planetarium by 31 March 2017	1,800	6,279	349%	4,237	
Outreach	6	Number of participants at outreach events by 31 March 2017	8,000	7,819	98%	23,239	In addition, approx. 750 attended events at AOP.
	7	Number of work placements at the Observatory offered to school children from deprived areas [1] by 31 March 2017 (PETPSE)	4	9	225%	12	
	8	Number of events targeted at areas of deprivation by 31 March 2017 (PETPSE)	10	11	110%	16	
Research	9	Number of articles by Observatory staff/students published in refereed scientific journal publications by 31 March 2017	35	58	166%	57	
	10	Number of citations about the Observatory in mass media publications by 31 March 2017	300	348	116%	643	
Resources	11	Total external income of £455k (equivalent to 26% of total expenditure) by 31 March 2017	455	565.4	124%	29.5%	
	12	Payments processed within 10 days by 31 March 2017	90%	89%		97%	

Area		Description
<b>Organisational Change</b>	13	<p><b>By December 2016, to support the new Chief Executive to develop a 5 year strategic plan (including an Asset Management Plan) for a unified organisation with strengthened outreach, research and corporate governance functions endorsed by the Governors.</b></p> <p>Consultation on a draft AOP Corporate Plan 2018-21 in place as at 31 March 2017. Subsequently the Corporate Plan 2018-21 was approved by the Management Committee on 1 September 2017 and by the Department in January 2018.</p>
	14	<p><b>By December 2016, to support the new Chief Executive to develop detailed implementation plans for delivery of any further staffing and structural changes required to support the new strategic plan.</b></p> <p>Plans for key Senior Management Posts were developed but implementation on a permanent basis was constrained by lack of budget planning information in the absence of the NI Executive. The post of Head of Corporate Services was appointed as at March 2017.</p>
	15	<p><b>By 31 March 2017, to support the new Chief Executive to deliver any further staffing and structural changes required to support the 5 year strategic plan.</b></p> <p>The need for further staffing and structural changes were identified but delayed pending appointment of the key Senior Management Posts.</p>
	16	<p><b>By 31 March 2017, to recalibrate the governance arrangements between AOP and the sponsor department to deliver a more effective arm's length relationship.</b></p> <p>Revised Terms of Reference of the AOP Board of Governors, Committees and Sub – Committees were progressed to clarify the internal responsibilities and governance arrangements. Bi-monthly Accountability Meetings with the Department were established to clarify external responsibilities and governance arrangements. Work on a revised Management Statement/Financial Memorandum (MSFM) was also progressed with the Department.</p>

[1] A deprived area is denoted by a school a) with 20% or greater entitlement to Free School Meals and/or b) registered on the Extended Schools Programme.

# Financial Review: Armagh Observatory and Planetarium

## Operating Results

In the financial year to 31 March 2017, Armagh Observatory and Planetarium increased its unrestricted funds by £1,278,392 and reduced its restricted funds by £16,938. Total funds increased by £1,261,454 which includes an increase of £810,105 following a revaluation of land and buildings, recognition for the first time of heritage assets valued at £1,191,960, and an increase in the pension fund deficit of £667,026. The table below provides a reconciliation of the net movement in funds as presented in the SOFA.

<b>Armagh Observatory and Planetarium</b>	<b>2017</b>	<b>2016 (combined)</b>
	£	£
Total Income	2,421,614	2,506,733
Total Expenditure	2,495,199	2,600,591
Net Income (Expenditure)	(73,585)	(93,858)
Gains (losses) on the revaluation of Fixed Assets	810,105	-
Gains on the revaluation of Heritage Assets	1,191,960	-
Actuarial gains/(losses) on defined benefit pension	(667,026)	404,000
<b>Net movement in funds for the year.</b>	<b>1,261,454</b>	<b>310,142</b>
Movement in Unusable Funds		
Capital Financing		
Capital Grants Received	209,194	173,237
Donated Assets	(18,642)	(19,443)
Government Grant Fund	(269,804)	(241,896)
Revaluation	2,002,065	-
Pension Reserve	(655,000)	404,000
<b>Movement in Usable Funds</b>		
Restricted	(16,939)	26,763
Unrestricted	10,580	(32,519)
	<b>1,261,454</b>	<b>310,142</b>

The total income for the year was £2.422m, a decrease of £0.085m from 2015/16, mainly due to a reduction in external grant income.

Expenditure was £2.495m, a decrease of £0.105m from the previous year. Staff costs remain the largest component of operational expenditure. The number of permanent staff in post is consistent with the previous year and some vacant posts remain unfilled.

Unrestricted operating costs are funded primarily by DfC Grant-in-aid. The balance of such unrestricted operating costs is funded by contributions from external grants and miscellaneous income in an increasingly competitive financial environment. Observatory staff continue to seek other funding streams to maintain this important source of funds. In 2016/17 DfC provided 77% of the total income through recurrent and capital grant allocations (2015/16: 73%).

## Net Assets

Net assets at 31 March 2017 were £7,692m (31 March 2016: £6.431m). This includes an increase £0.810m in value of land and buildings following a revaluation and an increase of £0.655m in the pension scheme liability from £0.911m at 31 March 2016 to £1.566m at 31 March 2017. Net assets increased by £1.192m following the inclusion of heritage assets on the balance sheet which were previously not recorded.

## Reserves

Armagh Observatory and Planetarium has total accumulated funds of £7,692m at 31 March 2017 (2015/16: £6.431m). The reserves policy is included in note 1 of the accounts. Funds are as follows:

<b>Funds at 31st March</b>	<b>2017</b>	<b>2016</b>
		<b>(combined and restated)</b>
	£	£
Restricted funds	171,907	188,845
Unrestricted funds	2,822,494	2,891,167
Revaluation Reserve	6,263,585	4,261,520
Pension Reserve	(1,566,000)	(911,000)
<b>Total Charity Funds</b>	<b>7,691,986</b>	<b>6,430,532</b>

## Going Concern

The Trustees are satisfied that the organisation is a going concern on the basis that it has a reasonable expectation that it will continue in operation for the foreseeable future. The financial statements are therefore prepared on a going concern basis

## Pension Liability

AOP is a member of Northern Ireland Local Government Officers' Superannuation Committee (NILGOSC) which provides a defined benefits pension to employees. The scheme is currently in deficit and at the 31<sup>st</sup> March 2017 the deficit was calculated by independent Actuaries at £1,566,000.

## Key Risks and Uncertainties

During the year the following key risks relating to business objectives were identified

- Damage to Armagh Observatory and Planetarium's reputation at either national or international level through inattention/ignorance of best practice and/or neglect of duties
- Lack of funding to carry out planned programmes and/or live within budgets
- Loss due to fire/catastrophic natural or man-made event, including damage to or loss of heritage assets, library and archives due to water ingress
- Financial loss/irregular spend as a result of theft or fraud or neglect of Accounting Officer duties including failure to comply with good governance
- Loss of key personnel leading to single point failure risk
- Loss of income by lower visitor numbers at the Planetarium or reduced grant funding at the Observatory
- Failure to safeguard children and vulnerable adults while visiting the organisation
- Injury to staff or members of the public due to identified maintenance and health and safety related issues not being carried out
- Failure of key Armagh Observatory and Planetarium systems.

As part of the Risk Management Strategy, management regularly review the inherent level of risk for each of the above and how the risk is currently managed. An Action Plan is documented to reduce the level of risk, mindful of the risk appetite of the organisation. This Risk Register is reviewed on a quarterly basis by the Audit and Risk Assurance Committee and approved by the Management Committee. Many of the above risks derive from the uncertainty around funding. Until Armagh Observatory and Planetarium has both a budget appropriate to its needs and long-term security of funding, this situation is likely to continue. In managing these funding risks, the organisation has developed and maintained close communication links with the Department and submitted in-year monitoring bids for additional funding while carefully monitoring spend and budgets.

The above risks also take account of recommendations from internal and external audit investigations and reports. Good work has been done to address the weaknesses identified in previous years and considerable effort has been put into the management of these risks going forward. While the organisation is within striking distance of establishing sound systems of control, there still remains work to be done.

For the 2017/18 year, in addition to the above risks, a further risk of failure to achieve a unified coherent organisation has been added to the risk register.

## Plans for Future Periods

- With the fall of The Northern Ireland Executive, a one-year budget was set for 2017/18, based on a 4% cut on the 2016/17 baseline but no budget has been decided for future years. Following representations from the Board, the 4% baseline cut was restored for 2017/18.
- Following the completion of the *Review of the Organisation and Management of Armagh Observatory and Planetarium*, the Board of Governors has commenced a programme of Organisational Change which will be ongoing for a number of years.
- The primary function of AOP will continue to be to carry out international-quality research in astronomy and related sciences, to disseminate these results widely through a vibrant programme of Science in the Community, and to identify new ways to attract visitors to Armagh as part of its wider contribution to enriching the economic, social and cultural life of the local and national communities that it serves. This is in full alignment with the Department's vision to promote equality and tackle poverty and social exclusion.
- A Corporate Plan 2018-21 has been developed and approved by the Department in January 2018
- A Chair for the Management Committee was appointed on the 1 January 2018.
- The celebration of the 50th anniversary of the opening of the Armagh Planetarium took place on the 1 May 2018.

## Structure, Governance and Management

The Armagh Observatory and Planetarium are two component divisions of a single statutory corporation and arms-length body (ALB), 'The Governors of the Armagh Observatory and Planetarium' as described in *The Armagh Observatory and Planetarium (Northern Ireland) Order 1995*.

This 1995 Order superseded the original 1791 Act of the Irish Parliament entitled '*An Act for Settling and Preserving a Public Observatory and Museum in the City of Armagh For Ever*', and an Amendment of 1938 ('The University and Collegiate and Scientific Institutions Act [Northern Ireland], 1938').

The Armagh Observatory and Planetarium is a recognised charity (HMRC reference NIC 103948).

### Board of Governors

The Armagh Observatory and Planetarium is governed by a Board of Governors. Membership of the Board of Governors consists of:

- the Church of Ireland Archbishop of Armagh;
- the Dean of the Church of Ireland Cathedral of Armagh;
- the other members of the Chapter of the Church of Ireland Cathedral of Armagh;
- one Department nominee;
- one Queen's University Belfast (QUB) nominee; and
- up to three additional members nominated by the Board of Governors.

The Board of Governors meets once a year, though it can call special meetings to discuss important issues that may arise. The Board formally approves the annual budget and future financial business plan and receives and approves major strategies and projects where appropriate.

At the annual meeting the Board of Governors reviews, examines and approves all the minutes from the Management Committee and the Audit and Risk Assurance Committee meetings.

### Management Committee of Armagh Observatory and Planetarium

The Board has established a Management Committee to provide specialist advice and expertise relating to Scientific Research and Education, and to fulfil certain duties of governance oversight and challenge.

The Management Committee comprises:

- the Church of Ireland Archbishop of Armagh (Chair) or his nominee (appointed as Chair);
- three nominees from the Board of Governors;
- six nominees from the Department;
- one nominee of the Queen's University, Belfast (vacant);
- one nominee of the Science and Technology Facilities Council (STFC);
- one nominee of the Dublin Institute for Advanced Studies (DIAS); and
- up to three additional members co-opted by the Board of Governors. This is by exception and subject to Departmental approval.

#### Audit and Risk Assurance Committee (ARAC)

The ARAC has been established to advise the Board of Governors, the Management Committee and the Accounting Officer on issues facing the organisation in respect of organisational risks, internal control, governance and their associated assurances.

#### Employment Conditions and Remuneration Committee

The Committee advises the Directors, Management Committee and/or Board of Governors when there are specific matters relating to the terms of employment, temporary promotions and pay to be considered.

#### Organisational Change Project Board

The Organisational Change Project Board was established to oversee the implementation of the proposals and recommendations arising from the Review of AOP. The Organisational Change Project Board ceased to operate after November 2016 when the first part of its remit was achieved and responsibility for the organisational change was handed back to the Management Committee.

Further details on the membership of these Committees is set out in the Governance Statement on page 22.

## Reference and Administrative Details

### Name of the Charity

The charity is registered with the Charity Commission for Northern Ireland under the name of the Governors of the Armagh Observatory and Planetarium.

**Charity number: 103498**

### Principal Office

College Hill, Armagh, BT61 9DG

### Trustees

Archbishop Richard Clarke, CHAIR  
The Very Rev G. Dunstan  
The Venerable Archdeacon T. Scott  
The Venerable Archdeacon A. Forster  
Rev Canon W.J.A. Dawson  
Rev Canon W.M. Adair  
Rev Canon R.J.N. Porteus  
Rev Canon N.J. Hughes  
Rev Canon S.R.T. Boyd (resigned 9 January 2017)  
Rev Canon J. Moore  
Rev Canon D. Hilliard  
Professor S. Smartt (resigned 7 December 2016)  
Professor R. Oudmaijer  
Mr W.G. Berry  
Professor A. Hibbert

### Director and Accounting Officer

Professor M.E. Bailey – Armagh Observatory Director to 31 May 2016 and Accounting Officer to 14 December 2014 (retired 31 May 2016).

Mr A. Hughes – Interim Accounting Officer, Armagh Observatory and Planetarium (from 14 December 2015 to 31 August 2016).

Dr J Vink – Acting Head of Armagh Planetarium 15 June 2015 to 31 August 2016 and Accounting Officer 15 June 2015 to 14 December 2015.

Professor J G Doyle - Acting head of Armagh Observatory 1 June 2016 to 31 March 2017.

Professor Michael Burton – Chief Executive Armagh Observatory and Planetarium from 1 August 2016 and Accounting Officer from 1 September 2016.

### Auditors

Northern Ireland Audit Office, 106 University Street, Belfast, BT7 1EU

### Internal Auditors

RSM UK Group LLP, Number One, Lanyon Quay, Belfast, BT1 3LG (to 31/03/2017)

Grant Thornton (NI) LLP, 2 Clarence Street West, Belfast BT2 7GP (from 01/04/2017)

### Bankers

Danske Bank, Donegal Square West, Belfast, BT1 6JS

## Register of Interests

A Register of Interests is maintained for Board members and the Executive Team and is available for inspection at the Principal Office address.

Related party transactions are shown in note 24 of the accounts.

## Personal data related incidents

Armagh Observatory and Planetarium has given consideration to the requirement to report personal data related incidents. It is content that there were no such incidents in the year ended 31 March 2017.

## Disclosure of Audit Information

So far as the Accounting Officer is aware, there is no relevant audit information of which the Board's auditors are unaware. The Accounting Officer has taken all necessary steps to make himself aware of any relevant audit information and to establish that the Board's auditors are aware of that information.

## Change of Funding Department

In May 2016, as part of the restructuring of the Northern Ireland Civil Service, the number of Departments reduced. As a result, the Armagh Observatory and Planetarium funding Department changed from the Department of Culture Arts and Leisure to the Department for Communities.

## Important events since the end of the financial year

There were no events since the end of the financial year requiring disclosure.



**Archbishop Richard Clarke**  
Chair of the Board of Trustees  
Date: 18 September 2018



**Professor Michael Burton**  
Chief Executive  
Date: 18 September 2018

# Remuneration and Staff Report — Armagh Observatory and Planetarium

## Remuneration Policy

### Board Members

Board members do not receive any remuneration. They receive travel and subsistence allowances at rates and on conditions determined by Armagh Observatory and Planetarium, subject to Departmental approval. No Board member receive pension benefits or make pension contributions in their capacity as a Board member

### Senior Managers

The Chair of the Board of Trustees or his nominee is responsible for monitoring and reviewing the performance of the Chief Executive in accordance with the SCS Pay Strategy.

The Chief Executive is responsible for monitoring and reviewing the performance of the Senior Managers in accordance with The Northern Ireland Civil Service Pay Strategy.

