

**The Armagh Observatory and Planetarium  
Accounts for 2006/2007, Year Ended 31 March 2007**





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*Laid before the Northern Ireland Assembly by the Department of Culture, Arts and Leisure  
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*

*18 September 2007*



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# Management Commentary

## Background

The Armagh Observatory and the Armagh Planetarium are part of a single corporate entity “The Governors of the Armagh Observatory and Planetarium” described in the Armagh Observatory and Planetarium (Northern Ireland) Order 1995. This superseded the original 1791 Act of the Irish Parliament entitled “An Act for Settling and Preserving a Public Observatory and Museum in the City of Armagh For Ever”, and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 Northern Ireland Order 1995 has since been amended by the Audit and Accountability (Northern Ireland) Order 2003. The corporation is registered as a charity under Section 505 of the Income and Corporation Taxes Act 1988.

The Armagh Observatory (see <http://star.arm.ac.uk/>) is a modern astronomical research institute, the oldest scientific institution in Northern Ireland. Founded by Archbishop Richard Robinson around 1790 as part of his dream to see the creation of a university in the City of Armagh, the Observatory stands close to the centre of the City of Armagh together with the Armagh Planetarium in approximately 14 acres of attractive, landscaped grounds known as the Armagh Astropark. The Observatory Grounds and Astropark include scale models of the Solar System and the Universe, two sundials and two historic telescopes, as well as telescope domes and other outdoor exhibits (see <http://star.arm.ac.uk/astropark/>). A new public outreach facility, the Armagh Human Orrery (see <http://star.arm.ac.uk/orrery/>), is located close to the historic main building of the modern Observatory. The Observatory’s Library and Archives, and its specialist collection of scientific instruments and artefacts associated with the development of modern astronomy over more than two hundred years, rank amongst the leading collections of their kind in the UK and Ireland.

The Armagh Planetarium (see <http://www.armaghplanet.com>) was founded by Dr Eric Mervyn Lindsay, the seventh director of the Armagh Observatory, and was officially opened on 1 May 1968, the first in Ireland and one of the first in the UK. The Armagh Observatory and the Armagh Planetarium operate under separate directors and receive core funding from the Northern Ireland Department of Culture, Arts and Leisure. The total staff complement is approximately 50: roughly 35 in the Observatory and 15 in the Planetarium.

## Aims and Objectives

The aim of the corporation is to advance the knowledge and understanding of astronomy and related sciences through the execution, promotion and dissemination of astronomical research nationally and internationally in order to enrich the intellectual, economic, social and cultural life of the community.

## Principal Activities

The principal function of the Armagh Observatory is to undertake original research of a world-class academic standard that broadens and expands our understanding of astronomy and related sciences. Research interests of Observatory staff currently focus on four main areas of astronomy, namely: (1) Solar-System Science (including celestial mechanics, planetary science, the dynamics of meteors and other small bodies, the origin of comets, and the interrelationships between comets, asteroids, meteoroids and interplanetary dust, and Near-Earth Objects); (2) Solar Physics (including the dynamic solar atmosphere, the chromosphere and corona, and Sun-Earth relationships including climate); (3) Stellar Astrophysics (including hot stars, massive stars, stellar winds, degenerate stars and helium stars, asteroseismology, studies of binary stars including their origins, physical properties, population studies, and the physical properties of ultra-compact binary systems, and constraints on gamma-ray burst progenitors); and (4) Galactic Astronomy (including brown dwarfs, star formation, globular and open clusters). In addition, Observatory staff participate in a vibrant education and public outreach programme via lectures, popular astronomy articles and interviews with the press, radio and television. Further details concerning recent and current research interests of Armagh Observatory staff may be obtained from the Observatory web-site, at <http://star.arm.ac.uk/>. In addition to this primary research role the Observatory maintains a unique 210-year long meteorological record and data-bank (<http://climate.arm.ac.uk/>), the longest in the UK and Ireland from a single site, and has an important responsibility to maintain and preserve the fabric of the historic buildings, the library, historic books and archives, and the collection of scientific instruments and other artefacts built up over more than 215 years of continuous astronomical activity in Armagh. The main historic buildings of the Observatory have unique architectural features and together house some of the most valuable collections of scientific books, instruments and archives in Northern Ireland.

The Armagh Planetarium is a leading educational establishment whose primary function is to disseminate knowledge of a wide range of science and to promote the public understanding of astronomy and science through its programme of educational services for schools and the wider public. 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. The Planetarium, also through the large number of visitors coming through its doors, plays an important role in promoting and enhancing tourism within Armagh City and District.

## Equal Opportunities Policy

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.

### **Policy on Payment of Suppliers**

The corporation is committed to the payment of all invoices not in dispute within agreed contractual terms or within 30 days of the presentation of a valid invoice, or delivery if later. In the year ended 31 March 2007, all of the corporation's invoices were paid within these limits.

### **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.

Further information is available on the Observatory at <http://star.arm.ac.uk/>, and on the Planetarium at <http://www.armaghplanet.com>.

### **Auditors**

Under the Audit and Accountability (Northern Ireland) Order 2003, responsibility for the audit of the accounts of the Armagh Observatory and Planetarium has been vested in the Comptroller and Auditor General for Northern Ireland.

## Corporate Governance

### Board of Governors

The Board of Governors comprises the Church of Ireland Archbishop of Armagh (Chairman), the Dean and Chapter of the Church of Ireland Cathedral of Armagh, 1 DCAL nominee, 1 Queen's University Belfast (QUB) nominee, and up to 3 additional members nominated by the Board of Governors. Nominees normally serve for an initial period of 5 years with the possibility of extension.

Chairman: His Grace, The Most Reverend Dr R.H.A. Eames, The Lord Archbishop of Armagh (To 31 December 2006)

Chairman: His Grace, The Most Reverend A.E.T. Harper, The Archbishop of Armagh and Primate of All Ireland  
(From 2 February 2007)

The Very Reverend Dean P. Rooke, St. Patrick's Cathedral, Armagh (From 1 May 2006)

The Venerable Archdeacon R.G. Hoey, Camlough

The Reverend Canon J.M. Barton, Acton

The Reverend Canon W.J.A. Dawson, Pomeroy

The Reverend Canon J.W. McKegney, Armagh

The Reverend Canon C.F. Moore, Newtownhamilton

The Reverend Canon H.J.W. Moore, Ballinderry

The Reverend Canon R.J.N. Porteus, Derryloran

The Reverend Canon T. Scott, Magherafelt

Councillor W. Gardiner-Watson (DCAL Nominee)

Professor A. Hibbert, Queens University Belfast (QUB Nominee)

Lord Ballyedmond, Ballyedmond Castle, Rostrevor (Board of Governors Nominee)

Professor J.E. Dyson, University of Leeds (Board of Governors Nominee)

### Management Committee

The Management Committee, an advisory committee to the Board of Governors, comprises the Church of Ireland Archbishop of Armagh or his nominee (Chairman), 3 Nominees from the Board of Governors, 4 DCAL nominees, 1 QUB nominee, 1 Particle Physics and Astronomy Research Council (PPARC) nominee, 1 Dublin Institute for Advanced Studies (DIAS) nominee, and up to 4 additional members co-opted by the Board of Governors. Nominees and those co-opted by the Governors normally serve for an initial period of 3–5 years with the possibility of extension.

Chairman: His Grace, The Most Reverend Dr R.H.A. Eames, The Lord Archbishop of Armagh (To 31 December 2006)

Chairman: His Grace, The Most Reverend A.E.T. Harper, The Archbishop of Armagh and Primate of All Ireland  
(From 2 February 2007)

Deputy Chairman: Dr F.N. Byrne (Co-opted, Board of Governors)

The Venerable Archdeacon R.G. Hoey, Camlough (Board of Governors Nominee)

Professor J.E. Dyson, University of Leeds (Board of Governors Nominee)

Professor A. Hibbert, Queens University Belfast (Board of Governors Nominee)

Dr E.M. (Á.) Downey (DCAL Nominee)

Mrs S. Hogg (DCAL Nominee)

Mrs M. Cruickshank (DCAL Nominee – to 30 September 2006)

Professor P.L. Dufton, Queens University Belfast (QUB Nominee)

Professor M.R. Merrifield, University of Nottingham (PPARC Nominee)

Professor L. Drury, Dublin Institute for Advanced Studies (DIAS Nominee – to 30 June 2006)

Professor E.J.A. Meurs, Dublin Institute for Advanced Studies (DIAS Nominee – from 1 July 2006)

Sir Kenneth Bloomfield (Co-opted, Board of Governors – to 30 September 2006)

### Internal Audit Committee

The Internal Audit Committee, a sub-committee of the Management Committee, comprises Dr F.N. Byrne (Chairman), the Venerable Archdeacon R.G. Hoey (Board of Governors nominee on the Committee), Professor P.L. Dufton and Sir Kenneth Bloomfield (to 30 September 2006). The Internal Audit Committee meets normally once per year to discuss audit reports and recommendations for the improvement of the corporation's system of internal control and to review the corporation's annual accounts. Meetings are attended by the auditors and the corporation's management.

### Directors and Secretary

Professor M.E. Bailey — Director, Armagh Observatory

Dr T.R. Mason — Director, Armagh Planetarium

Mr L.F. Young — Secretary

# The Armagh Observatory — Operating Review

## Research Highlights

The following research highlights, performance indicators for 2006/2007, and the objectives for 2007/2008 are extracted from the Armagh Observatory Annual Report for Calendar Year 2006 (Financial Year 2006/2007), which contains an extensive summary of the whole of the Observatory's principal research and other activities during 2006. The full report is available at <http://star.arm.ac.uk/annrep/> or by contacting the Administrator at the Armagh Observatory, College Hill, Armagh, BT61 9DG, tel. +44-28-3752-2928; e-mail: [info@arm.ac.uk](mailto:info@arm.ac.uk).

### Stellar Astrophysics

During the year the stellar astrophysics groups have published papers on subdwarf B stars, which are highly evolved low-mass stars, most being about half the mass of the Sun and with helium-burning cores, on extreme helium and post asymptotic giant branch stars, and theoretical and computational astrophysics.

**Origin of g-Mode Pulsations in Subluminous B Stars** Subluminous B stars are a bit like main-sequence stars such as the Sun, only they are made almost entirely of helium (instead of hydrogen) and shine by converting helium into carbon (instead of hydrogen into helium). They show two types of oscillation, namely pressure modes and gravity modes. The pressure modes have been reasonably well explained by a heat engine in which opacity coming from highly ionized iron acts as a valve. The gravity modes could be explained by the same mechanism, except that the observed temperatures of stars in which gravity modes were predicted were different from those in which gravity modes were observed.

Simon Jeffery and Hideyuki Saio (Sendai, Japan) realized that the problem had to do with the temperature at which iron was producing excess opacity. They asked whether anything else could produce opacity at a slightly higher temperature. This led to the discovery that by adding nickel to the mixture, and using the most recent atomic data, they could raise the temperature of stars in which gravity modes would be expected. Now, theory and observation are nearly in agreement. This solution to a problem in stellar physics provides a neat test of atomic physics, and opens up the possibility of further discoveries in stellar pulsation theory.

**Evolution of FG Sagittae** Although most white dwarfs fade away to become stellar cinders, gigantic crystals of carbon and oxygen, a few have just enough hydrogen and helium left on their surface to be re-ignited. When nuclear reactions restart, the white dwarf expands by a factor of over 1,000,000,000,000 in volume to become a yellow supergiant in an event so rare that it has only been seen three times in the last century. One of these, FG Sagittae, has expanded over an interval of about 100 years.

Jeffery and Schönberner (Potsdam, Germany) have re-examined nearly five decades of spectroscopy concerning FG Sge. Contrary to the story provided by more than ten individual studies spread throughout that period, they found that the surface composition of FG Sge has not changed as radically as previously thought. In particular, the reports that “s-process” elements have increased by factors of 100 to 1000 cannot be defended. On the other hand, it seems that the surface of FG Sge has become hydrogen deficient since 1950, in contradiction to any current model of post-AGB evolution.

**Origin of Extreme Helium Stars** Simon Jeffery also reports on a new result supporting the merger theory for the origin of extreme helium stars. Here, measurements of elemental abundances in several extreme helium stars were carried out by a team including himself, Gajendra Pandey (Indian Institute of Astrophysics), David Lambert (McDonald Observatory, University of Texas) and N. Kameswara Rao (Indian Institute of Astrophysics). The team made observations with the Hubble Space Telescope, the Harlan J. Smith telescope at McDonald Observatory and the Vainu Bappu telescope in India. The results have raised strong interest in the international press, as far afield as the USA and the Calcutta Telegraph.

Twenty years ago, Ronald Webbink and Icko Iben had introduced the idea that extreme helium stars formed from the merger of two white dwarfs. More recently, Jeffery and Hideyuki Saio had made more careful calculations so that the theory could be compared directly with observations. Their results were firmly in favour of the merger model rather than other ideas popular at the time. As part of this work, Jeffery had derived a simple recipe relating the chemistry of the merged star's surface to the chemical structure of its constituent white dwarfs. The new results follow this recipe almost perfectly, giving continued support to the merger theory as describing the origin of these stars. There is one exception. The recipe predicts that nearly all the surface oxygen should have been converted to nitrogen in the hydrogen-burning CNO cycle. However, in eight out of ten cases, oxygen has an observed abundance close to the value expected had it not participated in any nucleosynthesis. This remains a challenge.

**Brown Dwarfs** Gerry Doyle reports the discovery by Antoaneta Antonova of rotational modulation in the radio emission from an ultra-cool dwarf at the sub-stellar boundary. This represents a major new advance in the study of activity in this class of object. The proposed model is a significant departure from that generally applied to cool stars, which attributes the bulk of broad band, persistent radio emission to incoherent, gyrosynchrotron radiation. Instead, it is suggested that an electron cyclotron maser is at work. This is a particle-wave plasma instability caused by a resonance between the gyrating electrons in an externally generated magnetic field and the electric field of electromagnetic waves at frequencies near the electron cyclotron frequency. It has been proposed as a possible mechanism for a wide range of astrophysical radio emission including planetary radiation from all of the magnetized planets. The resulting radiation is expected to be highly beamed in a direction perpendicular to the magnetic field, explaining the rotational modulation of the emission from our detected objects.

**Star Formation** Anthony J. Moraghan and the former Research Astronomer Michael D. Smith (University of Kent at Canterbury), have applied a numerical hydrodynamics computer code incorporating magnetohydrodynamics and chemistry to investigate the phenomenon of protostellar jets, which are now known to be a key component of the star formation process. A protostellar jet is a powerful outflow of material from a young star. The jet creates a channel to remove excess angular momentum from the system so as to aid the accretion process whereby the young star grows in mass by the gravitational infall of material.

The first paper in the Moraghan, Smith and Rosen series, entitled “Velocity study of axisymmetric protostellar jets with molecular cooling”, was published in 2006. After having explored jet dynamics through precession and pulsation, the aim of this work was to determine which signatures should be sensitive to jet speed at the injection location. The environment against which the jet impacts may also determine what we detect. A second paper on the influence of the environment on the propagation of protostellar outflows is being prepared for publication. This work was presented at the third Jetset School in Sauze d’Oulx, Italy, in 2007 January and at the Lindsay Centennial Symposium in Armagh.

## Planetary Science

**Dynamics of Coorbital Satellites** Collaborative work on the dynamics of coorbitals of the Saturnian moons with Fathi Namouni (Observatoire de la Côte d’Azur, Nice, France) and Helena Morais (Observatório Astronómico de Coimbra, Santa Clara, Portugal) culminated in a presentation of our numerical results at the 37th Annual Meeting of Division of Dynamical Astronomy of the American Astronomical Society (Halifax, Nova Scotia, 2006 June 25–29) and the preparation of a paper on the conservative dynamics of the system.

**Mutual Events Between Planetary Satellites** Work continues in preparation for observing the mutual eclipses and occultations between Uranus’s satellites, predicted to occur in 2007 and 2008. These events are extremely rare and of high value, occurring once every 42 years (half a Uranian orbital period). During the summer 2006 a Nuffield Bursary summer student, Michelle Harrington (University of Leicester), was supervised on a project to reduce our 2002–2003 observations of mutual events between the Galilean satellites of Jupiter. The result was carefully calibrated lightcurves for each observed event, and the final product was submitted to the central repository for such data at the Institut de Mécanique Céleste et de Calcul des Éphémérides (IMCCE) in Paris, France.

**Meteor Camera Observations from Armagh** Apostolos Christou and Prakash Atreya report that the Observatory’s new video meteor camera system, which began recording data in 2005 July, is now detecting more than 100 meteors per month, many being double-station video observations made in collaboration with Robert Cobain, in Bangor. The data, which are recorded automatically each night, are stored for subsequent analysis of the varying rate of visual meteors throughout the year (minor showers etc.) and the brightness profile of each event (meteor photometry). For more information on the meteor video camera system, see <http://star.arm.ac.uk/meteor-cam/detections/>.

In 2006 November, Christou and Atreya, together with David Asher and Mark Bailey, field-tested a new mobile meteor station intended to provide the flexibility needed to observe future predicted meteor outbursts such as the Aurigids in 2007. On this occasion, the outburst of Leonid meteors during the early morning hours of the 2006 November 19, first predicted by David Asher and Rob McNaught in 1999, was successfully observed from a location 20 miles west of Armagh.

**Occultation Astronomy** Apostolos Christou reports that, on 2006 November 2, he and David Asher made the first CCD observation of an asteroid occultation made from anywhere in Ireland. This was the occultation of a 12th magnitude star (TYC 0717-00551-1) by the asteroid (258) Tyche (magnitude 12.1) using a CCD camera (ST-7) and a small telescope (6-inch, f/5 Newtonian). The observation was obtained by setting up a portable station in Bloody Foreland, County Donegal (one of the few parts of Ireland over which the narrow occultation track was predicted to pass), and it enabled the position of the 65 km asteroid to be refined in its orbit to a precision of approximately 70 km. This follows the occultation astronomy group’s earlier success (2002 January 14) in making the first successful detection of the shadow of an asteroid over the island of Ireland (see <http://star.arm.ac.uk/press/Asteroid-Shadow.html>).

## Solar Physics

During 2006 the solar physics group has published results on a wide range of investigations into the dynamics of the solar atmosphere, including the time-evolution of solar spicules and so-called ‘blinkers’, and a variety of transient flows and explosive events. The group uses data from both ground-based and space-borne instrumentation and interprets this information (usually spectral data) using detailed physical models.

A spectrum’s value lies in the quality of the underlying physics used to interpret it. This usually requires a model of the underlying radiation source (e.g. caused by magnetic reconnection or MHD waves) and of the dominant plasma processes (e.g. evolution of the electron velocities via collisions to achieve a Maxwellian or a non-Maxwellian distribution) which include all the relevant atomic physics (e.g. representation of the microphysics of the atomic rates).