### Pay and Conditions of Service

The staff of Armagh Observatory and Planetarium, (other than those paid in accordance with the Joint Negotiating Committee for Higher education) are subject to levels of remuneration within the general NICS pay structure, as approved by the Department and DoF. Current terms and conditions for staff are those set out in its Employee Handbook. These are currently under review.

### Policy on duration of contracts, notice periods and termination payments.

Senior staff, including the Chief Executive, are permanent employees of Armagh Observatory and Planetarium. The notice period for senior staff is three months. Termination payments are in accordance with contractual terms and those of the principal Civil Service Pension Scheme (NI)

The following tables provide details of the remuneration and pension entitlements of the Directors and Acting Heads of the organisation.

### Remuneration (Audited Information)

Single Total Figure of Remuneration						
Name	Salary 2016/2017 £'000	Pension Benefits* 2016/2017 £	Total 2016/2017 £'000	Salary 2015/2016 £'000	Pension Benefits 2015/2016 £	Total 2015/2016 £'000
M.E. Bailey	10-15 <sup>1</sup>	8,650	20-25	60-65	10,633	70-75
T.R. Mason	-	-		5-10 <sup>2</sup>	1,678	5-10
J.S. Vink	20-25 <sup>3</sup>	3,783	25-30	5-10	2,498	10-15
J.G. Doyle	45-50 <sup>4</sup>	31,846	75-80	-	-	-
M.G. Burton	45-50 <sup>5</sup>	15,643	60-65	-	-	-

\*The value of pension benefits accrued during the year is calculated as [the real increase in pension multiplied by 20] plus [the real increase in any lump sum] less [the contributions made by the individual]. The real increases exclude increases due to inflation or any increase or decreases due to a transfer of pension rights.

<sup>1</sup> Prof Bailey retired from service on 31 May 2016 – figure quoted is for the period 01 April 2016 to 31 May 2016. The full year equivalent is £63,346

<sup>2</sup> Dr Mason retired from service on 30 April 2015 – figure quoted is for the period 01 April 2015 to 30 April 2015.

<sup>3</sup> Dr Vink's term as Acting Head of the Planetarium ended on 31 August 2016 – figure quoted is for the period 01 April 2016 to 31 August 2016. The full year equivalent is £51,616. (Comparative figure quoted for 2015/16 relates to the proportion of his remuneration attributed to the Armagh Planetarium accounts for the period 15 June 2015 to 31 March 2016).

<sup>4</sup> Prof. Doyle was appointed Acting Head of the Observatory on 01 June 2016 – figure quoted is for the period 01 June 2016 to 31 March 2017. The full year equivalent is £54,406

<sup>5</sup> Prof. Burton was appointed Director of Armagh Observatory and Planetarium on 01 August 2016 – figure quoted is for the period 01 August 2016 to 31 March 2017. The full year equivalent is £72,562.

## Pension Entitlements (Audited Information)

Name	Accrued Pension at 31 March 2017	Real Increase in Accrued Pension	Accrued Lump Sum at 31 March 2017	Real Increase in Lump Sum	CETV at 31 March 2017	CETV at 31 March 2016	Real Increase in CETV
	£'000	£'000	£'000	£'000	£'000	£'000	£'000
M.E. Bailey	30-35	0-2.5	65-70	0-2.5	628	624	3
T.R. Mason	-	-	-	-	-	316	-
J.S. Vink	5-10	0-2.5	0-5	(0-2.5)	80	76	4
J.G. Doyle	25-30	0-2.5	55-60	0-2.5	557	525	27
M.G. Burton	0-5	0-2.5	0-5	0-2.5	12	-	8

Note: The Interim Accounting Officer Mr. A Hughes was employed and paid by the former DCAL. We are required to disclose any expenditure on staff working for Armagh Observatory and Planetarium whose contracts are with and are paid by a related party. Mr. Hughes served as Interim Accounting Officer from 14 December 2015 to 30 September 2016. His full-time equivalent salary over this period was in the band £65k - £70k. This equates to £19k – £20.5k in 2015/16 and £32.5k – £35k in 2016/17.

\*The value of pension benefits accrued during the year is calculated as (the real increase in pension multiplied by 20) plus (the real increase in any lump sum) less (the contributions made by the individual). The real increases exclude increases due to inflation or any increase or decreases due to a transfer of pension rights.

The CETVs above have been calculated in accordance with guidance used by the Northern Ireland Civil Service in Employer Pension Notice EPN13/2017.

1. The Director of Armagh Observatory and Planetarium and the Acting Heads of the Observatory and Planetarium, are the persons in senior positions having authority and responsibility for directing and controlling the activities of the organisation.
2. The salary of each Director/ Acting Head shown above is based on the Northern Ireland Civil Service Grades 5-7 pay scale respectively. No bonus was paid in the year and no benefits in kind were received.
3. The service contract of the Director of Armagh Observatory and Planetarium commenced on 01 August 2016. The service contract of the Director of the Planetarium ended on 30 April 2015. The service contract of the Director of the Observatory ended on 31 May 2016. The Acting Head of the Planetarium was on a short-term temporary contract which commenced on 15 June 2015 and continued to 31 August 2016. The Acting Head of the Observatory was on a short-term temporary contract which commenced on 01 June 2016.
4. Pension benefits are provided through the Northern Ireland Local Government Officers' Superannuation Committee Pension Scheme (NILGOSC). In the period up to 31 March 2009 members paid contributions of 6% of pensionable earnings to the scheme up until retirement. From 1 April 2009 banded contribution rates were introduced and for the year 2016/2017 the Directors and Acting Head paid contributions of 8.5% on pensionable pay.
5. The main benefits payable on retirement for service up to 31 March 2009 are: (i) a retirement pension at a rate of 1/80th of final pensionable pay for each year of membership of the scheme; and (ii) a lump sum retirement grant at a rate of 3/80ths of pensionable pay for each year of membership of the scheme. On death after retirement, the surviving spouse will receive a pension payable for 3 months (6 months if there are dependent children) paid at the same rate as the monthly retirement pension at the date of death and thereafter a spouse's pension of half of the retirement pension for life. On death in service, the scheme pays a lump sum death grant of twice pensionable pay, normally to the surviving spouse or, if the member was not married, to next of kin. For service from 1 April 2009 retirement pension will be at a rate of 1/60<sup>th</sup> of pensionable pay for membership built up after 31 March 2009 and further rights on pension augmentation, flexible retirement and family pension rights on death were introduced. Details of the changes can be obtained at <http://www.nilgosc.org.uk>.
6. The real increase in pension payable, lump sum and cash equivalent transfer value (CETV) shown above have been adjusted to take account of inflation and market investment factors. The CETV figures include the value of any pension benefit in another scheme that the individual has transferred to NILGOSC.
7. A CETV is the actuarially assessed capitalised value of the pension scheme benefits accrued by a member at a particular point in time. The benefits valued are the member's accrued benefits and any contingent spouse's pension payable from the scheme. A CETV is a payment made by a pension scheme to secure pension benefits

in another scheme when the member leaves a scheme and chooses to transfer the benefits accrued in their former scheme.

8. Compensation for loss of office: Professor Bailey left under Voluntary Exit on 31 May 2016. He received a compensation payment of £108,016. The cost to Armagh Observatory of buying out the actuarial reduction on his pension was £365.

#### Band of highest paid senior post holder (Audited Information)

	2016-17 £'000	2015-16 £'000
Band of highest paid director's total remuneration	70-75	60-65
Median total remuneration	29-31	28-31
Ratio	2.58	2.10

Reporting bodies are required to disclose the relationship between the remuneration of the highest paid worker in the organisation and the median remuneration of the organisations workforce. The banded remuneration of the highest paid director in 2016/17 was £70,000 - £75,000 (2015/16: £60,000 - £65,000). No employee received remuneration in excess of the highest paid director. Remuneration ranged from £19,615 to £77,500 (2015-16 £19,615 to £62,500).

#### Total Staff Costs (Audited Information)

	2017 £	2016 £
<b>Permanent staff</b>		
Wages and Salaries	712,488	786,676
Social security costs	77,194	64,796
Employers pension contributions	143,768	150,625
Defined benefit pension service cost	12,000	56,058
Termination Costs	193,714	108,016
Sub-total	1,139,164	1,166,171
<b>Fixed term contract staff costs</b>		
Wages and Salaries	144,233	161,083
Social security costs	9,799	12,662
Employers pension contributions	15,856	21,317
Termination Costs	2,250	-
Sub-total	172,138	195,062
<b>Agency Staff</b>		
Costs	106,467	82,087
Total	1,417,769	1,443,320

#### Average staff numbers

	2017	2016
Permanent staff	19.7	21.0
Fixed –term contract staff	4.2	4.2
Agency staff	2.4	2.5
Total	26.3	27.7

## Staff banding

The number of employees whose employee benefits (excluding employer pension costs) exceeded £60,000 was

	2017	2016
£70,001 - £80,000	2	-
£120,001- £130,000	1	-
£170,001- £180,000		1

## Staff Composition – employed (full time equivalent)

	Male	Female
Directors/senior managers	3	-
Employees	14	10

## Sickness Absence

Staff absenteeism for the period 1 April 2016 to 31 March 2017 was 86 days which equates to an average per FTE of 1.55%.

## Staff policies

As an equal opportunities employer, Armagh Observatory and Planetarium does not discriminate against staff or applicants for posts on any grounds, including disability. Care is taken to ensure the needs of disabled applicants are considered in the application process. Armagh Observatory and Planetarium also considers and introduces reasonable adjustments to support the employment of people with disabilities and to support the continuing employment of staff who have a disability.

Armagh Observatory and Planetarium is committed to the priorities as set out in legislation on equality, disability, discrimination, health and safety, child and vulnerable adult protection, data protection and freedom of information.

## Expenditure on Consultancy

Expenditure on consultancy during the year was £37,965 (2015/16 £0).

## Off –payroll Engagements

There were no “off-payroll” engagements in place as at 31 March 2016, nor were any arrangements entered into between 1 April 2016 and 31 March 2017.

## Exit Packages (Audited Information)

Exit package cost band	No of compulsory redundancies	No of other departures agreed	Total no. of exit packages by cost band	Total no. of exit packages by cost band
	2016-17	2016-17	2016-17	2015-16
< £10,000		1	1	
10,001 - 25,000				
25,001 - 50,000		2	2	
50,001 – 100,000		2	2	
100,001 – 150,000				1
Total no of exit packages		5	5	1
Total resource cost	Nil	195,964	195,964	108,016

Signed:

**Professor Michael Burton**  
Accounting Officer for the Armagh Observatory and Planetarium  
Date: 18 September 2018

## Statement of the Responsibilities of the Governors and Accounting Officer

Under the Audit and Accountability (Northern Ireland) Order 2003 the Governors are responsible for keeping proper accounts and proper records in relation to the accounts, and for preparing a statement of accounts in respect of each financial year in such form and containing such information as the Department for Communities (DfC), with the approval of the Department of Finance, shall direct.

On 14 December 2015, the Accounting Officer of the Department designated a member of his Departmental staff as Interim Accounting Officer for the Armagh Observatory and Planetarium. Prior to this date the Accounting Officer of the Department designated the respective Directors of the Observatory and the Planetarium and the acting Head of the Planetarium as the corporation's Accounting Officers. The Interim Accounting Officer ceased when the newly appointed Chief Executive of the Armagh Observatory and Planetarium was designated Accounting Officer on 1 September 2016.

The Accounting Officer has personal responsibility for the propriety and regularity of the public finances for which he is answerable and for the keeping of proper accounts. He is required to sign the accounts thereby accepting personal responsibility for their proper presentation and to sign the Governance Statement. The Accounting Officer's relevant responsibilities, including his responsibilities for the propriety and regularity of the public finances and for the keeping of proper records, are set out in Managing Public Money Northern Ireland.

The accounts are prepared on an accruals basis and give a true and fair view of the corporation's state of affairs at the end of the financial year and of its income and expenditure, total recognised gains and losses and cash flows for the financial year. The accounts have been prepared in accordance with the Statement of Recommended Practice "Accounting and Reporting by Charities" (SORP 2015). The financial statements comply with the guidance issued by the Department of Finance and Personnel on the form and contents of the Annual Reports and Accounts of Executive Non-Departmental Public Bodies and in particular:

- suitable accounting policies have been selected and applied consistently (subject to changes arising on the adoption of new accounting standards);
- reasonable and prudent judgements and estimates have been made;
- applicable accounting standards have been followed, subject to any material departures disclosed and explained in the financial statements; and
- the financial statements have been prepared on the going concern basis, unless it is inappropriate to presume that the corporation will continue in business.

The Accounting Officer is also responsible for safeguarding the assets of the corporation and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

## Statement of Disclosure of Information to the Auditors

So far as the Accounting Officer of the Armagh Observatory and Planetarium, in office at the date of the approval of these financial statements, is aware:

- there is no relevant audit information relating to these respective charitable organisations of which the auditors are unaware;
- he has taken all the steps that he ought to have taken as Accounting Officer in order to make himself aware of any relevant audit information relating to these charitable organisations and to establish that the auditors are aware of that information;
- that the annual report and accounts as a whole is fair, balanced and understandable; and
- that he takes responsibility for the ARA and the judgements required for determining that it is a fair, balanced and understandable.

## Armagh Observatory and Planetarium: Governance Statement

## 1. Scope of Responsibility

The Board of Governors, Management Committee and Directors of the Armagh Observatory and Planetarium are required to prepare a statement of accounts for each financial year to be laid before the Northern Ireland Assembly. The accounts are prepared to show a true and fair view of the corporation's financial activities during the year and the financial position at the end of the year.

In preparing the Armagh Observatory's and Planetarium's accounts, the Board of Governors and Management Committee of the Armagh Observatory and Planetarium are required to:

- comply with the Government Financial Reporting Manual;
- observe the accounts direction issued by the government, including the relevant accounting and disclosure requirements, and apply suitable accounting policies on a consistent basis;
- make judgments and estimates that are reasonable and prudent;
- state whether applicable accounting standards and statements of recommended practice have been followed, and disclose and explain any material departures in the financial statements;
- prepare the financial statements on the going concern basis unless it is inappropriate to presume that the Armagh Observatory and Planetarium will continue in operation.

## 2. Compliance with Corporate Governance Code

In April 2013 the former Department of Finance and Personnel issued Dear Accounting Officer (DFP) 06/13 regarding the revised Code of Good Practice on Corporate Governance in Central Government Departments.

While the 2013 Code has been written for central government departments, it concentrates throughout on key principles. As such, arms-length bodies (ALBs) are encouraged to consider and adopt the practices set out in the Code wherever it is relevant and practical and suits their business needs.

Armagh Observatory and Planetarium in so far as they are relevant for an arms-length body, comply with the principles of good practice in the Corporate Governance Code.

## 3. Governance Framework

### Accounting Officer

The Permanent Secretary of the Department appointed an Interim Accounting Officer from the former DCAL on 14 December 2015 until 31 August 2016. A new Chief Executive of the combined Armagh Observatory and Planetarium was appointed on 1 August 2016 and appointed as Accounting Officer on 1 September 2016. All officers who acted as Accounting Officer for the Observatory or Planetarium during 2016/17 are shown in the following table. The Accounting Officer, is responsible for the maintenance of a sound system of internal control as outlined in section 1.

Name	Accounting Officer – Period in 2016/17
Mr Alastair Hughes, DCAL appointee	From 14 December 2015 to 31 August 2016 (as Interim Accounting Officer)
Professor Michael Burton – Chief Executive Armagh Observatory and Planetarium	From 1 September 2016 onwards

## Board of Governors

The Armagh Observatory and Planetarium is governed by a Board of Governors. Membership of the Board of Governors consists of:

- the Church of Ireland Archbishop of Armagh;
- the Dean of the Church of Ireland Cathedral of Armagh;
- the other members of the Chapter of the Church of Ireland Cathedral of Armagh;
- one DfC nominee;
- one Queen's University Belfast (QUB) nominee; and
- up to three additional members nominated by the Board of Governors.