Transition region explosive events (generally interpreted as a signature of magnetic reconnection) are about 4–5 times more numerous along coronal hole boundaries than in the quiet Sun. The evidence for reconnection is provided by non-Gaussian profiles in lines from ions in both the mid and high transition region, produced as a result of shocks. In a recent investigation we studied events at a coronal hole boundary in the O VI 1031 Å line, observing that they occur in bursts. The repeated reconnection, starting with a period of approximately 3 minutes, increases to over 5 minutes at the end of the activity. Such activity can be triggered by transverse oscillations (so-called ‘kink’ modes) of flux tubes in the closed-field lines or via *p*-modes.

Another of our studies showed that with increasing electron density, two lines thought to originate at similar temperatures and therefore at the same location in the solar atmosphere, namely N v 1238 Å and O v 629 Å, might actually come from different electron density plasmas (our study considered a density-dependent ionization). These studies have highlighted the fact that in order to understand the underlying mechanisms of plasma jets and sporadic radiative events, we need to adopt a unified view of the phenomena, as opposed to studying separately the differently named event types, which might only *look* different.

Thus simultaneous high-resolution observations of several spectral lines, coupled with both high-quality imaging data and an in-depth knowledge of the various atomic physics processes, are needed to provide insight into the dynamics and energetics of these features. Full details of the solar physics group's results during 2006 are provided in the 2006 Annual Report (see <http://star.arm.ac.uk/annrep/>).

## Climate

Despite a slightly cool March, 2006 was generally a year of exceptionally warm weather, showing the warmest mean annual temperature at Armagh since records began in 1796. Table 1 shows the five warmest years in the Armagh series. Similarly, the average monthly temperature for July was the second highest mean July temperature since this Armagh series started in 1795 July, the value in 2006 (namely 18.0°C) equalling that in 1983, only 1989 July (18.2°C) being warmer. Both September and October were also unusually warm. September also had the second highest average temperature on record, at 15.0°C, with only 1865 September being warmer (at 15.4°C); and 2006 October, with a mean temperature of 12.1°C (equal to that in 1921) was the sixth warmest October on record, after 1969 (12.7°C), 2001 and 1995 (both 12.4°C), 1959 (12.3°C) and 1968 (12.2°C).

The Table shows that 2006 July was noteworthy in that it saw the third, fourth and fifth hottest July days on record since measurements of daily *maximum* temperatures at Armagh began in August 1843. The maximum temperatures on the 18th, 19th and 17th of the month reached 29.9, 29.6 and 29.5 degrees Celsius respectively. Only 1934 July 10 (30.3°C) and 1983 July 13 (30.0°C) were hotter.

Warmest Years		Warmest July Temps		Highest Max. July Daily Temp.		Warmest Sept. Temps	
Year	Mean Temp. (Celsius)	Year	Mean Temp. (Celsius)	Date	Temp. (Celsius)	Year	Mean Temp. (Celsius)
2006	10.46	1989	18.2	1934 July 10	30.3	1865	15.4
1949	10.42	1983/2006	18.0	1983 July 13	30.0	2006	15.0
1997	10.37	1811	17.3	2006 July 18	29.9	1846	14.8
1945	10.32	1934	17.1	2006 July 19	29.6	1949	14.7
2005	10.28	1995	17.0	2006 July 17	29.5	1825/1941	14.6

Table 1: The Table shows that 2006 saw the second warmest average July and September temperature on record at Armagh, the third warmest July day, and the warmest mean annual temperature at Armagh since records began.

In order to provide more information on our rapidly changing climate, a new automatic weather station was procured and its installation completed by Martin Murphy and Geoff Coxhead in 2006 July. Work to commission the instruments and check the accuracy of the automatic measurements against the on-going manual record (which represents the fundamental data calibration) continued during the following several months, and also into 2007 owing to the discovery of a calibration error in one of the new instruments. Martin Murphy supervised an IAESTE summer student during this period, who developed software to display data from the automatic climate station on the Observatory's climate web-site every minute, rather than at daily intervals every month as for the manual record.

## Technical Equipment

Technical equipment at Armagh, which is used primarily for numerical analysis, computer modelling and data reduction, is funded by the STFC, PRTLI, and the DCAL. Facilities presently comprise a number of iMac workstations, approximately 40 Linux workstations and peripherals, and a computer cluster comprising 25 dual-processor work nodes and one master node with a total of 50 GB memory. These computer facilities 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, stellar winds, radiation hydrodynamics, numerical magneto-hydrodynamics, and solar system dynamics.

The internal network is a 1 Gbps backbone ethernet linked with switched hubs. The external network is connected to the Joint Academic Network (JANET) through a 10 Mbps link provided through the Observatory's participation in the Northern Ireland Regional Area Network (NIRAN). The increase in the Observatory's network capacity together with a continuing programme of equipment upgrades provides an opportunity for the Observatory to participate in new developments such as the Virtual Observatory, the UK AstroGRID, and GRID Ireland. Access to Grid technology is currently provided via CosmoGrid (<http://www.cosmogrid.ie/>). This provides access to a high-performance supercomputer cluster at the Irish Centre for High-End Computing (ICHEC).

Armagh Observatory staff regularly obtain telescope time on national and international facilities, such as the ESO Very Large Telescope (<http://www.eso.org/outreach/ut1fl/>) and various spacecraft missions (such as SoHO, TRACE, Hinode, XMM-Newton, and HST), and attract research grants from various grant awarding bodies (e.g. the STFC, the Royal Society, the British Council etc). The

Observatory is also a member of the UK SALT Consortium (UKSC), providing access to the 10-metre class Southern African Large Telescope (SALT: see <http://star.arm.ac.uk/SALT/>), located at the Sutherland Observatory, South Africa. In addition, restoration of the Observatory's historic telescopes has brought opportunities to reintroduce professional observing from Armagh for research and student training (particularly through use of the 18-inch Calver reflector equipped with a new CCD camera), and new technology has facilitated the construction of a video camera system that automatically records meteors whenever the sky is clear.

## Education and Public Outreach

In addition to its primary research mission, the Armagh Observatory has an important secondary responsibility to maintain and preserve the fabric of the historic buildings, the library, historic books and archives, and the collection of scientific instruments and other artefacts built up over more than two hundred years of continuous astronomical activity in Armagh. The scientific, cultural and architectural heritage provided by astronomy at Armagh is a significant asset for the whole of Northern Ireland. The Armagh Observatory's Library and Archives, and its collection of historic scientific instruments and telescopes, span virtually every aspect of the development of modern astronomy; while its Grounds and Astropark provide a significant addition to the Gardens and Parklands of Armagh as well as an opportunity for visitors to tour scale models of the solar system and the wider Universe.

In many cases, the underlying motivation and reasons for the progress of astronomy at a particular time can be explained with reference to discoveries at Armagh or to material held within the Library and Archives. These facilities provide astronomers at Armagh with an unsurpassed opportunity to explain the development of astronomy and related sciences over more than two hundred years and the wider cultural context in which modern research is carried out. Thus, the Observatory plays an important role in advancing public understanding of science, and has become involved in a growing programme of education and public outreach.

The objectives of this programme, which is aimed at all sections of the community, are achieved in a variety of ways, for example:

- attracting visitors to Armagh, primarily to the Armagh Observatory Grounds and Astropark, and to the Human Orrery and Phenology Garden;
- disseminating knowledge of the Observatory's unique meteorological record — the longest in the UK and Ireland from a single site — and maintaining and extending it in the long term;
- widening knowledge of the Observatory's *cultural* heritage, for example its listed buildings, library, archives and historic scientific instruments, the telescopes and telescope domes, and the historical development of the Observatory's landscaped Grounds and Astropark;
- providing talks and presentations to individuals and groups encompassing people of all ages and from all backgrounds;
- developing links with institutions and organizations having similar public education objectives to those of the Armagh Observatory, for example the Astronomical Science Group of Ireland, the local history and philosophical societies, the Armagh Visitor Education Committee, the Irish Astronomical Association and other astronomy organizations, and university research groups and research institutes;
- ensuring that technical questions from members of the public about astronomy can be answered, and that the results of astronomical research are disseminated widely to the press, radio and television; and
- maintaining and developing the Observatory's web-site as a rich and versatile educational resource with the facility to widen access to the latest research findings on astronomy and related sciences and to the Armagh Observatory's history and heritage.

## Performance Indicators

The Armagh Observatory maintained a high level of research and other outputs during the year. Staff produced 45 publications in refereed scientific journals during 2006, approximately 10% above the target of 40 for the year; the number of identified media citations, namely 301, was again well above the business-plan target of 200; and the number of Distinct e-Visitors (DEVs) to the Observatory web-sites (<http://star.arm.ac.uk/>, <http://climate.arm.ac.uk/> and <http://arpc65.arm.ac.uk/~spm/>), i.e. 1,539,000, continues to grow at a significant rate. The number of DEVs was 50% higher in 2006 than the previous year.

Staff at the Observatory have obtained external grants and other income totalling approximately £179,586 during the period (£163,150 in external grant receipts). This is lower than in the previous year as no grant income was received for the Cosmogrid project owing to a delay in the recruitment of suitably qualified research staff to fill vacancies which arose during the year. The Cosmogrid project will now be completed by 31 December 2007. In the same period, Armagh Observatory staff have delivered 55 public talks and scientific contributions at meetings both locally and abroad, and have maintained an active programme of 21 formal seminars and internal colloquia, many of which were delivered by external visiting speakers.

In addition to pursuing front-line astronomical research, the Armagh Observatory presents a strong, positive image of Armagh and Northern Ireland on the national and international stage. Members of staff play a full role in the astronomical community, for example by reviewing grant and research proposals on behalf of external funding agencies, reviewing scientific papers, editing international academic journals, and serving on the committees of bodies such as the Particle Physics and Astronomy Research

Council, the Royal Astronomical Society, and the Royal Irish Academy. Moreover, the Observatory's principal web-sites, namely <http://star.arm.ac.uk/>, <http://climate.arm.ac.uk/> and <http://arpc65.arm.ac.uk/~spm/>, which record the level of external interest in the Armagh Observatory and its facilities, have attracted record numbers of Distinct e-Visitors (DEVs) and web-page 'hits', and provided a rapidly growing volume of data to external users. During 2006 these indicators of external interest in the Armagh Observatory were recorded as 1.539 million DEVs, 16.2 million hits, and 3.43 TB data exported (1 TB = 1,000 GB). In addition, more than 35,000 physical visitors were recorded passing through the Observatory Grounds and Astropark during 2006.

In short, staff at the Armagh Observatory have maintained a high level of scientific and other output during the year and achieved a very significant public profile at regional, national and international level. These activities reflect the strength of public interest in astronomy and space science, and also demonstrate how astronomy continues to attract people (both young and old) into science and towards a more scientific way of thinking. The support for astronomy provided by the Northern Ireland Department of Culture, Arts and Leisure (DCAL) is a key factor in the Observatory's success. In return, astronomical research at Armagh contributes significantly to the Department's mission to protect, nurture and grow Northern Ireland's cultural capital for today and tomorrow. Astronomy at Armagh projects a significant component of Northern Ireland's cultural capital on to the world stage.

### Key Performance Indicators

Key performance indicators (Key PIs) provide a means to assess the Observatory's performance in different spheres of activity, ranging from front-line scientific research in astronomy and related sciences, to the preservation and restoration of Northern Ireland's scientific, cultural and built heritage, and the promotion of public understanding of science through a vibrant programme of education, lifelong learning and public outreach.

Four Key PIs have been used in the past to span all these objectives, namely (1) External Grant Income; (2) Refereed Scientific Journal Publications; (3) Distinct e-Visitors to the Observatory's web-sites; and (4) Identified Media Citations in the press, digital media and on radio and television. Data referring to each of these measures have been collected systematically over several years. During 2006, however, the DCAL requested the Observatory to develop four new Key PIs, namely:

- A. Total external income as a percentage of overall income, per financial year, representing the economic 'rate of return' on DCAL investment in astronomy at Armagh (a high value is better).
- B. Total administration costs as a percentage of total costs, per financial year, representing the economic 'efficiency' of the Observatory's governance and administration systems in delivering high-quality astronomical research for the lowest reasonable cost (a low value is better).
- C. Average number of days absence per person per calendar year (d/p/yr), representing staff morale and the motivation and commitment of the Observatory staff to their work (a low value is better).
- D. Total number of scientific papers in refereed scientific journals, per calendar year, representing the volume of highest quality scientific output of Observatory staff per calendar year (a high value is better).

The first three Key PIs (A, B, and C) were chosen so as to align with those of other DCAL-funded NDPBs. It is expected that this will allow a comparison to be made between the performance of the Armagh Observatory in these areas and those of different government-funded organizations. The fourth Key PI (D), in common with the first (A), provides a proxy measure of the Observatory's success as a third-level astronomical research institute.

For ease of reference, the 2006 results against business-plan targets for these new Key PIs are presented in Table 2. All items, with the exception of financial matters, refer to calendar year. In addition to these performance indicators, various other data are routinely recorded for statistical or internal management purposes, many of which are presented in tabular or narrative form in each year's Annual Report (see <http://star.arm.ac.uk/annrep/>).

Calendar or Financial Year	New Key PI A		New Key PI B		New Key PI C		New Key PI D	
	Actual (%)	Target (%)	Actual (%)	Target (%)	Actual (d/p/yr)	Target (d/p/yr)	Actual #	Target #
2006 or 2006/2007	19.0	20.0	9.3	10.0	0.2	12.0	45	40
2007 or 2007/2008		20.0		8.8		11.0		45

Table 2: New key performance indicators agreed with the DCAL during 2006. The first column denotes the calendar or financial year. Key PI 'A' represents the percentage rate of return on DCAL investment in astronomy at Armagh (a higher value is better); Key PI 'B' represents the percentage efficiency of the Observatory's governance and administration systems (a lower value is better); Key PI 'C' is the average number of days absence per person per year (d/p/yr) (a lower value is better); and Key PI 'D' is the number of publications in refereed scientific journals per year (a higher value is better).

Two important factors to be considered in interpreting these results are the number of senior research staff available to obtain external grants and direct research projects, and the amount of core funding provided by the sponsor government department. In recent years

the DCAL has been generous in providing the Observatory with additional development funds, although the level of core funding to meet the Observatory's needs has often been insufficient. The Table of new key performance indicators illustrates the high rate of return on DCAL investment in front-line astronomical research at Armagh; the high efficiency of the Observatory's governance and administration systems; the exceptionally strong commitment of Armagh Observatory staff to their work; and the continuing high level of high-quality refereed scientific journal publications.

## **Objectives for 2006/2007**

The key tasks for the year are to (1) complete the Observatory's Research Assessment Exercise (RAE) submission; (2) complete the planned Skills and Science activities for the period; and (3) develop a Business Case for the new Library, Archives and Historic Scientific Instruments Building. There is a growing need to secure modern, long-term storage for the nationally significant collection of books, archives and historic scientific instruments in the Observatory's care, and to ensure that the Observatory's unique library and archives can be properly accommodated and displayed in the best possible setting. Completion of these tasks will lay a strong foundation both for the preservation of the heritage and the development of front-line research astronomy at Armagh.

The principal objectives during 2007 and the coming Financial Year 2007/2008 are to:

- maintain and expand existing high-quality research programmes;
- obtain grants and additional external funding to support new research projects;
- prepare for the Research Assessment Exercise (RAE 2008), which has a census date 2007 October 31, and make a high-quality RAE submission;
- promote and develop the Armagh Observatory Grounds and Astropark, and widen access to astronomy at Armagh by expanding the Observatory's Education and Public Outreach (EPO) programme; and
- progress plans for a new Library, Archives and Historic Scientific Instruments Building.

# The Armagh Planetarium — Operating Review 2006/2007

## Performance Measures 2006/2007

The table below provides the end of year performance figures.

Performance Measure	Target	Outcome
Re-opening date	12/5/2006	31/7/2006
Visitor numbers	35,000	38,724
Outreach numbers in the Republic of Ireland	12,000	16,844
Virtual Planetarium visitors	25,000	0
TSN numbers reached included above	1,000	1,951
Outreach numbers under the Skills and Science programme	10,000	10,485
Income from admissions	£105,000	£127,495
Income from Outreach Services	£12,900	£13,671
Income from shop and mail order sales	£54,000	£61,949
External income as a % of total income	21%	23%
Total cost per visitor/outreach	£15	£15

In our review of the past year of activity it is worth noting that delays in the completion of the building refurbishment meant that we did not operate for a full year as originally planned. Despite this we have achieved almost all of the targets that we set, operating for 8 months of the financial year from August 2006. The project to create a website to allow visits to a virtual planetarium originally planned for 2006/2007 will start in 2007/2008.

The building is fully operational and during the year we have modified our operation as changes have become necessary. We continually monitor the needs of the public, and the new lift has made a big difference to our special needs and older visitors who are less mobile. Our emergency systems are now much improved, and we can quickly evacuate the building in any emergency situation.

The Planetarium is a primary attraction in the city of Armagh. Our audiences are differentiated into schools, who visit during the week, and families at weekends, and families and tourists during the summer season. The small population of Northern Ireland means that the Planetarium has to continually re-invent itself and present something new to persuade our visitors to pay repeat visits. This normally means that we need to refresh and renew our shows in the digital theatre often. As the purchased shows are costly we have had as a target the re-instatement of our ability to make shows in-house that will prove to be attractive to our visitors and also to promote repeat visits. We can report that this has been achieved with new in-house shows attracting audiences and favourable comments. Our in-house shows are run by live presenters and document the stories of the night sky as the seasons progress through the year. We have also used purchased shows to play during the Christmas season when the Mystery of the Star of Bethlehem is a perennial favourite with our audiences. Our re-instatement in the international planetarium community as a productive and innovative site is confirmed by the award of the first prize for our short Digistar 3 show, “The Armagh Story” at the International Digistar Users Group meeting at Salt Lake City in October 2006.

We have also decided to concentrate on larger events where we can talk to large numbers of people off-site during a relatively short time span. Our outreach figures for visits to locations throughout Ireland show that this has yielded good results this past year with a total of 27,329 people as off-site visitors. This has been made possible by the allocation of funds from the Skills and Science Funding Package for the year, and we hope to repeat this for the new financial year. We know that such activities generate on-site visits to the Planetarium from both sides of the border.

We are also running Discover Primary Science, a specially funded programme for primary school children from the Republic of Ireland, and we are the one of two Northern Ireland attractions participating in this programme, the other being W5 in Belfast.

The Planetarium has also hosted many visitors during the year, with planetarium professionals from other locations seeking our advice and help to set up new ventures in England, and to see what we are doing as our reputation for innovation means that we are consulted about their planned programmes. Our venue is proving popular for business meetings and we intend to further progress the teacher training opportunities that are needed to re-instate astronomy as a core part of the curriculum. To this end, Planetarium staff are involved in working with the Curriculum Council in re-writing the Key Stage 3 curriculum, and our work is being held up as an exemplar for similar projects in England and Wales.

We have continued to work with local special needs schools and it is noteworthy that our “normal” activities need little modification to provide a stimulating experience for children with assorted disabilities and learning needs. We are grateful to our special school friends for helping us to test these programmes and work out what best suits their needs.