During 2016/17 there were no additions to the Chapter of the Church of Ireland Cathedral of Armagh and hence the Board of Governors. There remains one vacancy from within the Board of Governors nominees.

<b>BOARD OF GOVERNORS</b>			
<b>GOVERNOR</b>	<b>DATE OF APPOINTMENT</b>	<b>DATE OF EXPIRY</b>	<b>MEETINGS ATTENDED (max. 1)</b>
CHAIR Archbishop Richard Clarke	15 December 2012		1
The Dean: Very Rev G. Dunstan	4 December 2011		1
The Venerable Archdeacon T. Scott	9 November 2006		0
The Venerable Archdeacon A. Forster	11 October 2015		0
Rev Canon W.J.A. Dawson	1998		0
Rev Canon W.M. Adair	10 September 2008		0
Rev Canon R.J.N. Porteus	1998		1
Rev Canon N.J. Hughes	16 November 2014		0
Rev Canon S.R.T. Boyd	6 October 2013	Resigned 9 January 2017	0
Rev Canon J. Moore	13 March 2016		1
Rev Canon D. Hilliard	13 March 2016		0
Professor S. Smartt	23 March 2012	Resigned 7 December 2016	0
Professor R. Oudmaijer	1 July 2015		0
Mr W.G. Berry	1 January 2016	Up to 31 December 2019	0
Professor A. Hibbert	28 March 2014		1

The Board of Governors meets once a year, though it can call special meetings to discuss important issues that may arise. The Board formally approves the annual budget and future financial business plan and receives and approves major strategies and projects where appropriate. The Board has established a Management Committee to provide specialist advice and expertise relating to Scientific Research and Education, and to fulfil certain duties of governance oversight and challenge.

At the annual meeting the Board of Governors reviews, examines and approves all the minutes from the Management Committee and the Audit and Risk Assurance Committee meetings. At its meeting in 2017 it also received a report on the achievements of the Organisational Change Project Board. The Board approved the Annual Report and Accounts for 2015/16 and approved the direction of the 2017/18 Business Plan and revisions to a number of policies. The Board also noted the Management Report for 2016/17 and the Directors Activities Report.

The Board is satisfied that comprehensive arrangements are in place to ensure that high-quality information is received to enable it to make informed decisions. Internal controls are in place to validate the accuracy and completeness of information presented to the Board.

Minutes of the meetings record the business carried out and actions agreed.

## Management Committee of Armagh Observatory and Planetarium

The Management Committee comprises:

- the Church of Ireland Archbishop of Armagh (Chair) or his nominee (appointed as Chair);
- three nominees from the Board of Governors; (1 vacant)
- six nominees from DfC;
- one nominee of the Queen's University, Belfast;
- one nominee of the Science and Technology Facilities Council (STFC);
- one nominee of the Dublin Institute for Advanced Studies (DIAS); and
- up to three additional members co-opted by the Board of Governors. This is by exception and subject to Departmental approval.

During 2016/17 Queen's University made one nomination and the Board of Governors made one nomination leaving one vacant nominee position and two Board of Governors' co-opted positions vacant.

<b>MANAGEMENT COMMITTEE</b>			
<b>MEMBER</b>	<b>DATE OF APPOINTMENT</b>	<b>DATE OF EXPIRY</b>	<b>MEETINGS ATTENDED (max. 4)</b>
CHAIR Archbishop R. Clarke	15 December 2012		4
DEPUTY CHAIR Professor A. Hibbert	18 March 2005		4
Professor T. Ray	4 March 2009		3
Professor M. Merrifield	1 January 1999		3
Professor R. Oudmaijer	1 July 2015		4
Mr B. Hannam	1 January 2016	Up to 31 December 2019	4
Dr M. McKay	1 January 2016	Up to 31 December 2019	3
Mrs P. Wilson	1 November 2014	31 October 2018	3
Professor L. Harra	1 November 2014	31 October 2018	4
Mr S. Brown	1 November 2014	31 October 2018	4
Mr P. McGurgan	1 November 2014	31 October 2018	1
Professor M Mathioudakis	11 November 2016	10 November 2021	1
Cannon Hilliard	7 June 2016	6 June 2021	0

During 2016/17 the Management Committee considered a wide range of business including updates on key performance indicators and developments relating to financial performance, scientific research, science education, outreach and engagement, staffing, health and safety, Bi-Annual Assurance Statements and Risk Registers as well as reports of the Audit and Risk Assurance Committee. Internal controls are in place to validate the accuracy and completeness of information presented to the Management Committee. For these reasons, the Board/Management Committee are content with the quality of information received.

Minutes of the meetings record the business carried out and actions agreed.

## Audit and Risk Assurance Committee

The Audit and Risk Assurance Committee has been established to advise the Board of Governors, the Management Committee and the respective Directors of the Observatory and Planetarium as Accounting Officers on issues facing the organisation in respect of organisational risks, internal control, governance and their associated assurances.

<b>AUDIT AND RISK ASSURANCE COMMITTEE</b>	
<b>MEMBER</b>	<b>MEETINGS ATTENDED (max. 4)</b>
CHAIR	
Mr B. Hannam	4
Professor A. Hibbert	4
Professor L. Harra	4
Mr P. McGurgan	1

During 2016/17 the Audit and Risk Assurance Committee considered a number of areas including reports from Internal Audit on progress against their audit plan, other investigations and progress on outstanding recommendations; reports from external audits including initial drafts on the certification wording for the outstanding 2014/15 and 2015/16 Annual Report and Accounts; review of the Accounting Officer's Governance Statement and Assurance Statements and the Board's Assurance Statement and review of risk registers and risk assessment process. The Committee is satisfied that the integrated approach, the frequency of meeting, the breadth of the business undertaken and the range of attendees at meetings of the Committee has allowed the Committee to meet the governance requirements of the organisation and assisted the Management Committee to demonstrate its stewardship of the public resources with which it is charged.

Following a review of organisational risks and the 'unification' of the risk register, the Committee is satisfied that the organisation now has robust risk management arrangements in place which are in line with the good practice in the HM Treasury 'Orange Book' and are reviewed regularly by the Management Committee.

The Committee is also satisfied, from the evidence provided at meetings that a detailed work programme exists with the aim of implementing the recommendations arising from the Internal Audit, external audit and the special investigation. Progress in implementing outstanding recommendations has been slower than planned because of the time and resource involved in dealing with legacy issues and due to delays in implementing revised organisational structures.

The Committee undertook a self-assessment exercise in January 2016. There were no material findings identified as a result of this exercise.

Minutes of the meetings record the business carried out and actions agreed.

## Employment Conditions and Remuneration Committee

The Employment Conditions and Remuneration Committee, by necessity, meets infrequently as two of the members reside outside of Northern Ireland. Given these circumstances, alternative arrangements have been made so that its extensive business can be conducted by email or other communication methods. Consequently, no formal meetings of the Committee were held in 2016/17.

The Committee advises the Directors, Management Committee and/or Board of Governors when there are specific matters relating to the terms of employment, temporary promotions and pay to be considered. In 2016/17, amongst other matters, the Committee corresponded to consider the areas of:

- The Voluntary Exit Scheme policy
- Business Continuity
- The advertising and selection of the Chief Executive of the Observatory and Planetarium.

The Committee comprises the Deputy Chair of the Management Committee and three named members of the Management Committee.

<b>EMPLOYMENT CONDITIONS AND REMUNERATION COMMITTEE</b>
CHAIR
Professor A. Hibbert
Dr M. McKay
Professor T. Ray
Mrs P. Wilson

## Organisational Change Project Board

The Board of Governors and Management Committee agreed on 26 February 2015 that an Organisational Change Project Board should be established to oversee the implementation of the proposals and recommendations arising from the Review of AOP. An Implementation Plan for Stage One was also approved at that time. The Project Board comprises the Deputy Chair of the Management Committee, three named members of the Management Committee and a representative from the former DCAL. A Project Manager was appointed to manage all activities relating to the implementation process and deliver the required outputs. The Project Board has communicated its progress to the Board of Governors, Management Committee and AOP staff through a series of written updates and attendance at meetings throughout the year.

<b>ORGANISATIONAL CHANGE PROJECT BOARD</b>	
	<b>MEETINGS ATTENDED (max. 6)</b>
CHAIR Professor A. Hibbert	6
Mr S. Brown	5
Professor T. Ray	4
Mrs P. Wilson	6
Mr F. Devitt (DfC)	6

In addition, the members of the Organisational Change Project Board were closely involved in the appointment of the new Chief Executive/Director of Armagh Observatory and Planetarium. Professor Smartt (Governor) also served on the Appointment Panel. Each Panel member took part in formal recruitment and selection training, preparation meetings and interviews. The Chief Executive/Director took up his post on 1 August 2016.

Minutes of the meetings record the business carried out and actions agreed.

At its final meeting on 29 November 2016, the Project Board agreed that it had fulfilled its role in relation to the Implementation Plan for Stage One and that further work on the strategy and new staff structure should now be taken forward by the Management Committee.

### Conflicts of Interest

The organisation also maintains a register of interests to ensure that potential conflicts of interest can be identified and addressed in advance of Board, Management Committee and other Committee discussions. The register is formally revisited on an annual basis. Where conflicts exist, they are recorded in the Committee minutes and the Chair of the meeting decides the most appropriate way of managing the conflict which may include that member not taking part in discussions or making decisions on certain matters or being excluded for part/all of that meeting.

### Directors and Secretary

Professor M.E. Bailey	Director, Armagh Observatory
Mr A Hughes	Interim Accounting Officer Armagh Observatory and Planetarium
Dr J. Vink	Acting Head of Armagh Planetarium
Professor J G Doyle	Acting Head of Armagh Observatory
Professor Michael Burton	Director and Chief Executive, Armagh Observatory and Planetarium

The Operations Manager provides a range of secretarial support services to the Board of Governors, Management Committee and Audit and Risk Assurance Committee.

## 4. Business Planning and Risk Management

### Business Planning

The Mission of Armagh Observatory and Planetarium is:

*“To advance the knowledge and understanding of astronomy and related sciences through interactive engagement and the execution, promotion and dissemination of astronomical research nationally and internationally in order to enrich the intellectual, economic, social and cultural life of all members of the community”.*

This aligns closely with the aims and objectives of the Observatory and Planetarium’s sponsor - the Department for Communities (DfC) and with the broader aims and objectives of the Northern Ireland Executive’s Programme for Government. The organisation’s unified Business Plan received Departmental approval on 6 July 2016.

The work of the Observatory encompasses both internationally acclaimed research and a unique cultural heritage — scientific, historical, architectural — as well as maintaining the unique daily climate series (the longest daily series from a single site in the UK and Ireland) and undertaking a world-class programme of Science in the Community, which complements the Planetarium’s main business of education.

The Planetarium’s main business is education, and all age and social groups are welcome to visit. The educational programmes and demonstrations are designed to include participation by children of pre-nursery age up to senior citizens and all age groups in between. The primary educational aim of the Planetarium is to endorse and promote the Science, Technology, Engineering, Arts and Mathematics (STEAM) agenda which promotes scientific careers to young people. All of the ancillary activities support the primary aim, with the additional target of offering excellent value for money, both to the visitors taking part and to the public purse. The Planetarium is focused on actively assisting children from disadvantaged backgrounds to experience a visit to the site.

Full details of all the Observatory and Planetarium’s activities are provided in comprehensive Annual Reports which are available in hard copy on request or online at: <http://www.armagh.ac.uk>.

From 1 April 2016 the organisation has been registered as a single charity by the Charity Commission of Northern Ireland. Prior to this the Observatory and the Planetarium were separate charitable organisations.

No Ministerial Directions have been given regarding the work of the Armagh Observatory and Planetarium.

### Risk Management

Risk Management is an essential element of the Armagh Observatory and Planetarium’s corporate governance framework and is closely linked to the system of internal control and business planning process. A robust risk management process assists the Armagh Observatory and Planetarium in identifying and managing issues which may hinder the achievement of objectives. The arrangements are regularly reviewed.

As well as ensuring that there is an effective system in place to deal with threats to Armagh Observatory and Planetarium’s aims and objectives, the organisation encourages a proactive approach to innovation and well-managed risk taking where there is potential to realise sustainable improvements in the organisation’s research and educational services. For this reason, the organisation’s Risk Appetite is ‘Open’.

The Management Committee sets the risk appetite for the Armagh Observatory and Planetarium. The Accounting Officer, Interim Accounting Officer, Director of the Observatory, Acting Head of the Planetarium and other staff are responsible for ensuring that treated risks are reduced to a level as low as reasonably practicable and wherever possible consistent with the level of risk appetite established by the Management Committee.

Quarterly updates are provided to the Audit and Risk Assurance Committee on the development and implementation of the risk management process across the Armagh Observatory and Planetarium. The Audit and Risk Assurance Committee provides the Accounting Officer with objective advice on issues concerning the risk, control and governance of the organisation and the associated assurances. An update on the main points considered by the Audit and Risk Assurance Committee is provided to the Management Committee following each meeting.

## 5. Fraud and Information Risk

The Accounting Officer of the Armagh Observatory and Planetarium has overall responsibility for managing the risk of fraud including:

- developing a fraud risk profile and undertaking a regular review of the fraud risks associated with each of the key organisational objectives to keep the profile current;
- establishing an effective fraud prevention policy and fraud response plan, commensurate with the level of fraud risk identified in the fraud risk profile;
- designing an effective control environment to prevent fraud commensurate with the fraud risk profile;
- operating appropriate pre-employment screening measures;
- establishing appropriate mechanisms for reporting fraud risk issues, reporting significant incidents of fraud, and coordinating assurances about the effectiveness of fraud prevention policies to support the Governance Statement;
- liaising with the Audit and Risk Assurance Committee;
- ensuring that all staff are aware of the organisation's fraud prevention policy and know what their responsibilities are in relation to combating fraud;
- ensuring fraud awareness training is provided as appropriate and, if necessary, more specific fraud prevention training and development is provided to relevant staff;
- ensuring that vigorous and prompt preliminary investigations are carried out if fraud occurs, is attempted or is suspected;
- ensuring that vigorous and prompt investigations are carried out if fraud occurs, is attempted or is suspected by the establishment of a Fraud Investigation Oversight Group;
- ensuring, where appropriate, legal and/or disciplinary action against perpetrators of fraud;
- ensuring, where appropriate, disciplinary action against supervisors where supervisory failures have contributed to the commission of fraud;
- ensuring, where appropriate, disciplinary action against staff who fail to report fraud;
- taking appropriate action to recover assets and losses; and
- ensuring that appropriate action is taken to minimise the risk of similar frauds occurring in future.

Risks to data and information held by the organisation are owned and managed by individuals designated as information asset owners. The Operations Manager responds to requests for information under the Data Protection and Freedom of Information Acts following consultation with the Director of the Observatory, Acting Head of the Planetarium, Interim Accounting Officer, Accounting Officer and the organisation's governing committees, as appropriate.

There were no personal data related incidents during the year.

## 6. Governance and Accountability

The corporation seeks to achieve excellence in good governance, in particular the precepts: (1) leadership; (2) effectiveness; (3) accountability and (4) sustainability.

The Chair has a particular leadership responsibility for securing the sustainability and vitality of the corporation in the long term; giving advice and direction in formulating the corporation's forward look and overall strategy; ensuring that account is taken of guidance provided by the Minister or the Department; promoting the efficient and effective use of staff and other resources; encouraging high standards of probity amongst staff and Board and Committee members alike; and ensuring that the Board and its committees meet at regular intervals throughout the year and that the Minutes of meetings accurately record the decisions taken and, where appropriate, the views of individual Board members.