In December 2006 the Director was elected President-Elect of the International Planetarium Society which is the premier professional planetarium organisation in the world. The Director is the third person who has been on staff at Armagh to serve in this position, following former Director Terence Murtagh and former Assistant Director Martin Ratcliffe.

## Objectives for 2007/2008

The primary aim of the Armagh Planetarium is to promote the public knowledge and understanding of astronomy and related sciences by being, and being recognised as, the leading centre for space science, astronomy and related science education and advice in Ireland. In pursuance of this aim the following key objectives have been identified:

- to be the leading centre for space astronomy and related science education and advice in Ireland;
- to remain at the leading edge of centre-based and outreach learning through the use of state-of-the-art technical and other resources;
- to enhance the Planetarium's reputation as a centre of innovation for astronomy and science teaching and events for young people and the general public;
- to provide a unique visitor experience that will strike a balance between formal education and fun-based learning;
- to make a significant contribution to the implementation of the Northern Ireland curriculum through the medium of space and astronomy education;
- to make a significant contribution to major science events throughout Ireland;
- to bring our education services to as many people as is possible through visits to the Planetarium and through the Planetarium's Outreach Service and in so doing also contribute to the development of cultural tourism in Armagh City and District;
- to use the Skills and Science funding to enhance and expand our educational outreach programme and to create new shows and activities and to revive evening and daytime observing events. To do this we will be purchasing modern equipment to better demonstrate the cosmos to our visitors and to exploit the resurgent interest in astrophotography;
- to provide equal access to the wonders of space and astronomy to all in our society;
- to seek to maximize income from our services whilst taking account of the needs of those from economically and other deprived backgrounds;
- to develop the Planetarium as the European Space Agency's outlet for space education in Ireland in partnership with colleagues and sister institutions in the Republic of Ireland.

## Performance measures 2007/2008

In order to measure our effectiveness in pursuing these objectives in 2007/2008 we will record performance against targets for the primary performance measures set out in the table below:

Performance Measure	Target
Visitor numbers	67,000
Outreach numbers	12,000
Virtual Planetarium visitors	50,000
TSN numbers reached included above	1,000
Skills and Science outreach numbers	10,000
Income from admissions	£243,000
Income from Outreach Services	£12,900
Income from shop and mail order sales	£100,000
External income as a % of total income	41%
Total cost per visitor/outreach	£10

## Actions required in 2007/2008 to achieve performance targets

### Building refurbishment

As we bring the building to full operational status we have continued to refine the accommodation, fittings and displays to allow for a more efficient use of space.

### Staff Resources

In order to sustain 6-day per week opening, the full staff complement of education and support staff needs to be carefully rostered to alleviate the long hours that accumulate at busy periods. The Skills and Science funding has enabled us to maintain a significant outreach presence, but as this is intensive of staff time and travelling it will be kept under constant review. It is a valuable service and is worth retaining.

### Public Shows

Since reopening we have successfully shown three shows designed and programmed in house, *Pole Position* looks at the four seasons in the heavens: the summer, autumn and spring versions have been finished and the remaining season winter is in progress. We have also shown purchased shows, *Big*, *Sunshine*, *Astronaut*, *Wonders of the Universe* and *The Mystery of the Christmas Star*. We are planning to buy two new shows this year and, in addition, two new in-house shows are in production, one of them a new interactive

venture that is an experimental departure from the norm. We are acting as co-producers of a new Mars show with Evans & Sutherland, and we have restored Armagh Planetarium's reputation as an innovative centre for show production and ideas that can be promulgated to other planetaria around the world. The shows are tailored to suit the needs of the many different individuals and groups who visit the Planetarium.

The shows for schools are designed to support the teaching curriculum. Curriculum development and teacher training are topics in which the Planetarium is increasingly involved, and we anticipate that this aspect of our work will grow this coming year.

### **Exhibit Area**

We are planning to enhance the exhibit spaces with some new interactive exhibits. One has already been installed, and it is Ireland's first interactive floor display.

### **European collaboration: Northern Ireland Space Office (NISO)**

In the European scene, we now have a new Northern Ireland Space Office (NISO) in place and staffed by Robert Hill, who has been seconded from the Planetarium. We have building modification plans to allow a refit of the Planetarium bungalow, if the money can be found for the necessary refit. Our lobbying has firmly placed Armagh Planetarium at the forefront of the European agenda, and we have been leaders in new projects with the Faulkes robotic telescopes, Earth Observation schools programme (European Union Hands on Universe project), and the MINERVA programme in partnership with our European colleagues. We also have worked with the European Space Agency, EURISY, UNESCO and the British Council on various international projects that are planned to be operated further afield. We are now serving on influential committees of many of these agencies which are deciding the future direction of space education.

### **New Targeting Social Needs (NTSN)**

In all of our work we are conscious of the New Targeting Social Need programme (NTSN) and we strive to include as many underprivileged or otherwise disadvantaged schools or other bodies in our work as possible. The Outreach Programme lends itself well to this work and the new Planetarium is a much more user friendly space for those with special needs or disabilities. We have already run a number of special days for special needs schools and these have been received with acclaim.

### **Skills and Science Funds**

The addition of Skills and Science funds to the Planetarium's budget has allowed us to make more of our Outreach Programme, to add in new displays and other elements in the public spaces that will enhance the Planetarium experience for visitors as well as making for a more interesting Virtual Planetarium visit. We have embarked on an ambitious plan to upgrade and modernise our virtual presence in cyberspace. We anticipate that this will result in 50,000 virtual visitors looking at our site. The key additions that have been funded by the Skills and Science funding include a rejuvenation of our telescope activities for visitors. We have planned special events around this aspect of our public education work in May and in the autumn.

### **Advertising**

We will participate in a new advertising activity with the Mars confectionery organisation through the launch of a new confectionery, Mars Planets. This will promote the name of the Armagh Planetarium in 359 major retail outlets.

## Change in the Pension Scheme Accounting Policy

The corporation provides pension benefits to its employees by participating in the Northern Ireland Local Government Officers' Superannuation Committee (NILGOSC) Pension Scheme, which is a defined benefit scheme. In previous years the corporation was unable to identify its share of the underlying assets and liabilities and accordingly contributions were accounted for on a multi-employer contribution basis in accordance with the provisions of Financial Reporting Standard (FRS) 17. In 2005/2006 the NILGOSC scheme actuary was able to split the scheme's assets and liabilities between the employing authorities and accordingly the corporation is required under FRS 17 to change the application of FRS 17 from a multi-employer scheme to a defined benefit scheme under which the operating costs of providing retirement benefits to the corporation's employees are recognised in the 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.

The NILGOSC actuary, Hymans Robertson LLP, has provided the necessary disclosures required for a defined benefit scheme under FRS 17 and these have been included in the 2006/2007 accounts. The accounts for 2005/2006 have been restated to provide a comparison between the two years. At 31 March 2007 the Observatory has a pension scheme liability of £422,000 (2005/2006: £68,000) and the Planetarium has a pension scheme liability of £333,000 (2005/2006: £71,000).

## Revaluation of Land and Buildings

The corporation's land and buildings were revalued at 31 March 2007 by the Valuation & Lands Agency, an agency within the Department of Finance and Personnel, in accordance with the Appraisal and Valuation Standards (the Red Book 5<sup>th</sup> edition) prepared and published by the Royal Institution of Chartered Surveyors. The surplus on revaluation, £2,289,996 for the Observatory and £3,756,724, has been credited to the designated funds reserve in the respective balance sheets.

## Armagh Observatory

### Income

The Observatory received baseline funding of £660,000 (2005/2006: £660,000) from the DCAL for the general operating costs of the organization and additional recurrent grant of £4,600 for the fees charged by the NILGOSC actuary to provide the information on the pension scheme required by FRS 17. The DCAL also provided new funding of £124,955 under the Government Skills and Science Funding Package for the Observatory's Education and Public Outreach programmes.

The total of external research grants received during the year was £163,150 (2005/2006: £207,947). This is lower than in the previous year as no grant income was received for the Cosmogrid project owing to a delay in the recruitment of suitably qualified research staff to fill vacancies which arose during the year.

### Resources Expended

Total resources expended of £1,063,597 increased by £45,459 (2005/2006: £1,018,138). The main reasons for the increase in costs were: (i) higher buildings maintenance costs arising from the need to replace many of the doors in the buildings as a result of the fire risk assessment carried out in the year; (ii) charges for the first time this year of professional fees from the Properties Division of the Department of Finance and Personnel for buildings maintenance work and the actuary's fees for the FRS 17 work (funded by additional grant from the DCAL); (iii) higher costs for computer consumables including software and licences for the research infrastructure; (iv) higher library costs due to the re-binding of a further 266 volumes as part of the ongoing programme of restoration and preservation of the Observatory's historic books and journals; (v) contributions made to the operating costs of the 10-metre class telescope at the Sutherland Outstation of the Southern African Astronomical Observatory; (vi) additional conferences in the year - the Lindsay Centennial Conference and the Cross-Border Schools Science Conference, both of which were funded by the Skills and Science Funding Package; and (vii) higher recruitment costs due to the recruitment of three Research Astronomers.

### Fixed Assets Additions

The Observatory received capital grant of £6,500 and in-year capital funding of £14,967 to maintain its investment in computer equipment for the research infrastructure and £23,425 from the Skills and Science Funding Package for equipment for the Observatory's Education and Public Outreach programmes. The work on the restoration of the Observatory's historic telescopes was completed in the year and the remainder of the resin surface of the Human Orrery was laid.

### Pension Liability

The pension scheme liability, as measured by the NILGOSC actuary, was £422,000 at 31 March 2007 (2005/2006: £68,000). In 2006/2007 the net discount rate to be applied to the value placed on future pension scheme liabilities was changed under Government accounting rules from 2.8% to 2.1% (equal to the yields available on long-dated, high quality bonds). The effect of this change is that

more future money (higher liabilities) will be required to provide the desired final amount for the pension benefits which will accrue. It is likely that the employer pension contribution rate will increase in future years to provide sufficient funds for the pension liability.

### **Unrestricted Reserves**

Unrestricted reserves at 31 March 2007 have gone into a deficit of £289,921, mainly as a result of the introduction into the accounts of the pension liability. However cash reserves, after adjusting for the pension liability, are £132,079 and represent a reasonable level of funds for future cash needs and other contingencies.

### **Factors which will Influence Future Financing Requirements**

Recurrent grant from the DCAL is anticipated to be £660,000 for the year ending 31 March 2008, the same level of funding announced by the DCAL for the previous four years. This level of core funding is insufficient to maintain the current planned programmes of research, outreach and public understanding of science for the year. If no additional funding is obtained, it will be necessary to fund the shortfall in income from the Observatory's unrestricted cash reserves.

## **Armagh Planetarium**

### **Income**

The Armagh Planetarium received funding from the DCAL of £390,000 (2005/2006: £390,000) for general operating costs together with a further £5,400 for the actuary's fees for the FRS 17 disclosures. The DCAL also provided £6,436 (2005/2006: £6,404) for equipment, £178,847 (2005/2006: £2,190,886) for the completion of the buildings refurbishment project and £174,423 (2005/2006: £nil) under the Skills and Science Funding Package to support the Planetarium's education and outreach programme.

The Planetarium reopened to the public on 31 July 2006 and as a result generated valuable additional funds from admissions of £127,495 (2005/2006: £nil) and shop and mail order sales of £61,949 (2005/2006: £19,864).

### **Resources Expended**

Total expenditure of £972,537 (2005/2006: £2,602,647) decreased from the previous year because of lower costs on the buildings refurbishment project. Other operating expenditure was substantially above the previous year because of additional costs arising from the restoration of full operations: three of the vacant posts were filled; agency staff costs increased with the restoration of weekend and evening opening; contract cleaning was introduced for the main building; and heat, light and power and general buildings maintenance costs all increased.

### **Fixed Asset Additions**

Fixed assets additions, totalling £123,601, were funded by the Skills and Science Funding Package and grant from the DCAL. These grants provided funds for the purchase of new equipment for the education services and new exhibits for the main building.

### **Pension Liability**

The pension scheme liability, as measured by the NILGOSC actuary, was £333,000 at 31 March 2007 (2005/2006: £71,000). The Planetarium faced a similar increase to the Observatory in pension scheme liabilities due to a change in the discount rate applied to future liabilities and it is likely that employer pension contribution rate will increase in future years to provide sufficient funds for the pension liability.

### **Unrestricted Reserves**

Unrestricted reserves at 31 March 2007 have gone into a deficit of £325,347, mainly as a result of the introduction of the pension liability into the accounts.

### **Factors which will Influence Future Financing Requirements**

Recurrent grant from the DCAL is anticipated to be £390,000 for the year ending 31 March 2008, the same level of funding announced by the DCAL for the previous four years. The Planetarium re-opened to the public at the end of July 2006 after over 5 years of closure. In 2006/2007 there were 38,724 visitors to the Planetarium and 27,329 persons were reached through the outreach service bringing valuable additional funding for salary and other operating costs. The key task for the Planetarium over 2007/2008 and subsequent years is to build on visitor and outreach numbers and in so doing maximise the full potential of the Planetarium's science education services and provide very valuable additional sources of income for operational costs.

## Remuneration Report — Armagh Observatory

The salary and pension entitlements of the Director of the Observatory were as follows:

Director	Salary	Accrued Pension at 31 March 2007	Real Increase in Accrued Pension	Accrued Lump Sum at 31 March 2007	Real Increase in Lump Sum	CETV at 31 March 2006	CETV at 31 March 2007	Real Increase in CETV
	£	£	£	£	£	£	£	£
Professor M.E. Bailey	53,298	17,736	670	53,209	2,010	272,496	297,496	21,807

This section is subject to audit.

**Signed:**

**Professor Mark Bailey**  
Accounting Officer for the Armagh Observatory

**Date: 11 July 2007**

## Remuneration Report — Armagh Planetarium

The salary and pension entitlements of the Director of the Planetarium were as follows:

Director	Salary	Accrued Pension at 31 March 2007	Real Increase in Accrued Pension	Accrued Lump Sum at 31 March 2007	Real Increase in Lump Sum	CETV at 31 March 2006	CETV at 31 March 2007	Real Increase in CETV
	£	£	£	£	£	£	£	£
Dr T.R. Mason	53,298	7,106	668	21,317	2,003	83,560	105,451	20,362

This section is subject to audit.

**Signed:**

**Dr Tom Mason**  
Accounting Officer for the Armagh Planetarium

**Date: 11 July 2007**

1. The Directors of the Observatory and Planetarium are the persons in senior positions having authority and responsibility for directing and controlling the activities of their respective organisations.
2. The salary of each Director shown above comprises gross salary and a performance bonus. Gross salary is based on the Northern Ireland Civil Service Grade 6 pay scale. The maximum performance bonus entitlement in the year was £400. Neither of the Directors receives any benefits in kind.
3. The service contracts of the Directors are open-ended until they reach the normal retirement age of 65.
4. Pension benefits are provided through the Northern Ireland Local Government Officers' Superannuation Committee Pension Scheme (NILGOSC). Members pay contributions of 6% of pensionable earnings to the scheme up until retirement. On retirement, benefits payable are: (i) a retirement pension at a rate of 1/80<sup>th</sup> 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.
5. 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 which the individual has transferred to the NILGOSC.
6. 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.

## **Statement of the Responsibilities of the Governors and Accounting Officers**

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 DCAL, with the approval of the Department of Finance and Personnel, shall direct. The Accounting Officer of the DCAL has designated the respective Directors of the Armagh Observatory and Planetarium as the corporation's Accounting Officers. As Accounting Officers the Directors take personal responsibility for the propriety and regularity of the public finances for which they are answerable and for the keeping of proper accounts. They are required to sign the accounts thereby accepting personal responsibility for their proper presentation and to sign the Statement of Internal Control. Their relevant responsibilities as Accounting Officers, including their responsibilities for the propriety and regularity of the public finances and for the keeping of proper records, are set out in the Non-Departmental Accounting Officer Memorandum issued by the Department of Finance and Personnel.

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" issued in October 2000 (SORP 2000). 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;
- 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 Officers are 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 Officers of the Armagh Observatory and the Armagh Planetarium in office at the date of the approval of these financial statements are aware:

- there is no relevant audit information relating to their respective organizations of which the auditors are unaware; and
- they have taken all the steps that they ought to have taken as Accounting Officers in order to make themselves aware of any relevant audit information relating to their respective organizations and to establish that the auditors are aware of that information.

## **Armagh Observatory — Statement on Internal Control**

As Accounting Officer for the Armagh Observatory I have responsibility for maintaining a sound system of internal control that supports the achievement of the policies, aims and objectives of the Armagh Observatory, whilst safeguarding public funds and the assets of the Armagh Observatory for which I am personally responsible in accordance with the responsibilities assigned to me by the Governors of the Armagh Observatory and Planetarium and in Government Accounting Northern Ireland.

The system of internal control is designed to manage risk to a reasonable level, rather than to eliminate all risk of failure to achieve policies, aims and objectives; it can therefore only provide reasonable and not absolute assurance of effectiveness. The system of internal control is based on an ongoing process designed to identify and prioritise the risks to the achievement of the Armagh Observatory'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 control has been in place in the Armagh Observatory for the year ended 31 March 2007 and up to the date of approval of the annual accounts, and accords with Department of Finance and Personnel guidance. The main procedures in place to monitor the effectiveness of the system of internal control are as follows:

- Regular meetings with officials from the DCAL to consider both operational and strategic issues and matters relating to the system of internal control.
- 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 national and international standing.
- Peer review of the research quality, capability and output of the Observatory through participation in the periodic Research Assessment Exercise.
- Regular reports by administrative 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 from internal auditors to the Internal Audit Committee on the system of internal control, which provide an opinion on the adequacy and effectiveness of the system and contain recommendations for improvement.
- 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.
- Periodic review of the Armagh Observatory Risk Register by the Director and the Administrator, and also by the Armagh Observatory and Planetarium Internal Audit Committee. The principal risks to the achievement of the Armagh Observatory's policies, aims and objectives have been identified and recorded in the Armagh Observatory Risk Register together with the controls in place and any further controls required to manage the risk effectively, efficiently and economically. Reports on emerging issues and strategies to deal with any associated risks are made to the DCAL and to the Management Committee and Board of Governors of the Armagh Observatory and Planetarium at their regular meetings.

As Accounting Officer, I have responsibility for reviewing the effectiveness of the system of internal control. My assessment is informed by the work of the internal auditors and the senior staff within the Armagh Observatory who have responsibility for the development and maintenance of the internal control framework, and by the comments made by the external auditors in their management letter and other reports. I have been advised on the effectiveness of the system of internal control and plan to address any weaknesses so as to ensure continuous improvement of the system.

A number of minor weaknesses were identified during the financial year 2006/2007 as part of the annual audit and appropriate action has been taken to resolve them.

**Signed:**

**Professor Mark Bailey**  
**Accounting Officer for the Armagh Observatory**

**Date: 11 July 2007**

## **Armagh Planetarium — Statement on Internal Control**

As Accounting Officer for the Armagh Planetarium I have responsibility for maintaining a sound system of internal control that supports the achievement of the policies, aims and objectives of the Armagh Planetarium, whilst safeguarding public funds and the assets of the Armagh Planetarium for which I am personally responsible in accordance with the responsibilities assigned to me by the Governors of the Armagh Observatory and Planetarium and in Government Accounting Northern Ireland.