Within the Observatory and Planetarium, leadership was exercised by the Director of the Observatory, Acting Head of the Planetarium, Interim Accounting Officer and Accounting Officer who are responsible for the management and effective operation of their organisation. Their operational responsibilities include:

- developing, implementing and monitoring the strategic and operational plans;
- undertaking financial management and Accounting Officer responsibilities;
- managing and developing a team of highly qualified professional and administrative staff;
- identifying and attracting sources of external income (Observatory);
- promoting their respective organisations in relevant local, national and international arenas; and
- promoting Public Understanding of Science with the objective of improving the level of scientific literacy in the community and to ensure a strong link with government policy and the STEM agenda.

Members of the Board of Governors and of the Management Committee and their various sub-committees exercise an effective challenge function on the leadership team in accord with their respective roles in the organisation. They also provide guidance and advice on strategic and operational matters such as Human Resource issues, accountability and relationships with stakeholders.

The members of these senior management committees are drawn from a very wide community background within, and beyond, Northern Ireland, and provide the corporation with a correspondingly wide range of expert knowledge and advice. All the committees of the corporation operate with full transparency and accountability, and over the last year have proved effective in the discharge of their duties and responsibilities.

The Management Committee completed an internal self-assessment of its effectiveness in 2014/15, using the National Audit Office template questionnaire. Committee members raised concerns about 1) the lack of objectives for the Committee, 2) not regularly reviewing its performance, 3) no long-term strategy being in place for the organisation and 4) oversight by the Department appearing to be increasing. It was agreed that further work on these areas would be taken forward by the new Management Committee which was proposed in the ongoing *Review of the Organisation and Management of the Armagh Observatory and Planetarium*.

It was agreed by the Board of Governors and the Management Committee that the proposed governance changes arising from the Review removed the need for the current Board of Governors to complete an internal self-assessment of its effectiveness.

The Accounting Officer, Interim Accounting Officer and Board of Governors and supporting Committees receive assurances from the Director of the Observatory, Acting Head of the Planetarium and Internal Audit that the governance and accountability processes are being managed effectively.

## 7. Sources of Independent Assurance

### Internal Audit

The independent internal audit function is carried out by a contractor following a competitive tender process. The appointed firm operates to the standards defined in the Public Sector Internal Audit Standards.

The Terms of Reference for the Internal Audit work was approved by the Audit and Risk Committee in February 2017. The Audit and Risk Assurance Committee considered reports on the following areas in June 2017:

<b>Audit Assignment</b>	<b>Level of Assurance</b>
Contract management	Limited
Payroll	Satisfactory
IT Security	Limited
Procurement and Creditor Payments	Unacceptable
Complaints Handling	Substantial
Child Protection/safeguarding	Satisfactory
Follow up on previously accepted recommendations	Limited
Overall	Limited

Following the end of the three-year contract period in March 2017, a further competitive tender process was undertaken and a new independent internal auditor was appointed. Their priority was to address the outstanding recommendations carried over from the previous period.

### External Audit

The organisation is also subject to independent scrutiny from the Northern Ireland Audit Office. The Audit Office is independent of Government and is tasked by the Assembly to hold the Northern Ireland Departments and their Agencies to account for their use of public money. The Comptroller and Auditor General works closely with the Assembly's Public Accounts Committee which can require Accounting Officers and senior officials to account for their actions in relation to the management of public funds.

A representative from the Northern Ireland Audit Office is invited to all Audit and Risk Assurance Committee meetings.

## 8. Review of the Effectiveness of the System of Internal Governance

The system of internal governance is designed to manage risk to a reasonable level, rather than to eliminate all risk of failure to achieve certain policies, aims and objectives; it can therefore only provide reasonable and not absolute assurance of effectiveness. The system of internal governance is based on an ongoing process designed to identify and prioritise risks to the achievement of the Armagh Observatory's and Planetarium's policies, aims and objectives; to assess the likelihood of the events occurring and the impact should they be realised; and to manage the risks effectively, efficiently and economically. The system of internal governance has been in place in the Armagh Observatory and Planetarium for the year ended 31 March 2017 and up to the date of approval of the annual accounts, and accords with Department of Finance and Personnel guidance.

As previously detailed in Section 3, the responsibilities of the Accounting Officer include the need to maintain a sound system of internal control which supports the achievement of the organisation's policies, aims and objectives. The review of the effectiveness of the system of internal governance has been informed by the assurances provided by relevant parties such as: Internal Audit, the Director of the Observatory and the Acting Head of the Planetarium. Where weaknesses have been identified these have been promptly drawn, through normal reporting mechanisms, to the attention of the Audit and Risk Assurance Committee, Management Committee and/or Board of Governors, as appropriate.

The main procedures in place to monitor the effectiveness of the system of internal governance are as follows:

- The ongoing independent assessment of the Observatory's research outputs;
- regular reports by Observatory and Planetarium financial staff on progress against principal financial targets and the projected financial outcome for the year and progress reports by staff responsible for major projects;
- detailed progress reports to the Management Committee and Board of Governors at their regular meetings and inclusion of performance measures and results against targets in the annual operating plan;
- annual reports on the system of internal control from internal auditors to the Armagh Observatory and Planetarium Audit and Risk Assurance Committee;
- regular Accountability meetings with officials from the Sponsor Department to consider operational and strategic issues and matters relating to the system of internal control;
- Bi-Annual Assurance Statements and ALB Quarterly Monitoring Data Collection Templates submitted to the Sponsor Department;
- periodic review of the Armagh Observatory and Planetarium Risk Registers by the respective Directors, the Armagh Observatory and Planetarium Audit and Risk Assurance Committee, the Interim Accounting Officer, the Accounting Officer of the Observatory and Planetarium and the Sponsor Department;
- Joint Issues Meeting chaired by the Sponsor Department with senior Planetarium and Observatory staff;
- continuous assessment of the quality of research through peer review of grant applications, applications for telescope time, and the submission of scientific papers to academic journals of international standing by Armagh Observatory staff;
- peer review of the research quality, capability and output of the Observatory, and through participation in an objective external Assurance Committee, which provide an opinion on the adequacy and effectiveness of the system and contain recommendations for improvement; and
- annual reports from external auditors to the Management Committee and the Board of Governors on the material issues relating to the annual accounts, which provide an opinion on whether the accounts give a true and fair view of the affairs of the organisation and of its incoming resources and application of resources.

All reports based on the internal and external audits include opinions on the adequacy and effectiveness of risk management and the control framework in place. These matters are considered by the Audit and Risk Assurance Committee and are reported by the Audit and Risk Assurance Committee Chair or Deputy Chair to the Management Committee and the Board of Governors.

The *Review of the Organisation and Management of the Armagh Observatory and Planetarium* was carried out by the Strategic Investment Board in 2014/15. The Board of Governors agreed to implement some of the proposals and recommendations arising from this and an implementation plan has been progressed for stage 1 by the Organisational Change Project Board. This includes the key governance and organisational changes and this is ongoing.

A range of weaknesses identified in the corporation's control systems and internal governances are set out within the next section. Upon identification, plans were immediately put into place to addresses these issues.

## 9. Internal Governance Divergences

### Update on Prior Years:

#### 2014/15 Internal Audit Recommendations

The corporation's Internal Auditors identified a number of weaknesses during work undertaken in 2014/15. Ten 'high' rated recommendations are being actively addressed, and one has not yet been implemented. This relates to the need to have a revised Board Operating Framework. This issue will be considered going forward as part of the ongoing Organisational Change activities.

The area of 'IT Security and Business Continuity' previously received a 'limited' assurance. Since this was awarded the recently appointed IT Manager has been actively documenting the controls and strengthening our IT environment. A significant amount of work on revising and developing the existing Business Continuity Plans has also been undertaken. Internal Audit's follow up review on previously accepted recommendations provides a SATISFACTORY level of assurance.

#### Irregularities at the Planetarium

In July 2015 the Chair of the Audit and Risk Assurance Committee commissioned Internal Audit to carry out an investigation into a series of procurement irregularities that had been brought to his attention. The investigation team considered the policies, procedures and practices relating to procurement, use of the Planetarium's credit card, the acceptance of gifts and hospitality. The team subsequently provided its opinion on the robustness of the management and control environment within the Planetarium. Its conclusion was that there was an UNACCEPTABLE ASSURANCE over the areas considered under the scope of the review.

The report identifies that one individual did not consistently consider: (i) The need for business cases; (ii) whether money was available in either capital and/or revenue to support spend; (iii) the requirements relating to the acceptance of gifts and hospitality; (iv) matters relating to the funding of gifts and hospitality; (v) completeness of reporting to audit committee; and (vi) compliance with policy and procedures over the use of the corporate credit card.

The report also identified that an employee's contract had been significantly modified but that this was not brought to the attention of the Sponsor Department for approval in advance of finalisation, in accordance with the terms of the Management Statement and Financial Memorandum.

Given these areas of concern the Internal Audit report concluded that there had been a '*wilful disregard*' of responsibilities by this individual.

As a response to these issues the organisation's internal financial procedures were immediately strengthened. For example, business cases now require the Accounting Officer's approval and delegated limits are also being strictly adhered to. As a result, key staff are now acutely aware of the need to ensure that procurement guidance on obtaining quotations and awarding contracts is closely followed.

Increased levels of control over the location and safe storage of the Planetarium's IT equipment were also introduced and a full IT equipment identification exercise was carried out.

On discovery, these matters were immediately brought to the attention of the former Department of Culture, Arts and Leisure, the former Department of Finance and Personnel and the Northern Ireland Audit Office. The former DCAL did not regularise these irregular expenditures and the Annual Accounts for 2015/16 were qualified as a result. The Armagh Planetarium's governance structures did not operate effectively in the 2015/16 year. Evidence has been presented that established procurement and other key procedures, including the appropriate disclosure of specific transactions to the Management and Audit and Risk Assurance Committees, were deliberately overridden by one individual.

It is important to note however that these matters were identified by other staff who promptly brought them to the attention of the Audit and Risk Committee and the Department. In this regard, it is arguable that the operation of secondary level governance controls protected the organisation.

In the months following the Management Committee, the Audit and Risk Assurance Committee and staff have worked closely with the Sponsor Department and Internal Audit to significantly increase the levels of due diligence and oversight exercised over the Planetarium's activities.

Therefore, while the effectiveness of the Planetarium's governance and reporting structure was weakened for period at the start of the 2015/16 financial year, a range of mitigating factors including the promptness of actions taken to both address and contain these areas of concern, and the likelihood of reoccurrence indicate

that the Planetarium was able to re-establish an effective governance structure and that it is currently operating to a high standard of integrity and probity.

The Armagh Observatory and Planetarium accounts for the year ended 31st March 2016 were qualified by the Controller and Auditor General to the Northern Ireland Assembly in respect of irregular spend on three contracts of £49,969. One of the contracts was for a three-year period and during the year to 31st March 2017 spend of £9,178 was incurred on this contract.

#### *Salary overpayments*

An Internal Audit review of the organisation's payroll systems identified that an ongoing misunderstanding of the annual pay settlement guidance issued by the former Department of Finance and Personnel led to some staff receiving salary overpayments. The cumulative overpayment amounted to £7,553.

Staff who were entitled to receive an annual non-consolidated payment did not receive this as a one-off payment, rather it was incorrectly added onto their gross salaries. The result was that their final pay was positioned above the top of their grade's pay-scale.

The salaries of the affected staff were immediately realigned within the correct pay-bands in the following month. The recovery of these overpayments is being undertaken in accordance with the provisions of the organisation's current Financial Memorandum. This was agreed by the Audit and Risk Committee on 24 March 2016.

Further training is being provided for staff involved in the preparation and verification of the organisation's salaries.

### **Identification of New Issues:**

#### 2016/17 Internal Audit Recommendations

An "unacceptable" assurance was provided for Procurement and Creditor Payments in relation to two high priority recommendations that management should ensure that all necessary supporting documentation is held on file and a sufficient audit trail can be evidenced. A "limited" assurance was provided for IT Security in relation to one low level recommendation that on-going and regular training should be made available and completed by all relevant staff. "Limited" assurance was also provided for Contract Management which included one high priority recommendation that all contract management activities should be detailed, held on file and made available for review when required. "Limited" assurance was also provided in relation to progress on previous recommendations. Overall a Limited Assurance was provided by Internal Audit.

#### 2016/17 NIAO Audit Recommendations

In their draft Report to Those Charged with Governance, the NIAO has qualified their opinion in relation to the existence and valuation of Heritage Assets. For the first time, Armagh Observatory and Planetarium has recognised Heritage Assets to the value of £1,191,960 in the 2016/17 Annual Report and Accounts, based on a 2010 insurance valuation report. The valuation has not been updated or the assets reviewed since that date. As a result, the NIAO were unable to obtain sufficient appropriate audit evidence to support the valuation and confirm the existence and completeness of the assets as at 31 March 2017.

Based on the initial draft 2016/17 Annual Report and Accounts submitted for audit, the NIAO has made two priority 1 recommendations in relation to the Quality of the Annual Report and Accounts and the Compliance with financial reporting standards. Both these recommendations were implemented in the final draft Annual Report and Accounts.

## 10. Conclusion

The Armagh Observatory and Planetarium has an effective governance structure and is operating to a high standard of integrity and probity.

In signing this report, I have taken assurances, where available, from the Audit and Risk Assurance Committee and I will continue to monitor the Internal Audit and Northern Ireland Audit Office recommendations to ensure that all issues are appropriately addressed.

To the best of my knowledge this report provides a fair and accurate reflection of the business of the Armagh Observatory and Planetarium and of the status of the controls and checks that have been put in place to regulate and inform the organisation's committees.

Signed:



Date: 18 September 2018

**Professor Michael Burton**  
**Accounting Officer**  
**Armagh Observatory & Planetarium**

## **Armagh Observatory and Planetarium**

### **THE CERTIFICATE AND REPORT OF THE COMPTROLLER AND AUDITOR GENERAL TO THE NORTHERN IRELAND ASSEMBLY**

#### **Opinion on financial statements**

I certify that I have audited the financial statements of the Armagh Observatory and Planetarium for the year ended 31 March 2017 under the Armagh Observatory and Planetarium (Northern Ireland) Order 1995. The financial statements comprise: the Statement of Financial Activities, the Balance Sheet, the Cash Flow Statement and the related notes. These financial statements have been prepared under the accounting policies set out within them. I have also audited the information in the Remuneration and Staff Report that is described in that report as having been audited.

In my opinion, except for the financial effect of such adjustments as may have been determined necessary had I been able to obtain sufficient and appropriate audit evidence concerning the issue outlined below in the basis of opinions paragraph, the financial statements:

- give a true and fair view of the state of Armagh Observatory and Planetarium's affairs as at 31 March 2017 and of its total incoming resources and expenditure of resources for the year then ended; and
- have been properly prepared in accordance with the Armagh Observatory and Planetarium (Northern Ireland) Order 1995 and Department for Communities directions issued thereunder.

#### **Opinion on regularity**

In my opinion, in all material respects the expenditure and income recorded in the financial statements have been applied to the purposes intended by the Assembly and the financial transactions recorded in the financial statements conform to the authorities which govern them.

#### **Basis of opinions**

Armagh Observatory and Planetarium have recognised heritage assets with a value of £1,191,960 in its financial statements as at 31 March 2017. This is based on a 2010 valuation provided for insurance purposes. Since that time Armagh Observatory and Planetarium has not sought to update the valuation. As a result I was unable to obtain sufficient, appropriate audit evidence to support the amount of £1,191,960 included on the Balance Sheet in respect of these assets and to confirm the existence and completeness of the heritage assets as at 31 March 2017.