The system of internal control is designed to manage risk to a reasonable level rather than to eliminate all risk of failure to achieve policies, aims and objectives; it can therefore only provide reasonable and not absolute assurance of effectiveness. The system of internal control is based on an ongoing process designed to identify and prioritise the risks to the achievement of the Armagh Planetarium's policies, aims and objectives, to assess the likelihood of the events occurring and the impact should they be realised, and to manage them effectively, efficiently and economically. The system of internal control has been in place in the Armagh Planetarium for the year ended 31 March 2007 and up to the date of approval of the annual accounts, and accords with Department of Finance and Personnel guidance. The main procedures in place to monitor the effectiveness of the system of internal control are as follows:

- Periodic review of the Armagh Planetarium Risk Register by the Director and the Administrator, and also by the Armagh Observatory and Planetarium Internal Audit Committee. The principal risks to the achievement of the Armagh Planetarium's policies, aims and objective have been identified and recorded in the Armagh Planetarium Risk Register together with the controls in place and any further controls required to manage the risk effectively, efficiently and economically. Reports on emerging issues and strategies to deal with any associated risks are made to the DCAL and to the Management Committee and Board of Governors of the Armagh Observatory and Planetarium at their regular meetings.
- Detailed progress reports to the Management Committee and Board of Governors at their regular meetings, and inclusion of performance measures in the annual operating plan.
- Regular meetings with officials from the DCAL to consider both operational and strategic issues and matters relating to the system of internal control.
- Annual reports from the internal auditors to the Internal Audit Committee on the system of internal control, which provide an opinion on the adequacy and effectiveness of the system and contain recommendations for improvement.
- 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.
- Regular reports by administrative staff on progress against principal financial targets and the projected financial outcome for the year and progress reports provided by staff responsible for major projects.

As Accounting Officer, I have responsibility for reviewing the effectiveness of the system of internal control. My assessment is informed by the work of the internal auditors and the senior staff within the Armagh Planetarium who have responsibility for the development and maintenance of the internal control framework, and by the comments made by external auditors in their management letter and other reports. I have been advised on the effectiveness of the system of internal control and plan to address any weaknesses so as to ensure continuous improvement of the system.

A number of minor weaknesses were identified as part of the annual audit for the 2006/2007 financial year and appropriate action has been taken to resolve them.

**Signed:**

**Dr Tom Mason**  
**Accounting Officer for the Armagh Planetarium**

**Date: 11 July 2007**

# **The Armagh Observatory and Planetarium**

## **The Certificate and Report of the Comptroller and Auditor General to The Northern Ireland Assembly**

I certify that I have audited the financial statements of the Armagh Observatory and Planetarium for the year ended 31 March 2007 under the Audit and Accountability (Northern Ireland ) Order 2003. These comprise the Statements of Financial Activities, the Balance Sheets, the Cashflow Statements and the Statements of Total Recognised Gains and Losses 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 Reports that is described in those reports as having being audited.

### **Respective responsibilities of the Governors, Accounting Officers and Auditor**

The Governors and Accounting Officers are responsible for preparing the Annual Report, the Remuneration Reports and the financial statements in accordance with the Audit and Accountability (Northern Ireland ) Order 2003 and Department of Culture Arts and Leisure directions made thereunder and for ensuring the regularity of financial transactions. These responsibilities are set out in the Statement of the Responsibilities of the Governors and Accounting Officers.

My responsibility is to audit the financial statements and the parts of the remuneration reports to be audited in accordance with relevant legal and regulatory requirements, and with International Standards on Auditing (UK and Ireland).

I report to you my opinion as to whether the financial statements give a true and fair view and whether the financial statements and the parts of the Remuneration Reports to be audited have been properly prepared in accordance with the Audit and Accountability (Northern Ireland) Order 2003 and Department of Culture Arts and Leisure directions made thereunder. I report to you whether, in my opinion, certain information given in the Annual Report, which comprises the Management Commentary, Corporate Governance, the Armagh Observatory – Operating Review, the Armagh Planetarium – Operating Review, the Armagh Observatory and Planetarium – Financial Review for the year ended 31 March 2007 and the Remuneration Reports, is consistent with the financial statements. I also report whether in all material respects the expenditure and income have been applied to the purposes intended by Parliament and the financial transactions conform to the authorities which govern them.

In addition, I report to you if the Armagh Observatory and Planetarium has not kept proper accounting records, if I have not received all the information and explanations I require for my audit, or if information specified by the Department of Finance and Personnel regarding remuneration and other transactions is not disclosed.

I review whether the Statements on Internal Control reflects the Armagh Observatory and Planetarium's compliance with the Department of Finance and Personnel's guidance, and I report if they do not. I am not required to consider whether these statements cover all risks and controls, or form an opinion on the effectiveness of the Armagh Observatory and Planetarium's corporate governance procedures or its risk and control procedures. I read the other information contained in the Annual Report and consider whether it is consistent with the audited financial statements. I consider the implications for my report if I become aware of any apparent misstatements or material inconsistencies with the financial statements. My responsibilities do not extend to any other information.

### **Basis of audit opinion**

I conducted my audit in accordance with International Standards on Auditing (UK and Ireland) issued by the Auditing Practices Board. My audit includes examination, on a test basis, of evidence relevant to the amounts, disclosures and regularity of financial transactions included in the financial statements and the parts of the Remuneration Reports to be audited. It also includes an assessment of the significant estimates and judgments made by the Governors and Accounting Officers in the preparation of the financial statements, and of whether the accounting policies are most appropriate to the Armagh Observatory and Planetarium's circumstances, consistently applied and adequately disclosed.

I planned and performed my audit so as to obtain all the information and explanations which I considered necessary in order to provide me with sufficient evidence to give reasonable assurance that the financial statements and the parts of the Remuneration Reports to be audited are free from material misstatement, whether caused by fraud or error, and that in all material respects the expenditure and income have been applied to the purposes intended by Parliament and the financial transactions conform to the authorities which govern them. In forming my opinion I also evaluated the overall adequacy of the presentation of information in the financial statements and the parts of the Remuneration Reports to be audited.

### **Opinions**

#### **Audit Opinion**

In my opinion:

- the financial statements give a true and fair view, in accordance with the Audit and Accountability (Northern Ireland ) Order 2003 and directions made thereunder by the Department of Culture Arts and Leisure, of the state of the Armagh Observatory and

Planetarium's affairs as at 31 March 2007 and of its movement in funds after cost of capital, cash flows and total recognised gains and losses for the year then ended;

- the financial statements and the parts of the Remuneration Reports to be audited have been properly prepared in accordance with the Audit and Accountability (Northern Ireland ) Order 2003 and Department of Culture Arts and Leisure directions made thereunder; and
- information given within the Annual Report, which comprises the Management Commentary, Corporate Governance, the Armagh Observatory – Operating Review, the Armagh Planetarium – Operating Review, the Armagh Observatory and Planetarium – Financial Review for the year ended 31 March 2007 and the Remuneration Reports, is consistent with the financial statements.

#### **Audit Opinion on Regularity**

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

#### **Report**

I have no observations to make on these financial statements.

**J M Dowdall CB**  
**Comptroller and Auditor General**  
**Date: 30 July 2007**

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

# Armagh Observatory

## Statement of financial activities for the year ended 31 March 2007

	Notes	Unrestricted funds 2007 £	Restricted funds 2007 £	Total funds 2007 £	Total funds 2006 Restated £
<b>Incoming resources</b>					
DCAL grants	2	664,600	146,422	811,022	791,500
Other grants and receipts	2	-	163,150	163,150	207,947
Interest receivable		9,054	-	9,054	6,577
Rents		5,999	-	5,999	4,050
Miscellaneous income		1,383	-	1,383	2,301
Transfer to deferred income	11	-	(25,157)	(25,157)	(63,012)
Transfer from deferred income	11	-	49,678	49,678	44,416
Transfer between funds		132,397	(132,397)	-	-
<b>Total incoming resources</b>		<b>813,433</b>	<b>201,696</b>	<b>1,015,129</b>	<b>993,779</b>
<b>Resources expended</b>					
Direct expenditure of the corporation	3	707,258	139,602	846,860	845,235
Fundraising and publicity	4	-	-	-	-
Management and administration of the corporation	6	151,763	2,279	154,042	108,184
Capital expenditure		-	62,695	62,695	64,719
<b>Total resources expended</b>		<b>859,021</b>	<b>204,576</b>	<b>1,063,597</b>	<b>1,018,138</b>
<b>Net incoming resources for the year before cost of capital</b>					
		(45,588)	(2,880)	(48,468)	(24,359)
Cost of capital		-	(31,348)	(31,348)	(35,314)
<b>Net movement in funds after cost of capital</b>		<b>(45,588)</b>	<b>(34,228)</b>	<b>(79,816)</b>	<b>(59,673)</b>
Cost of capital reversed		-	31,348	31,348	35,314
<b>Net movement in funds</b>		<b>(45,588)</b>	<b>(2,880)</b>	<b>(48,468)</b>	<b>(24,359)</b>
Other finance income - pension scheme		18,000	-	18,000	1,000
<b>Net movement in funds after other finance income</b>		<b>(27,588)</b>	<b>(2,880)</b>	<b>(30,468)</b>	<b>(23,359)</b>
Balances brought forward at					
1 April as previously stated		83,667	10,173	93,840	147,199
Prior year adjustment		(346,000)	-	(346,000)	(30,000)
Balances brought forward restated		(262,333)	10,173	(252,160)	117,199
<b>Balances carried forward at 31 March</b>	13, 14	<b>(289,921)</b>	<b>7,293</b>	<b>(282,628)</b>	<b>93,840</b>

All amounts above relate to continuing operations of the corporation.