I conducted my audit in accordance with International Standards on Auditing (UK) (ISAs) and Practice Note 10 'Audit of Financial Statements of Public Sector Entities in the United Kingdom'. My responsibilities under those standards are further described in the Auditor's responsibilities for the audit of the financial statements section of this certificate. My staff and I are independent of Armagh Observatory and Planetarium in accordance with the ethical requirements of the Financial Reporting Council's Revised Ethical Standard 2016, and have fulfilled our other ethical responsibilities in accordance with these requirements. I believe that the audit evidence obtained is sufficient and appropriate to provide a basis for my opinions.

#### **Other Information**

The Governors and the Accounting Officer are responsible for the other information included in the annual report. The other information comprises the information included in the Trustees' annual report, other than the financial statements; the parts of the Remuneration and Staff Report described in the report as having been audited; and my audit certificate and report. My opinion on the financial statements does not cover the other information and I do not express any form of assurance conclusion thereon.

In connection with my audit of the financial statements, my responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or my knowledge obtained in the audit or otherwise appears to be materially misstated. If, based on the work I have performed, I conclude that there is a material misstatement of this other information, I am required to report that fact. I have nothing to report in this regard.

#### **Opinion on other matters**

In my opinion:

- the parts of the Remuneration and Staff Report to be audited have been properly prepared in accordance with the Department for Communities directions made under the Armagh Observatory and Planetarium (Northern Ireland) Order 1995; and
- the information given in the Trustees' Annual Report for the financial year for which the financial statements are prepared is consistent with the financial statements.

### **Responsibilities of the Governors and Accounting Officer for the financial statements**

As explained more fully in the Statement of the Governors and Accounting Officer Responsibilities, the Governors and the Accounting Officer are responsible for the preparation of the financial statements and for being satisfied that they give a true and fair view.

### **Auditor's responsibilities for the audit of the financial statements**

My responsibility is to audit, certify and report on the financial statements in accordance with the Armagh Observatory and Planetarium (Northern Ireland) Order 1995.

I am required to obtain evidence about the amounts and disclosures in the financial statements sufficient to give reasonable assurance that the financial statements are free from material misstatement, whether caused by fraud or error. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

A further description of my responsibilities for the audit of the financial statements is located on the Financial Reporting Council's website [www.frc.org.uk/auditorsresponsibilities](http://www.frc.org.uk/auditorsresponsibilities). This description forms part of my certificate.

In addition, I am required to obtain evidence sufficient to give reasonable assurance that the expenditure and income recorded in the financial statements have been applied to the purposes intended by the Assembly and the financial transactions recorded in the financial statements conform to the authorities which govern them.

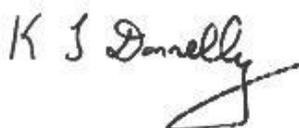
### **Matters on which I report by exception**

I have nothing to report in respect of the following matters which I report to you if, in my opinion:

- adequate accounting records have not been kept; or
- the financial statements and the parts of the Remuneration and Staff Report to be audited are not in agreement with the accounting records; or
- I have not received all of the information and explanations I require for my audit; or
- the Governance Statement does not reflect compliance with the Department of Finance's guidance.

### **Report**

Other than the information included above in the basis of opinion paragraph, I have no other observations to make on these financial statements.



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28<sup>th</sup> September 2018

## Refereed Publications: April 2016 – March 2017

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## Non-Refereed Publications: April 2016 – March 2017

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- Soffitta P., et al., 2016, in Space Telescopes and Instrumentation 2016: Ultraviolet to Gamma Ray. XIPE: the x-ray imaging polarimetry explorer. p. 990515, doi:[10.1117/12.2233046](https://doi.org/10.1117/12.2233046)
- Vink J. S., 2017, in Miroshnichenko A., Zharikov S., Korčáková D., Wolf M., eds, Astronomical Society of the Pacific Conference Series Vol. 508, The B[e] Phenomenon: Forty Years of Studies. Polarimetry as a Tool to Study Multi-Dimensional Winds and Disks. p. 151 ([arXiv:1610.00573](https://arxiv.org/abs/1610.00573))

## Seminars and Public Talks delivered April 2016 – March 2017

Date	Speaker	Title	Location	Category
07 Apr 2016	J. Sheyte	High Cadence Observations of Spicular-Type Events and Wave-Signatures Associated With Them	DKIST Community Meeting, Royal Astronomical Society, London, England	Research
08 Apr 2016	J.S. Vink	Winds from Very Massive Stars (Invited)	“Stars to Massive Stars” Meeting, University of Florida, USA	Research
11 Apr 2016	C.S. Jeffery	Early-Type Low-Mass Stars: Evolution and Pulsation. 1. The Evolved Star Zoo (Invited)	Beijing Normal University, Beijing, China	Research
13 Apr 2016	P.D. Hall	The Evolution of Binary Star Systems	Lecture Series: Early-Type Low-Mass Stars: Evolution and Pulsation, Beijing Normal University, Beijing, China	Research
14 Apr 2016	C.S. Jeffery	Heavy-Metal Stars: Crazy Composition, Puzzling Pulsation and Chaotic Kinematics (Invited)	National Astronomical Observatory of China, Beijing, China	Research
16 Apr 2016	M.E. Bailey	Small Solar System Bodies: Origins and Impacts Through Time	Midlands Astronomy Club COSMO 25, Star Party, Athlone, Co. Westmeath, Ireland	External Outreach
19 Apr 2016	C.S. Jeffery	Probing Pulsation Physics by Resolving Dynamical Structure in the Photosphere of V652 Herculis (Invited)	National Astronomical Observatory of China, Kunming, Yunnan, China	Research
21 Apr 2016	P.D. Hall	Hydrogen in Helium White Dwarf Mergers	Research Colloquium, Yunnan Observatory, Kunming, China	Research
26 Apr 2016	C.S. Jeffery	Early-Type Low-Mass Stars: Evolution and Pulsation. 3. Pulsation in Evolved Stars (Invited)	Beijing Normal University, Beijing, China	Research
27 Apr 2016	C.S. Jeffery	Early-Type Low-Mass Stars: Evolution and Pulsation. 4. Surface Abundances (Invited)	Beijing Normal University, Beijing, China	Research
12 May 2016	A. Sekhar	Impact Risks from Small Solar System Bodies	Centre for Earth Evolution and Dynamics, University of Oslo, Norway	Research
25 May 2016	D. Li	Himalia and Phoebe: Little Moons That Punch Above Their Weight	2016 DDA Meeting, Vanderbilt University, USA	Research
25 May 2016	A. Sekhar	Bombardment Rates on Terrestrial Planets: Tuning the Crater Clock	Centre for Earth Evolution and Dynamics, University of Oslo, Norway	Research
31 May 2016	J. Shetye	High Cadence Observations and Analysis of Spicular-Type Events Using CRISP Onboard SST	Solar Physics Division Meeting (SPD), Boulder, Colorado, USA	Research
01 Jun 2016	J. Shetye	High Cadence Observations and Analysis of Spicular-Type Events Using CRISP Onboard SST	Solar Physics Division Meeting (SPD), Boulder, Colorado, USA	Research
01 Jun 2016	J.S. Vink	Stellar Winds	“Bridging the Gap: from Massive Stars to Supernovae”, Royal Society Meeting, Buckinghamshire, England	Research
07 Jun 2016	A. Sekhar	General Relativistic Precession in Small Solar System Bodies	Meteoroids International Conference (organised by IAU Commission F1), ESA/ESTEC, Netherlands	Research
10 Jun 2016	A. Christou	The Exosphere of Mercury as a Detector of Encke Meteoroids		
21 Jun 2016	S. Bagnulo	WHT and VLT Polarimetry	Workshop on 67P, Seggau, Austria	Research
22 Jun 2016	M.E. Bailey	The Human Orrery: Ground-Based Astronomy for All! (Invited)	Colloquium on Body, Cognition and Knowledge, Sorbonne University, Paris, France	Research
27 Jun 2016	A. Christou	The Composition of the Eureka Family of Martian Trojan Asteroids	England National Astronomy Meeting 2016, University of Nottingham, England	Research
27 Jun 2016	J.S. Vink	Mass Loss and Stellar Winds (Invited Review)	B[e] Stars Meeting, Prague, Czech Republic	Research
28 Jun 2016	J.S. Vink	Testing the B[e] Phenomenon with Polarimetry (Invited Review)		

Date	Speaker	Title	Location	Category
15 Jul 2016	Y. Metodieva	Radio Emission from Ultracool Dwarfs	Annual Meeting of the Bulgarian Astronomical Society, Kardzhali, Bulgaria	Research
27 Jul 2016	A. Christou	The Composition of the Eureka Family of Martian Trojan Asteroids	Physics and Astronomy Department, University of Western Ontario, London, Ontario, Canada	Research
27 Jul 2016	P.D. Hall	Hydrogen in Helium White Dwarf Mergers	Binary Stars in Cambridge 2016, Institute of Astronomy, University of Cambridge, England	Research
27 Jul 2016	C.S. Jeffery	Observational Evidence for Merging Binary Stars (Invited)		
01 Aug 2016	J.S. Vink	Lectures on Model Atmospheres	Summer School Rencontre de Vietnam, Vietnam	Research
08 Aug 2016	J.S. Vink	Wind Models (Invited Review)	“Blowing in the Wind” Meeting, Vietnam	Research
12 Aug 2016	M.E. Bailey	Introduction to the Perseid Meteors and What We Might See Tonight (Invited Intergenerational Talk)	Colin Neighbourhood Partnership Allotments, Poleglass, Belfast Co. Antrim	External Outreach
01 Sep 2016	M.E. Bailey	The Origin of Comets: Persistent Puzzles Through Time (Invited)	STFC Introductory Solar System Plasmas Summer School, University of St. Andrews, Scotland	Research
02 Sep 2016	M. Burton	Multi-Wavelength Astronomy and the Orion Nebula	Astrobytes, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
05 Sep 2016	M.E. Bailey	The Origin of Comets: Problems and Persistent Puzzles Through Time	Orkney International Science Festival 2016, Kirkwall, Orkney, Scotland	External Outreach
06 Sep 2016	M.E. Bailey	Ancient Stones and Comets: Developing the Giant-Comet Hypothesis		
07 Sep 2016	J.S. Vink	Mass Loss Across the HRD (Invited)	BridgeC Meeting, Keele University, England	Research
08 Sep 2016	M. Burton	The Mopra Southern Galactic Plane Survey: Why the CTA Needs It	Irish National Astronomy Meeting, University College Dublin, Ireland	Research
08 Sep 2016	J.S. Vink	Massive Stars with VLT-Flames and Future Multi-Object Instruments		
09 Sep 2016	R. Nezić	Cometary Dust Particles and Polarised Light - A Modelling Perspective		
15 Sep 2016	C.S. Jeffery	Pulsation in the Chemically Peculiar Hot Star Zoo	STARS 2016, Understanding the Roles of Rotation, Pulsation and Chemical Peculiarities in the Upper Main Sequence’, Lake District, England	Research
20 Sep 2016	G. Ramsay	Vampire Stars	Astrobytes, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
21 Sep 2016	A. Christou	Examining a Collisional Origin for the Eureka Family	STFC Project Meeting, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Research
22 Sep 2016	D.J. Asher	Bombardment Episodes and Meteor Storms (Invited)	University of Oslo, Norway	Research
27 Sep 2016	C.S. Jeffery	Discovery of a Pulsating Lead-Rich Hot Subdwarf: UVO 0825+15	Seminar, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Research
30 Sep 2016	C.S. Jeffery	Meet the Heavy Metal Stars	Science Uncovered Event, Ulster Museum, Belfast, Co. Antrim	External Outreach
30 Sep 2016	J.S. Vink	Black Holes from Massive Stars	Science Uncovered Event, Ulster Museum, Belfast, Co. Antrim	External Outreach
04 Oct 2016	Y. Metodieva	Space Week	Planetarium Space Week Event, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
04 Oct 2016	Y. Metodieva	Astronomy – It’s Above You!		
07 Oct 2016	C.S. Jeffery	A Few Short Words for Another Day	Millennium Court Arts Centre, Portadown, Co. Armagh	External Outreach
15 Oct 2016	M.E. Bailey	Introduction to ‘aroundNorth’ and Beaghmore Stone Circles	Beaghmore Stone Circles, Co. Tyrone	External Outreach
18 Oct 2016	A. Christou	Exomars TGO Orbiter/Schiaparelli Lander. Arrive Mars 19 Oct!	Astrobytes, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
19 Oct 2016	A. Sakhar	Extrasolar Planets: Orbital Dynamics Oral Session (Chair)	Division of Planetary Sciences, European Planetary Science Congress	Research

<b>Date</b>	<b>Speaker</b>	<b>Title</b>	<b>Location</b>	<b>Category</b>
19 Oct 2016	A. Sekhar	Extrasolar Planets and Systems: Orbital Dynamics Poster Session (Chair)	Joint Meeting, Pasadena, CA, USA	
25 Oct 2016	M. Burton	Australian Radio Telescopes and the CTA	CTA Consortium Meeting, Bologna, Italy	Research
27 Oct 2016	M.E. Bailey	The Return to Cosmology (Discussion)	“Gerard McCartan: A Life in Science Communication”, Armagh Natural History and Philosophical Society Event, Armagh, Co. Armagh	External Outreach
28 Oct 2016	M.E. Bailey	Earth’s Place in Space: Discovering Humanity’s Shared Celestial Heritage	Millennium Court Arts Centre, Portadown, Co. Armagh	External Outreach
01 Nov 2016	M. Burton	The Armagh Observatory and Planetarium Science Vision	Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
01 Nov 2016	J.S. Vink	Black Holes from Massive Stars	Astrobytes, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
02 Nov 2016	M. Burton	Dark Molecular Gas and the Mopra CO Survey of the Southern Galactic Plane: Terahertz Imaging from Antarctica	University of Warwick, England	Research
04 Nov 2016	M. Burton	Formation Pumping of Molecular Hydrogen: The Shocking Story of H <sub>2</sub>	University of Edinburgh, Scotland	Research
08 Nov 2016	M. Burton	Formation Pumping of Molecular Hydrogen: The Shocking Story of H <sub>2</sub>	Seminar, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Research
09 Nov 2016	M.E. Bailey	Earth, Moon, Sun and Stars: An Introduction to Astronomy	1st Ballygawley Beavers and Cubs, Errigle Kerog Community Church Hall, Ballinasaggart, Ballygawley, Co. Tyrone	External Outreach
11 Nov 2016	A. Christou	Trojan Asteroids of the Earth and Mars	German Aerospace Centre, Berlin, Germany	Research
15 Nov 2016	S. Bagnulo	Polarimetry of Planet Earth	Astrobytes, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
15 Nov 2016	M. Burton	The Astronomy Photographer of the Year, 2015	Planetarium Open Evening, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
15 Nov 2016	P. Martin	Exploring the Universe with State-of-the-Art Space Telescopes		
21 Nov 2016	G. Ramsay	Cataclysmic Variables - Probes of Accretion Physics (Invited)	‘Exploring the X-ray Transient and Variable Sky’, EXTraS Workshop, Pavia, Italy	Research
23 Nov 2016	C.J. Butler	Is There Life in Outer Space?	County Armagh Wildlife Society, Armagh, Co. Armagh	External Outreach
29 Nov 2016	D.J. Asher	Meteors	Astrobytes, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
02 Dec 2016	J.S. Vink	The VLT-Flames Tarantula Survey (Invited Review)	The Lives and Death Throes of Massive Stars, IAU Symposia 329, Auckland, New Zealand	Research
05 Dec 2016	D.J. Asher	Did the Ancient Maya Observe Meteor Storms?	Northern Ireland Amateur Astronomy Society, Ballyclare, Co. Antrim	External Outreach
06 Dec 2016	M. Burton	The Cherenkov Telescope Array and Mopra	School of Physics and Chemistry, University of Liverpool, England	Research
06 Dec 2016	C. Byrne	Twinkle Twinkle Little Star: The Exciting Lives of Stars	Planetarium Open Evening, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
06 Dec 2016	G. Ramsay	Cataclysmic Variables: Probes of Accretion Physics	Seminar, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Research
07 Dec 2016	M. Burton	Formation Pumping of Molecular Hydrogen: The Shocking Story of H <sub>2</sub>	School of Physics, University of Leeds, England	Research
08 Dec 2016	C.S. Jeffery	The Pulsating Heavy-Metal Stars	Argelander Institute for Astronomy, Bonn, Germany	Research
09 Dec 2016	M. Burton	Formation Pumping of Molecular Hydrogen: The Shocking Story of H <sub>2</sub>	School of Physics, University of Oxford, England	Research
13 Dec 2016	J.G. Doyle	High Resolution Images of the Sun in the Chromosphere and Corona	Astrobytes, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach

<b>Date</b>	<b>Speaker</b>	<b>Title</b>	<b>Location</b>	<b>Category</b>
15 Dec 2016	C.S. Jeffery	The Pulsating Heavy-Metal Stars	Dr. Remeis Sternwarte, Bamberg, Germany	Research
04 Jan 2017	M. Burton	Explorers of the Galaxy: Mapping the Molecular Gas of the Milky Way	Irish Astronomical Association, Queen's University, Belfast, Co. Antrim	External Outreach
09 Jan 2017	M.E. Bailey	Ancient Stones and Comets: Developing the Giant-Comet Hypothesis	Coleraine U3A, Agherton Parish Centre, Portstewart, Co. Antrim	External Outreach
10 Jan 2017	M. Burton	The Astronomy Photographer of the Year, 2016	Planetarium Open Evening, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
10 Jan 2017	L. Doyle	The Sun		
11 Jan 2017	S. Bagnulo	Polarimetry of Planet Earth and Other Bodies of Our Solar System	Universidad de Chile, Chile	Research
18 Jan 2017	S. Bagnulo	Polarimetric Calibration and Accuracy: Lessons Learnt From Previous Instrumentation (Invited)	European Southern Observatory, Chile	Research
27 Jan 2017	S. Bagnulo	Transient Polarimetry Research	CTA Workshop, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Research
27 Jan 2017	M. Burton	The Mopra Southern Galactic Plane CO Survey and the CTA		
28 Jan 2017	D.J. Asher	A Maya Adventure in Historical Astronomy	Galway Astrofest 2017, Galway, Ireland	External Outreach
01 Feb 2017	J.G. Doyle	QPPs in M Dwarfs Flares as seen by GALEX	International Space Science Institute, Bern, Switzerland	Research
08 Feb 2017	C.J. Butler	The Transit of Venus in 1769, Captain Cook, Charles Mason and Donegal	Belfast Natural History and Philosophical Society, Belfast, Co. Antrim	External Outreach
21 Feb 2017	P.D. Hall	Binary Stars	Planetarium Open Evening, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
24 Feb 2017	Y. Metodieva	What's in the Sky?	Women in STEM Event, Belfast Metropolitan College, Belfast, Co. Antrim	External Outreach
28 Feb 2017	C.S. Jeffery	Heavy Metals	Astrobytes, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
03 Mar 2017	D.J. Asher	The Formation of the Solar System, Comets, Asteroids and Meteorites	Red Shift - The Cosmic Yard Stick, Physics Teacher Training Workshop, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
03 Mar 2017	M. Burton	Galaxies and Redshift: A Journey from Earth to the Big Bang		
03 Mar 2017	C.S. Jeffery	Red Shift		
03 Mar 2017	J.S. Vink	Cosmic History: Big Bang to Black Holes		
07 Mar 2017	Y. Metodieva	Planets Around Other Suns	Planetarium Open Evening, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
08 Mar 2017	C.J. Butler	Armagh Observatory in Four Centuries	Armagh and District History Group, Armagh, Co. Armagh	External Outreach
09 Mar 2017	J.S. Vink	The Most Massive Stars in the Universe (Invited)	Mullard Space Science Laboratory, England	Research
10 Mar 2017	J.S. Vink	LSST Colours of Luminous Blue Variables	Royal Astronomical Society, London, England	Research
14 Mar 2017	M. Burton	Molecules in Space	Astrobytes, Armagh Observatory and Planetarium, Armagh, Co. Armagh	Internal Outreach
17 Mar 2017	M. Burton	Discovering Stars, Our Milky Way and Our Place in Space	St. Patrick's Day Lecture, The Studio Theatre, The Market Place, Armagh, Co. Armagh	External Outreach
24 Mar 2017	R. Nezić	Polarimetric Observations of Comet 67P/Churyumov-Gerasimenko and Preliminary Modelling Results	16th Electromagnetic and Light Scattering Conference, University of Maryland, College Park, USA	Research

## Armagh Observatory and Planetarium

### Statement of Financial Activities for the year ended 31 March 2017

		Unrestricted funds 2017	Restricted funds 2017	<b>Total funds 2017</b>	Unrestricted funds 2016 (combined)	Restricted funds 2016 (combined)	<b>Total funds 2016 (combined and restated)</b>
	Notes	£	£	£	£	£	£
<b>Income from:</b>							
Charitable Activities	2	1,646,384	685,755	<b>2,332,139</b>	1,686,197	730,617	<b>2,416,814</b>
Other Trading activities	4	89,475	-	<b>89,475</b>	89,919	-	<b>89,919</b>
<b>Total incoming resources</b>		<b>1,735,859</b>	<b>685,755</b>	<b>2,421,614</b>	<b>1,776,116</b>	<b>730,617</b>	<b>2,506,733</b>
<b>Expenditure on:</b>							
Charitable activities	5	2,031,718	424,813	<b>2,456,531</b>	2,085,463	472,253	<b>2,557,716</b>
Trading activities	7	38,668	-	<b>38,668</b>	42,875	-	<b>42,875</b>
<b>Total Expenditure</b>		<b>2,070,386</b>	<b>424,813</b>	<b>2,495,199</b>	<b>2,128,338</b>	<b>472,253</b>	<b>2,600,591</b>
<b>Net Income (Expenditure)</b>		<b>(334,527)</b>	<b>260,942</b>	<b>(73,585)</b>	<b>(352,222)</b>	<b>258,364</b>	<b>(93,858)</b>
<b>Transfers between funds</b>	16	277,880	(277,880)	-	231,601	(231,601)	-
<b>Other Recognised Gains/(losses):</b>							
Gains (losses) on the revaluation of Fixed Assets	11	810,105	-	<b>810,105</b>	-	-	-
Gains (losses) on the revaluation of Heritage Assets	12	1,191,960	-	<b>1,191,960</b>	-	-	-
Actuarial gains/(losses) on defined scheme	20	(667,026)	-	<b>(667,026)</b>	404,000	-	<b>404,000</b>
<b>Net Movement in Funds</b>		<b>1,278,392</b>	<b>(16,938)</b>	<b>1,261,454</b>	<b>283,379</b>	<b>26,763</b>	<b>310,142</b>
<b>Reconciliation of funds</b>							
Total funds brought forward at 1 April 2016		6,241,687	188,845	<b>6,430,532</b>	5,958,308	162,082	<b>6,120,390</b>
<b>Total funds carried forward at 31 March 2017</b>		<b>7,520,079</b>	<b>171,907</b>	<b>7,691,986</b>	<b>6,241,687</b>	<b>188,845</b>	<b>6,430,532</b>

All amounts above relate to continuing operations of the organisation.

The notes on pages 49 to 62 form part of the financial statements.

## Armagh Observatory and Planetarium

### Balance Sheet as at 31 March 2017

		2017	2016 (combined and restated)
		£	£
<b>Fixed Assets</b>			
Tangible assets	11	7,875,119	7,144,267
Heritage Assets	12	1,191,960	-
<b>Total Fixed Assets</b>		<b>9,067,079</b>	<b>7,144,267</b>
<b>Current assets</b>			
Inventories	13	7,946	10,186
Debtors	14	103,628	221,459
Cash at bank and in hand	19	486,805	368,728
		598,379	600,373
<b>Creditors: amounts falling due within one year</b>	15	(407,472)	(403,108)
<b>Net current assets</b>		<b>190,907</b>	<b>197,265</b>
<b>Total assets less current liabilities</b>		<b>9,257,986</b>	<b>7,341,532</b>
<b>Creditors: amounts falling due after more than one year</b>		-	-
<b>Net assets excluding pension liability</b>		<b>9,257,986</b>	<b>7,341,532</b>
<b>Defined benefit pension scheme liability</b>	20	(1,566,000)	(911,000)
<b>Net assets</b>		<b>7,691,986</b>	<b>6,430,532</b>
<b>Funds</b>			
Restricted funds	16	171,907	188,845
Unrestricted funds	16	2,822,494	2,891,167
Revaluation Reserve	16	6,263,585	4,261,520
Pension Reserve	16	(1,566,000)	(911,000)
<b>Total Charity Funds</b>	<b>16</b>	<b>7,691,986</b>	<b>6,430,532</b>

The notes on pages 49 to 62 form part of these financial statements.

The financial statements on pages 46 to 62 were approved by the Board of Trustees of Armagh Observatory and Planetarium on 18 September 2018 and were signed on its behalf by:

*Richard Armagh*

Chair of the Board of Trustees

*M. C. B.*

Accounting Officer

## Armagh Observatory and Planetarium

### Cash flow statement for the year ended 31 March 2017

	Note	2017 £	2016 (combined and restated) £
<b>Net cashflow from operating activities</b>	18	327,176	317,049
<b>Cashflows from investing activities</b>			
Interest received		33	46
Proceeds from sale of assets		60	690
Purchase of tangible fixed assets		(209,194)	(173,237)
		(209,101)	(172,501)
<b>Increase in cash and cash equivalents</b>		118,076	144,548

### Reconciliation of net cashflow to movement in net cash funds

		2017 £	2016 (combined and restated) £
<b>Increase in cash and cash equivalents in the year</b>		118,076	144,548
Cash and cash equivalents at 1 April 2016		368,728	224,180
<b>Cash and cash equivalents at 31 March 2017</b>	19	486,804	368,728

Further detail is reported in note 19

The notes on pages 49 to 62 form part of the financial statements.

# Armagh Observatory and Planetarium

## Notes to the financial statements for the year ended 31 March 2017

### 1 Summary of significant accounting policies

#### (a) Basis of Accounting

Armagh Observatory and Armagh Planetarium merged on 1 April 2016 to form Armagh Observatory and Planetarium. The financial statements for the year ended 31 March 2017 are the first financial statements for the merged organisation. The financial statements have been prepared under direction issued by DfC, in particular the requirement to recognise grant in aid received from them on a cash basis in order to present a true and fair view of Government funding. In 2016 and 2017 grant aid for VES was accrued in the year in which the expenditure was incurred, this funding was sourced from DfC. Following restructuring of the NICS department on 9 May 2016, the funding department for Armagh Observatory Planetarium became the Department for Communities DfC. With the exception of this departure from the SORP, in all other aspects the financial statements comply with the Statement of Recommended Practice applicable to charities preparing their accounts in accordance with the Financial Reporting Standard applicable in the UK and Republic of Ireland (FRS102) (Charities SORP (FRS102)).

The Trustees of Armagh Observatory and Planetarium confirm that they have complied with their duty to have regard to the guidance on Public Benefit produced by the Charities Commission of Northern Ireland under section 4(b) of the Charities Act (the public benefit requirement statutory guidance) and that this has informed the activities of the organisation in the year to 31 March 2017.

The Trustees are satisfied that the organisation is a going concern on the basis that it has a reasonable expectation that it will continue in operation for the foreseeable future. The financial statements are therefore prepared on a going concern basis.

#### (b) Merger Accounting and adjustments to prior year results

On the 1st April 2016 two registered charities The Armagh Observatory Charity Registration XN 46022 and The Armagh Planetarium Charity Registration XN 48022 merged to form a new charity Armagh Observatory and Planetarium Charity Registration NIC 103948. The accounts of the two charities were combined to form the comparative figures for 2016 removing any inter company balances. In combining the two sets of accounts some inconsistencies with The Charities Statement of Recommended Practice (SORP)(FRS102) and the Government Financial Manual (FREM) were corrected which resulted in some changes in the presentation of financial transactions and a restatement of results for 2016 from the Accounts previously published. The 2017 Accounts comply with SORP and FREM. The changes are as follows:

##### i) Grant Income

Grant income in the Statement of Financial Activities (SOFA) are now reported as charitable income, previously reported as donations.

##### ii) Rental Income

Rental income is now reported as charitable income, previously reported as investment income.

##### iii) Shop Income and Expenditure

Shop income and expenditure is now reported under trading, previously reported as charitable activities.

##### iv) Expenditure Reporting

Expenditure reporting in the notes to accounts is classified under four segments Research, Education, Governance and Support and Trading and further classified under staff costs, direct costs, support costs and depreciation.

##### v) Funds Reporting SOFA

The SOFA now reports all movements in funds and the reconciliation of funds now reconciles to total charity funds in the balance sheet.

##### vi) Statement of Funds

The presentation of the statement of funds now reports the value of all funds and reconciles to the SOFA and balance sheet.

##### vii) Capital Expenditure and Capital Grant Financing

Capital expenditure is no longer reported in the SOFA. Capital grants are reported in the SOFA and recorded in a reserve, Government grant for fixed assets is released as the asset is used by means of a transfer between funds.

##### viii) Deferred Income and Grants

Certain revenue income and grants which did not strictly meet the definition of a liability were previously reported as a creditor within current liabilities. These are now currently treated as income and recognised as a restricted fund within the statement of funds in the balance sheet. The impact of this change was that 2016 creditors reduced and restricted funds increased by £154,789.

# Armagh Observatory and Planetarium

## Notes to the financial statements for the year ended 31 March 2017 (continued)

### 1 Accounting policies (continued)

#### (c) Incoming Resources

Grant income from Department for Communities is shown in the Statement of Financial Activities in the year in which it is received. Grants that relate to specific capital expenditure are initially recognised in the SOFA and transferred to a restricted fund, Government Grant for fixed assets, where no restriction on the use of the assets exists the value is transferred to an unrestricted fund. Grants that relate to specific research projects are recognised in the Statement of Financial Activities and transferred to a restricted fund, once the relevant conditions for recognition (entitlement and certainty of value) have been met they are transferred to funds to match the relevant expenditure. Other grants are credited to the Statement of Financial Activities when received.

#### (d) Resources Expended

Resources expended are accounted for on an accruals basis. Expenditure is classified under principal charitable activities, Research, Education and Corporate & Administration.

#### (e) Pension scheme

The organisation provides pension benefits to its employees by participating in the Local Government Pension Scheme for Northern Ireland, administered by Northern Ireland Local Government Officers' Superannuation Committee (NILGOSC), which is a defined benefit scheme. Annual contributions to the NILGOSC scheme are based on actuarial advice. The operating costs of providing retirement benefits to the organisation's employees are recognised in accounting periods in which the benefits are earned by employees, and the related finance costs and other changes in value of the assets and liabilities are recognised in the period in which they arise.

#### (f) Tangible fixed assets

The cost of tangible fixed assets is their purchase cost or valuation together with any incidental costs of acquisition. Depreciation is calculated so as to write off the cost or valuation of tangible fixed assets, less their estimated residual values, on a straight-line basis over the expected useful economic lives of the assets concerned. Land is not depreciated.

The principal annual depreciation rates used are as follows:

	%
Digistar	10
Furniture and fittings	2 - 15
Office equipment	10 - 25
Scientific equipment and other equipment	10 - 25
Buildings	Remaining Asset Life as valued
Astropark	2 - 5
Exhibits and grounds	6 - 25
Motor Vehicles	25

The Trustees have assessed the small number of long-life fixed assets which have not been revalued, and do not consider it appropriate to carry out an annual indexation exercise on grounds of immateriality.

Land and buildings are included in the balance sheet at depreciated replacement cost, estimated value in use or market value. Land and Buildings are professionally revalued every 5 years in accordance with accounting guidance. Land and Buildings were revalued as at the 31st March 2017 recording a gain on revaluation of £250,245, the depreciation to date amounted to £559,860 which was transferred to the revaluation reserve. The net increase in the value of assets following revaluation is £810,105. Revaluation gains (losses) net of accrued depreciation are transferred to a revaluation reserve. Land and buildings in years where no revaluation occurs are restated using indices.

Land and Buildings were revalued by Land and Property Services (LPS). The valuations were prepared by LPS in accordance with the RICS Valuation Standards, insofar as these are consistent with the requirements of the Client. The valuations were undertaken having regard to International Financial Reporting Standards (IFRS) as applied to the United Kingdom public sector and in accordance with HM Treasury guidance, International Valuation Standards and the requirements of the Royal Institution of Chartered Surveyors Valuation – Professional Standards.

#### (g) Heritage Assets

Armagh Observatory was founded in 1789 and from this date the Observatory has collected through its operations scientific items, books, furniture and other artefacts which would be considered heritage assets. It is not the policy of Armagh Observatory and Planetarium to acquire heritage assets but has collected such assets through donations and operations. These assets were not previously recorded on the Balance Sheet. In 2017 these assets have been included on the Balance Sheet at the 2010 insurance valuation of £1,191,960 categorised as follows:

Books	£297,180
Clocks	£380,300
Scientific Instruments	£488,300
Furniture, Artworks etc.	£26,180

Assets are recorded in catalogues and on databases. The assets are valued for insurance purposes with reference to auction estimates for replacement. Included within operational assets are historic buildings which have heritage value. These were included within the recent property revaluation as operational assets and continue to be used for operational purposes.

## Armagh Observatory and Planetarium

### Notes to the financial statements for the year ended 31 March 2017 (continued)

#### 1 Accounting policies (continued)

##### (h) Inventories

Inventories are stated at the lower of cost and net realisable value. In general, cost is determined on a first in first out basis. Provision is made where necessary for obsolete, slow moving and defective inventories.

##### (i) Debtors

Debtors comprise amounts due from customers, grants due, prepayments made and value added tax.

##### (j) Cash at bank and in hand

Cash held in bank accounts payable on demand and cash floats.

##### (k) Creditors

Creditors comprises payments due to suppliers and accruals for amounts due at the year end.

##### (l) Fund accounting

The organisation has various types of funds for which it is responsible, and which require separate disclosure. These are as follows:

###### Restricted funds

Grants or donations received which are earmarked by the donor for specific purposes. Such purposes are within the overall aims of the organisation.

###### Unrestricted funds

Funds which are expendable at the discretion of the trustees in furtherance of the objectives of the organisation. In addition to expenditure on the provision of services, such funds may be held in order to finance capital investment and working capital.

Government grant fund - this fund represents the value of grants received to finance expenditure on assets, namely land and buildings, exhibits and grounds, astropark, equipment and historic telescopes, fixtures, equipment and motor vehicles. The fund is reduced annually by the value of depreciation charged on the related assets.

Designated funds - Donated assets fund and Government grants fund represent the capital financing of the Charity's assets and are released in line with depreciation policy. Donated assets are the buildings and grounds donated to the organisation in 1790 by its founder Archbishop Richard Robinson.

Undesignated funds - These represent the revaluation reserve which records the movement from the revaluation of Charity assets. They also include a pension reserve which matches the long term liability of an underfunded defined benefits pension scheme.

##### (m) Reserves policy

The Armagh Observatory and Planetarium adopts a risk-based approach to establishing a sound system of control covering all types of risks to the aims and objectives of the organisation. There is a need to retain a sufficient level of unrestricted cash reserves to meet the risks associated with financial contingencies, uncertainties and demands.

Armagh Observatory and Planetarium forecasts to operate on an annual basis within a balanced funding formula of grant in aid and self generated income. Annual operating surpluses (deficits) are kept to a minimum and are transferred to an unrestricted general reserve at 31st March each year. The level of unrestricted general fund at 31 March 2017 was £34,719 (£24,141 at 31 March 2016). The policy is reviewed on an annual basis.

The reserves are held in a short-term bank deposit account within the NICS banking arrangements, with any interest earned being used to fund operating costs.

## Armagh Observatory and Planetarium

### Notes to the financial statements for the year ended 31 March 2017 (continued)

#### 2 Income from Charitable Activities

		Unrestricted funds 2017	Restricted funds 2017	Total funds 2017	Total funds 2016 (combined and restated)
		£	£	£	£
<b>Grant - In Aid from the DfC</b>					
DfC Recurrent grant-in-aid		1,498,004	-	1,498,004	1,528,000
DfC VES grant-in-aid		-	188,000	188,000	108,012
DfC In-year capital grant-in-aid		-	173,237	173,237	200,000
<b>Total grant-in-aid from the DfC</b>		<b>1,498,004</b>	<b>361,237</b>	<b>1,859,241</b>	<b>1,836,012</b>
Income from other grants and receipts	3	1,530	324,518	326,048	422,605
<b>Total Grant Income</b>		<b>1,499,534</b>	<b>685,755</b>	<b>2,185,289</b>	<b>2,258,617</b>
<b>Operating Income</b>					
Admissions		140,602	-	140,602	142,864
Outreach income		3,475	-	3,475	492
Miscellaneous income		2,773	-	2,773	14,841
<b>Total Operating Income</b>		<b>146,850</b>	<b>-</b>	<b>146,850</b>	<b>158,197</b>
<b>Total Income from Charitable Activities</b>		<b>1,646,384</b>	<b>685,755</b>	<b>2,332,139</b>	<b>2,416,814</b>

#### 3 Other revenue grants and receipts

		Unrestricted funds 2017	Restricted funds 2017	Total funds 2017	Total funds 2016 (combined)
	Note	£	£	£	£
STFC Research, Visitor and Travel grants		-	269,615	269,615	341,566
STFC Capital grant income		-	9,194	9,194	-
Lindsay Scholar		-	21,349	21,349	-
Leverhulme Trust		-	22,565	22,565	69,358
Leverhulme Artist-in-Residence		-	-	-	1,481
Around North Project		-	995	995	4,500
Royal Society		-	800	800	5,700
ASDC-STFC World Space Week		902	-	902	-
Titan - TBUC Event		150	-	150	-
Sundry donations		478	-	478	-
<b>Total other grants and receipts</b>	2	<b>1,530</b>	<b>324,518</b>	<b>326,048</b>	<b>422,605</b>

#### 4 Income from other trading activities

	Unrestricted funds 2017	Restricted funds 2017	Total funds 2017	Total funds 2016 (combined and restated)
	£	£	£	£
Shop Income	71,762	-	71,762	75,377
Rental income	17,713	-	17,713	14,542
<b>Total Income from other trading</b>	<b>89,475</b>	<b>-</b>	<b>89,475</b>	<b>89,919</b>

## Armagh Observatory and Planetarium

### Notes to the financial statements for the year ended 31 March 2017 (continued)

#### 5 Expenditure on charitable activities

		Unrestricted funds 2017	Restricted funds 2017	Total funds 2017	Total funds 2016 (combined and restated)
	Note	£	£	£	£
Research	6	801,478	424,813	1,226,291	1,542,431
Education	6	722,558	-	722,558	722,684
Corporate and Administration	6	507,682	-	507,682	292,601
		2,031,718	424,813	2,456,531	2,557,716

#### 6 Expenditure on charitable activities

		Unrestricted funds 2017	Restricted funds 2017	Total funds 2017	Total funds 2016 (combined and restated)
		£	£	£	£
<b>Research</b>					
Staff Costs		396,630	309,217	705,847	890,016
Direct Costs		215,515	113,832	329,347	475,029
Support Costs		55,176	1,764	56,940	64,371
Depreciation		134,157	-	134,157	113,015
		<b>801,478</b>	<b>424,813</b>	<b>1,226,291</b>	<b>1,542,431</b>
<b>Educational</b>					
Staff Costs		351,726	-	351,726	317,768
Direct Costs		51,769	-	51,769	173,821
Support Costs		164,773	-	164,773	85,327
Depreciation		154,290	-	154,290	145,768
		<b>722,558</b>	<b>-</b>	<b>722,558</b>	<b>722,684</b>
<b>Corporate and Administration</b>					
Staff Costs		360,195	-	360,195	224,344
Direct Costs	8	133,251	-	133,251	62,858
Support Costs		14,236	-	14,236	5,399
		<b>507,682</b>	<b>-</b>	<b>507,682</b>	<b>292,601</b>

#### 7 Expenditure on other trading activities

		Unrestricted funds 2017	Restricted funds 2017	Total funds 2017	Total funds 2016 (combined and restated)
		£	£	£	£
<b>Trading</b>					
Direct Costs		38,668	-	38,668	42,875
		<b>38,668</b>	<b>-</b>	<b>38,668</b>	<b>42,875</b>

#### 8 Analysis of governance costs

Included within Corporate and Administrative costs are the following governance costs

		Unrestricted funds 2017	Restricted funds 2017	Total funds 2017	Total funds 2016 (combined and restated)
		£	£	£	£
Management Committee expenses		6,575	-	6,575	4,560
Audit		28,245	-	28,245	29,295
		<b>34,820</b>	<b>-</b>	<b>34,820</b>	<b>33,855</b>

## Armagh Observatory and Planetarium

### Notes to the financial statements for the year ended 31 March 2017 (continued)

#### 9 Average staff numbers and related costs

	2017	2016 (combined and restated)
	Number	Number
Permanent staff	19.7	21.0
Fixed-term contract staff	4.2	4.2
Agency staff	2.4	2.5
	26.3	27.7

The number of employees whose employee benefits (excluding employer pension costs) exceeded £60,000 was:

	2017	2016 (combined and restated)
	Number	Number
£70,001 - £80,000	2	-
£120,001 - £130,000	1	-
£170,001 - £180,000	-	1

The key management personnel of the organisation comprise the trustees and the executive director.

The total amount of employee benefits (including employer pension contributions) received by key management personnel for their services to the organisation was £80,507 (2016: £209,503).

There was no remuneration paid to trustees during the year (2016: nil). Travel and subsistence expenses totalling £673 was reimbursed to 2 trustees (2016: £721 to 4 trustees).

	2017	2016 (combined and restated)
	£	£
	Note	
<b>Permanent staff</b>		
Wages and salaries	712,488	786,676
Social security costs	77,194	64,796
Employer's pension contributions	143,768	150,625
Additional defined benefit pension service cost	12,000	56,058
Termination costs	193,714	108,016
	1,139,164	1,166,171
<b>Fixed-term contract staff costs</b>		
Wages and salaries	144,233	161,083
Social security costs	9,799	12,662
Employer's pension contributions	15,856	21,317
Termination costs	2,250	-
	172,138	195,062

#### 10 Average staff numbers and related costs (continued)

	2017	2016 (combined and restated)
	£	£
	Note	
<b>Total permanent and fixed-term contract staff</b>		
Wages and salaries	856,721	947,759
Social security costs	86,993	77,458
Employer's pension contributions	20 159,624	171,942
Additional defined benefit pension service cost	20 12,000	56,058
Termination costs	195,964	108,016
	1,311,302	1,361,233
Agency staff costs	106,467	82,087
<b>Total staff costs</b>	1,417,769	1,443,320

The pension service cost of £12,000 is the actuarial present value of pension benefits earned by staff during the year. Termination costs relate to compensation under the terms of the voluntary exit scheme.

#### Average student numbers and related costs

	2017	2016 (combined and restated)
	Number	Number
PhD students	10	10
	£	£
Student maintenance grants & stipends	140,733	135,741

## Armagh Observatory and Planetarium

### Notes to the financial statements for the year ended 31 March 2017 (continued)

#### 11 Tangible fixed assets

	Freehold Land & buildings £	Exhibits grounds and Astropark £	Digistar Projection System £	Observatory Equipment & Historic telescopes £	Other Equipment & Vehicles £	Total £
<b>Cost or valuation</b>						
At 1 April 2016	6,876,854	556,194	1,200,332	957,795	590,522	10,181,697
Asset Reclassification	71,999				(71,999)	-
Asset revaluation	250,245	-	-	-	-	250,245
Additions	94,112	-	-	43,382	71,700	209,194
Disposals	-	-	-	(67,129)	(76,181)	(143,310)
<b>At 31 March 2017</b>	<b>7,293,210</b>	<b>556,194</b>	<b>1,200,332</b>	<b>934,048</b>	<b>514,042</b>	<b>10,497,826</b>
<b>Depreciation</b>						
At 1 April 2016	423,562	492,783	1,046,017	631,681	443,387	3,037,430
Asset Reclassification	13,795				(13,795)	-
Adjustment for asset revaluation	(559,860)	-	-	-	-	(559,860)
Charge for year	122,503	14,079	29,428	72,840	49,597	288,447
Disposals	-	-	-	(67,129)	(76,181)	(143,310)
<b>At 31 March 2017</b>	<b>-</b>	<b>506,862</b>	<b>1,075,445</b>	<b>637,392</b>	<b>403,008</b>	<b>2,622,707</b>
<b>Net book value</b>						
<b>At 31 March 2017</b>	<b>7,293,210</b>	<b>49,332</b>	<b>124,887</b>	<b>296,656</b>	<b>111,034</b>	<b>7,875,119</b>
<b>At 31 March 2016</b>	<b>6,453,292</b>	<b>63,411</b>	<b>154,315</b>	<b>326,114</b>	<b>147,135</b>	<b>7,144,267</b>

#### 11 Tangible fixed assets (continued)

Tangible fixed asset additions of £209,194 as shown above were funded as follows:

	£
DfC In-year capital grant-in-aid	173,237
STFC Capital grant income	9,194
Brought forward reserve	26,763
	<b>209,194</b>

If the land and buildings had not been valued, they would have been included at the following amounts:

	2017 £	2016 (combined and restated) £
Cost	2,066,573	2,066,573
Aggregate depreciation	(832,370)	(791,316)
<b>Net book value based on historic cost</b>	<b>1,234,203</b>	<b>1,275,257</b>

Depreciation on fixed assets for the year was £288,447 (2016: £258,783).

Land and buildings include grounds and buildings with a net book value of £1,838,725 at 31 March 2017 which were donated to the organisation in 1790 by Archbishop Richard Robinson, the founder of the organisation (31 March 2016: £1,766,531).

Armagh Observatory and Planetarium includes in fixed assets any expenditure over £1,500 (on an item or group of related items) which is expected to be used for more than a year.

## Armagh Observatory and Planetarium

### Notes to the financial statements for the year ended 31 March 2017 (continued)

#### 12 Heritage Assets

	Books	Furniture & Artworks	Clocks & Scientific Equipment	Total
<b>Cost Valuation 1 April 2016</b>	-	-	-	-
Additions	-	-	-	-
Disposals	-	-	-	-
Depreciation Impairment	-	-	-	-
Revaluation	297,180	26,180	868,600	1,191,960
<b>Cost Valuation 11 March 2017</b>	<b>297,180</b>	<b>26,180</b>	<b>868,600</b>	<b>1,191,960</b>

Armagh Observatory was founded in 1789 and from this date the Observatory has collected through its operations scientific items, books, furniture and other artefacts which would be considered heritage assets. It is not the policy of Armagh Observatory and Planetarium to acquire heritage assets but has collected such assets through donations and operations. These assets were not previously recorded on the Balance Sheet. In 2017 these assets have been included on the Balance Sheet at the 2010 insurance valuation of £1,191,960.

#### Summary Analysis of heritage asset transactions

	2017	2016	2015	2014	2013
<b>Purchases</b>					
Books	-	-	-	-	-
Furniture & Artworks	-	-	-	-	-
Clocks & Scientific Equipment	-	-	-	-	-
<b>Donations</b>	-	-	-	-	-
Books	-	-	-	-	-
Furniture & Artworks	-	-	-	-	-
Clocks & Scientific Equipment	-	-	-	-	-
<b>Total Additions</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Impairment / Depreciation</b>					
Books	-	-	-	-	-
Furniture & Artworks	-	-	-	-	-
Clocks & Scientific Equipment	-	-	-	-	-
<b>Total Charge for impairment</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Disposals</b>					
Books	-	-	-	-	-
Furniture & Artworks	-	-	-	-	-
Clocks & Scientific Equipment	-	-	-	-	-
<b>Total Disposals</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Proceeds from disposals</b>					
Books	-	-	-	-	-
Furniture & Artworks	-	-	-	-	-
Clocks & Scientific Equipment	-	-	-	-	-
<b>Total Sale Proceeds</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

## Armagh Observatory and Planetarium

### Notes to the financial statements for the year ended 31 March 2017 (continued)

#### 13 Inventories

	2017	2016
	£	£
Goods for resale	7,946	10,186

#### 14 Debtors

	2017	2016 (combined and restated)
	£	£
Trade and grant debtors	14,813	151,533
Prepayments	77,311	59,522
VAT recoverable	11,504	10,404
	103,628	221,459

#### 15 Creditors: amounts falling due within one year

	2017	2016 (combined and restated)
	£	£
	Note	
Trade creditors	87,691	103,742
Accruals	319,781	299,365
	407,472	403,107

#### 16 Statement of Funds

	At 1 April 2016	Income	Expenditure	Revaluation	Transfers	At 31 March 2017
	£	£	£	£	£	£
<b>Restricted Funds</b>						
Government grant for fixed assets	26,763	182,431	-	-	(209,194)	-
VES	-	188,000	(188,000)	-	-	-
Deferred Grants	162,082	315,324	(236,813)	-	(68,686)	171,907
<b>Total restricted funds</b>	<b>188,845</b>	<b>685,755</b>	<b>(424,813)</b>	<b>-</b>	<b>(277,880)</b>	<b>171,907</b>
<b>Unrestricted Funds</b>						
<b>Designated Funds</b>						
Donated Assets Reserve	1,767,518	-	-	-	(18,642)	1,748,876
Government Grant for fixed assets	1,099,509	-	-	-	(60,610)	1,038,899
General Fund	24,140	1,735,859	(2,082,412)	-	357,132	34,719
	<b>2,891,167</b>	<b>1,735,859</b>	<b>(2,082,412)</b>	<b>-</b>	<b>277,880</b>	<b>2,822,494</b>
<b>Undesignated Funds</b>						
Revaluation Reserve	4,261,520	-	-	2,002,065	-	6,263,585
Pension Reserve	(911,000)	-	12,026	(667,026)	-	(1,566,000)
	<b>3,350,520</b>	<b>-</b>	<b>12,026</b>	<b>1,335,039</b>	<b>-</b>	<b>4,697,585</b>
<b>Total Unrestricted</b>	<b>6,241,687</b>	<b>1,735,859</b>	<b>(2,070,386)</b>	<b>1,335,039</b>	<b>277,880</b>	<b>7,520,079</b>
<b>Total Funds</b>	<b>6,430,532</b>	<b>2,421,614</b>	<b>(2,495,199)</b>	<b>1,335,039</b>	<b>-</b>	<b>7,691,986</b>

#### Details of Transfers between funds

Transfer of unrestricted capital grants received to unrestricted fund	209,194
Release of deferred Capital grant	269,804
Capital Grants to Government Grant	(209,194)
Transfer of donated asset reserve to match depreciation	18,642
Release of deferred Capital grant	68,686
<b>General Fund</b>	<b>357,132</b>

## Armagh Observatory and Planetarium

### Notes to the financial statements for the year ended 31 March 2017 (continued)

#### 17 Analysis of net assets between funds

	Pension Reserve £	Revaluation Reserve £	Unrestricted Funds £	Restricted Funds £	Total Funds £
Tangible fixed assets		6,263,585	2,803,494	-	9,067,079
Current assets		-	426,472	171,907	598,379
Creditors: amounts falling due within one year		-	(407,472)	-	(407,472)
Pension scheme liability	(1,566,000)	-	-	-	(1,566,000)
<b>Net assets/(liabilities)</b>	<b>(1,566,000)</b>	<b>6,263,585</b>	<b>2,822,494</b>	<b>171,907</b>	<b>7,691,986</b>

#### 18 Reconciliation of net income/(expenditure) to net cash flow from operating activities

	2017 £	2016 (combined and restated) £
Net income (expenditure) per statement of financial activities	(73,585)	(93,858)
Loss/(profit) on sale of assets	(61)	6,377
Depreciation	288,447	258,783
Interest received	(33)	(46)
Defined benefit pension scheme service cost less contributions payable	(12,026)	55,000
Decrease/(increase) in stock	2,240	4,546
Decrease/(increase) in debtors	117,831	(78,995)
Decrease/(increase) in creditors	4,364	165,242
<b>Net cash inflow/ (outflow) from operating activities</b>	<b>327,176</b>	<b>317,049</b>

#### 19 Analysis of cash and cash equivalents

	31 March 2017 £	1 April 2016 (combined and restated) £
Cash at bank and in hand	486,805	368,728
<b>Total cash and cash equivalents</b>	<b>486,805</b>	<b>368,728</b>

#### 20 Pension scheme

The disclosures below relate to the funded liabilities within the Local Government Pension Scheme for Northern Ireland (the "LGPS"), administered by NILGOSC, and certain related unfunded liabilities which have been separately disclosed. Employer pension costs within the SOFA have been adjusted to reflect employer pension costs in the AON Hewitt actuarial report which are transferred to the pension reserve.

The LGPS is a funded defined benefit plan with benefits earned up to 31 March 2015 being linked to final salary. Benefits after 31 March 2015 are based on a Career Average Revalued Earnings Scheme. The unfunded pension arrangements relate to termination benefits made on a discretionary basis upon early retirement in respect of members of the LGPS under the Local Government (Early Termination of Employment) Regulations (Northern Ireland) 2007.

The last actuarial valuation of the LGPS funded benefits was carried out at 31 March 2016 and the contributions to be paid until 31 March 2020 are set out in the Fund's Rates and Adjustment Certificate. The funding level (ratio of assets to past service liabilities) at 31 March 2016 was 96% compared to 91% at 31 March 2013 corresponding to a funding deficit of £262.6 million (£467m at 31 March 2013).

The NILGOSC actuary, Aon Hewitt Ltd, has provided the following details for the purposes of accounting for the Observatory and Planetarium's joint share of the scheme deficit in accordance with FRS 102 at 31 March 2017.

## Armagh Observatory and Planetarium

### Notes to the financial statements for the year ended 31 March 2017 (continued)

#### 20 Pension scheme (continued)

Key assumptions used by the actuary were:

	31/3/2017	31/3/2016 (combined and restated)	31/3/2015 (combined and restated)
	%	%	%
Discount rate	2.5	3.4	3.2
RPI Inflation	3.1	2.9	2.9
CPI Inflation	2.0	1.8	1.8
Pension increases	2.0	1.8	1.8
Pension accounts revaluation rate	2.0	1.8	1.8
Rate of increase in salaries	3.5	3.3	3.3

#### Mortality assumptions

	2017	2016 (combined and restated)
	Years	Years
<b>Males</b>		
Member aged 65 at accounting date	23.2	22.3
Member aged 45 at accounting date	25.4	24.5
<b>Females</b>		
Member aged 65 at accounting date	25.8	24.8
Member aged 45 at accounting date	28.1	27.2

#### Asset Allocation

	Value at 31/3/2017	Value at 31/3/2016 (combined and restated)
	%	%
Equities	74.5	71.9
Property	10.5	13.2
Government Bonds	5.4	5.7
Corporate Bonds	6.1	6.4
Cash	2.6	2.3
Other	0.9	0.5
Total	100.0	100.0

#### Reconciliation to balance sheet

	31/3/2017	31/3/2016 (combined and restated)
	£'000	£'000
Fair value of assets	9,340	7,949
Present value of funded defined benefit obligation	10,903	8,946
Funded status	(1,563)	(997)
Present value of unfunded defined benefit obligation	(3)	(3)
Liability recognised on the balance sheet	(1,566)	(1,000)

#### Amounts recognised in income statement

	Year to 31/3/2017	Year to 31/3/2016 (combined and restated)
	£'000	£'000
<b>Operating cost</b>		
Current service costs	172	228
<b>Financing cost</b>		
Interest on net defined benefit liability	31	37
<b>Pension expense recognised in profit and loss</b>	<b>203</b>	<b>265</b>
Allowance for administrative expenses included in Current Service Cost	3	1

## Armagh Observatory and Planetarium

### Notes to the financial statements for the year ended 31 March 2017 (continued)

#### 20 Pension scheme (continued)

##### Assets recognised in other comprehensive income

	Year to 31/3/2017	Year to 31/3/2016 (combined and restated)
	£'000	£'000
Asset gains/(losses) arising during the period	1,130	(28)
Liability gains/(losses) arising during the period	(1,654)	380
Total	(524)	352

##### Changes to the present value of defined benefit obligation

	Year to 31/3/2017	Year to 31/3/2016 (combined and restated)
	£'000	£'000
Opening defined benefit obligation	8,949	8,939
Current service cost	172	228
Interest expense on defined benefit obligation	301	284
Contributions by participants	60	64
Actuarial (gains)/ losses on liabilities	1,654	(380)
Net benefits paid out	(230)	(186)
Closing defined benefit obligation	10,906	8,949

##### Changes to the fair value of assets

	Year to 31/3/2017	Year to 31/3/2016 (combined and restated)
	£'000	£'000
Opening fair value of assets	7,949	7,679
Interest income on assets	270	247
Remeasurement gains/(losses) on assets	1,130	(28)
Contributions by the employer	161	173
Contributions by participants	60	64
Net benefits paid out	(230)	(186)
Closing fair value of assets	9,340	7,949

##### Liability of Members

The split of the liabilities at the last valuation between the various categories of members is as follows:

Active members	46%
Deferred Pensioners	18%
Pensioners	36%

##### Sensitivity Analysis

###### Funded LGPS benefits

###### Discount rate assumptions

Adjustment to discount rate	+0.1%pa	Base Figure	-0.1%pa
Present value of total obligation (£m)	10.716	10.903	11.093
% change in present value of total obligation	-1.7%		1.7%
Projected service cost (£m)	0.227	0.233	0.239
Approximate % change in projected service cost	-2.5%		2.6%

###### Rate of general increase in salaries

Adjustment to salary increase rate	+0.1%pa	Base Figure	-0.1%pa
Present value of total obligation (£m)	10.943	10.903	10.863
% change in present value of total obligation	0.4%		-0.4%
Projected service cost (£m)	0.233	0.233	0.233
Approximate % change in projected service cost	0.0%		0.0%

## Armagh Observatory and Planetarium

### Notes to the financial statements for the year ended 31 March 2017 (continued)

#### 20 Pension scheme (continued)

##### Rate of increase to pensions in payment and deferred pension assumption, and rate of revaluation of pension account assumptions:

	<b>+0.1%pa</b>	<b>Base Figure</b>	<b>-0.1%pa</b>
<b>Adjustment to pension increase rate</b>			
Present value of total obligation (£m)	11.053	10.903	10.755
% change in present value of total obligation	1.4%		-1.4%
Projected service cost (£m)	0.239	0.233	0.227
Approximate % change in projected service cost	2.6%		-2.5%

##### Post retirement mortality assumption

	<b>+0.1%pa</b>	<b>Base Figure</b>	<b>-0.1%pa</b>
<b>Adjustment to mortality age rating assumption</b>			
Present value of total obligation (£m)	11.226	10.903	10.581
% change in present value of total obligation	3.0%		-3.0%
Projected service cost (£m)	0.242	0.233	0.224
Approximate % change in projected service cost	3.8%		-3.8%

#### 21 Capital Commitments

There were no outstanding capital commitments at 31 March 2017 (2016: £nil).

#### 22 Contingent Liabilities

There were no contingent liabilities at the 31st March 2017 (2016 £nil).

#### 23 Related-Party Transactions

None of the members of the Board of Governors, the Management Committee, the Director or other related parties have undertaken any material transactions with the Armagh Observatory and Planetarium during the year. The Armagh Observatory and Planetarium has had various material transactions with a number of Government Departments, Executive Agencies and Non-Departmental Public Bodies in Northern Ireland and the UK. Most of these transactions have been with DfC, the Central Procurement Directorate (CPD), the Science and Technology Facilities Council (STFC) and the Education Authority (EA). DfC provides recurrent and capital grant-in-aid ( note 2), the STFC provides grants for research projects (note 2) and CPD and EA are the Centres of Procurement Expertise for the organisation.

No related party transactions took place in the year, other than certain trustees' expenses already disclosed in note 10.

#### 24 Losses and Special Payments

There were no losses or special payments during the year.

#### 25 Financial Instruments

As the cash requirements of the Observatory and Planetarium are met through grants from DfC and other grant funding bodies, financial instruments play a more limited role in creating risk than would apply to a non-public sector body of a similar size. The majority of financial instruments relate to contracts to buy non-financial items in line with the Observatory's expected purchase and usage requirements and the Observatory and Planetarium is therefore exposed to little credit, liquidity or market risk.

## Armagh Observatory and Planetarium

### Notes to the financial statements for the year ended 31 March 2017 (continued)

#### 26 Additional disclosures to comply with the Financial Reporting Manual (FRoM)

FRoM requires non-departmental public bodies to regard grant-in-aid received as contributions from controlling bodies giving rise to a financial interest in the residual interest of the body and hence accounting for as financing, that is by crediting them to income and expenditure reserve. In addition FRoM requires grant-in-aid to be accounted for on a cash basis.

However, as the organisation is required to prepare accounts in accordance with the SORP for charities, DfC has given the organisation permission to continue to treat grants as income. If the Observatory and Planetarium were required to comply with the FRoM the result of this compliance would be as follows:

#### Statement of Financial Activities prepared under FRoM

	2017	2016 (combined and restated)
	£	£
<b>Incoming resources</b>		
Incoming resources from research and other non-DfC grants	326,048	422,605
Other Charitable Income	146,850	158,197
Trading Income	89,475	89,919
<b>Total incoming resources</b>	<b>562,373</b>	<b>670,721</b>
<b>Resources expended</b>		
Direct expenditure of the organisation	2,495,199	2,600,591
<b>Total Resources expended</b>	<b>2,495,199</b>	<b>2,600,591</b>
<b>Net deficit for the year</b>	<b>(1,932,826)</b>	<b>(1,929,870)</b>
Gain on revaluation of Fixed Assets	810,105	-
Heritage assets	1,191,960	-
Actuarial gain/(loss) - pension scheme	(667,026)	404,000
<b>Amount transferred to funds</b>	<b>(597,787)</b>	<b>(1,525,870)</b>

#### Analysis of funds prepared under the FRoM

	2017	2016 (combined and restated)
	£	£
<b>Balance at 1 April 2016 Combined</b>	6,430,532	6,120,390
Grant-in-aid received and accrued in the year	1,859,241	1,836,012
Net operating costs for the year	(597,787)	(1,525,870)
<b>Balance at 31 March 2017</b>	<b>7,691,986</b>	<b>6,430,532</b>

	2017
	£
Grant-in-aid received and accrued in the year	1,859,241
Accrued VES grant aid 31 March 2017	50,428
Grant-in-aid received on cash basis	1,808,813

#### 27 Events after the Reporting Date

##### 1) Adjusting Events

There were no events after the reporting date which would require adjustment to the financial statements.

##### 2) Non-adjusting Events

There were no events after the reporting date which would require disclosure in the financial statements.

The Accounting Officer authorised the issue of these financial statements on 18 September 2018.