The income and expenditure summary is included at Note 8.

Cost of capital at 3.5% has been charged on the average net assets of the corporation, excluding the net book value of donated assets. As this is a notional charge the cost of capital is reversed in the Statement of Financial Activities.

## Statement of total recognised gains and losses

	2007 £	2006 Restated £
Net movement in funds for the year after other finance income	(30,468)	(23,359)
Surplus arising from the revaluation of land and buildings	2,289,996	-
Net movement on government grant reserve	(19,077)	(7,738)
Net movement on donated assets reserve	(14,693)	(4,870)
Actuarial gain/(loss) on pension scheme	(346,000)	129,000
<b>Total gains/(losses) recognised for the year</b>	<b>1,879,758</b>	<b>93,033</b>
Prior year adjustment - FRS 17	20	(68,000)
<b>Total gains/(losses) recognised since the last annual report</b>	<b>1,811,758</b>	

## Armagh Observatory

### Balance sheet at 31 March 2007

	Notes	2007 £	2006 Restated £
<b>Tangible assets</b>	9	3,750,482	1,494,256
<b>Current assets</b>			
Debtors	10	39,677	31,384
Cash at bank and in hand	18, 19	229,311	243,143
		268,988	274,527
<b>Creditors: amounts falling due within one year</b>	11	(145,336)	(128,407)
<b>Net current assets</b>		123,652	146,120
<b>Net assets excluding pension liability</b>		3,874,134	1,640,376
<b>Pension liability</b>	20	(422,000)	(68,000)
<b>Net assets</b>		3,452,134	1,572,376
<b>Funds</b>			
Unrestricted	13	(289,921)	83,667
Restricted	14	7,293	10,173
Government grant reserve	12	781,585	800,662
Designated	16	2,953,177	677,874
		3,452,134	1,572,376

The financial statements on pages 21 to 36 were approved on 11 July 2007 and were signed by:

\_\_\_\_\_  
Professor Mark Bailey, Accounting Officer for the Armagh Observatory

## Armagh Observatory

### Cash flow statement for the year ended 31 March 2007

	Notes	2007 £	2006 Restated £
<b>Net cashflow from operating activities</b>		(4,819)	(12,627)
<b>Returns on investments and servicing of finance</b>			
Interest received		9,054	6,577
Interest paid and similar charges		(67)	(15)
Other finance income - pension scheme		(18,000)	(1,000)
		(9,013)	5,562
<b>Capital expenditure</b>			
Purchase of tangible assets		(62,695)	(64,719)
Capital grants received		62,695	64,719
		-	-
<b>Net cash (outflow)/inflow before financing and management of liquid resources</b>		(13,832)	(7,065)
<b>Management of liquid resources</b>			
Movement in First Trust deposit account		(6,151)	(16,435)
<b>Net cash outflow from management of liquid resources</b>		(6,151)	(16,435)
<b>(Decrease)/increase in cash in the year</b>	18, 19	(19,983)	(23,500)

### Reconciliation of operating result to net cash flow

	2007 £	2006 Restated £
Net incoming resources per statement of financial activities	(30,468)	(23,359)
Interest received	(9,054)	(6,577)
Interest paid and similar charges	67	15
Depreciation	96,465	86,257
Pension service costs	26,000	39,000
Release of deferred credit - Government grant reserve	(81,772)	(72,457)
Release of deferred credit - donated asset reserve	(14,693)	(13,800)
(Increase)/decrease in debtors	(8,293)	35,594
Increase/(decrease) in creditors	16,929	(57,300)
<b>Net cash (outflow)/inflow from operating activities</b>	(4,819)	(12,627)

# Armagh Observatory

## Notes to the financial statements for the year ended 31 March 2007

### 1 Accounting policies

These financial statements are prepared on the going concern basis under the historical cost convention, as modified by the revaluation of certain tangible fixed assets, and in accordance with The Audit and Accountability (Northern Ireland) Order 2003, directions made thereunder by the Department of Culture, Arts and Leisure and applicable accounting standards. The principal accounting policies are set out below.

#### 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:

	%
Furniture and fittings	10 - 15
Office equipment	10 - 25
Scientific equipment and other equipment	15 - 25
Land and buildings	1 - 2
Astropark	5

Land and buildings are included in the balance sheet at depreciated replacement cost, estimated value in use or market value.

#### Government grants

The Government Financial Reporting Manual requires that grants are to be shown as a movement in reserves rather than as income. However, as the corporation is required to prepare accounts in accordance with the SORP for charities, the DCAL has given the corporation permission to continue to treat grants as income.

Grants that relate to specific capital expenditure are treated as deferred income which is then credited to the income and expenditure account over the related asset's useful life. Other grants are credited to the statement of financial activities when received.

#### Pension scheme

The corporation provides pension benefits to its employees by participating in the Northern Ireland Local Government Officers' Superannuation Committee (NILGOSC) Pension Scheme, 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 corporation'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. This is a change in accounting policy due to the implementation of FRS 17 in 2006/2007. Prior year figures have been restated accordingly.

#### Fund accounting

The corporation 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 Governors in furtherance of the objectives of the corporation. In addition to expenditure on the provision of services, such funds may be held in order to finance capital investment and working capital.

# Armagh Observatory

## 2 Incoming Resources

The accounts reflect the receipt of the following grants:

### Grants from the Department of Culture, Arts and Leisure (DCAL)

	Unrestricted funds 2007 £	Restricted funds 2007 £	Total funds 2007 £	Total funds 2006 £
Recurrent grant	660,000	-	660,000	660,000
In-year recurrent grant	4,600	-	4,600	90,000
Capital grant	-	6,500	6,500	6,500
In-year capital grant	-	14,967	14,967	35,000
Skills and Science Funding Package	-	124,955	124,955	-
	664,600	146,422	811,022	791,500

### Other grants and receipts

	Unrestricted funds 2007 £	Restricted funds 2007 £	Total funds 2007 £	Total funds 2006 £
PPARC Research, Visitor and Travel grants	-	147,258	147,258	129,302
Programme for Research in Third Level Institutions - Cosmograd project	-	-	-	56,490
Miscellaneous travel grants	-	1,292	1,292	1,212
Lindsay Scholarship	-	7,699	7,699	16,749
INTAS	-	-	-	706
The Royal Society	-	5,041	5,041	3,400
Other grants and receipts	-	1,860	1,860	88
	-	163,150	163,150	207,947

## 3 Direct expenditure of the corporation

	Unrestricted funds 2007 £	Restricted funds 2007 £	Total funds 2007 £	Total funds 2006 Restated £
Salaries and wages	436,783	100,366	537,149	542,775
Student maintenance grants	107,333	3,075	110,408	116,390
Scholarship and training	10,813	-	10,813	12,793
Travelling and subsistence	20,418	22,073	42,491	46,993
Technical maintenance and computer consumables	24,019	3,437	27,456	17,945
Library and publications	46,340	-	46,340	32,659
JANET access service	-	-	-	(656)
Northern Ireland Regional Area Network	19,388	-	19,388	25,850
Contribution to UKSC and SALT operating costs	11,000	-	11,000	-
Radio Telescope for Ireland Project	-	-	-	3,484
Meetings and conferences	2,351	9,271	11,622	-
Historic books and instruments	928	-	928	-
Visitor programme	1,885	1,380	3,265	8,002
Pension service cost	26,000	-	26,000	39,000
	707,258	139,602	846,860	845,235

## Armagh Observatory

### 4 Fundraising and publicity

	Unrestricted funds 2007	Restricted funds 2007	Total funds 2007	Total funds 2006
	£	£	£	£
	-	-	-	-

### 5 Travel and subsistence

Restricted travel and subsistence is funded in the main from external grant aid from the Particle Physics and Astronomy Research Council (PPARC).

### 6 Management and administration of the corporation

	Unrestricted funds 2007	Restricted funds 2007	Total funds 2007	Total funds 2006
	£	£	£	£
Insurance	11,132	-	11,132	13,027
Heat, light and power	26,620	-	26,620	26,567
Rates	312	-	312	276
Property and grounds maintenance	43,122	-	43,122	16,945
Grounds agency staff costs	15,733	-	15,733	15,787
Postage and telephone	5,524	-	5,524	4,684
Recruitment costs	10,353	-	10,353	708
General expenses	4,559	2,279	6,838	5,289
Cleaning costs	708	-	708	1,437
Management Committee	837	-	837	804
Office equipment	4,494	-	4,494	2,593
Bank charges	67	-	67	15
Audit	5,463	-	5,463	4,680
Other professional fees	16,498	-	16,498	10,850
Stationery, printing and advertising	4,404	-	4,404	4,522
Losses and special payments	1,937	-	1,937	-
Depreciation	-	96,465	96,465	86,257
Release from grants reserve	-	(81,772)	(81,772)	(72,457)
Release from donated asset reserve	-	(14,693)	(14,693)	(13,800)
	151,763	2,279	154,042	108,184

#### Note - Losses and Special Payments

A member of staff signed a carrier's consignment documentation confirming that 3 items had been delivered to the Observatory on 2 March 2007. It was subsequently discovered that only 2 items were delivered and a portable computer costing £1,937 was missing. A full report on the matter was submitted to the DCAL in accordance with the provisions of Government Accounting Northern Ireland and permission was received to write off the loss.

## Armagh Observatory

### 7 Average staff numbers and related costs

#### Average staff numbers

	2007	2006
	Number	Number
Permanent staff	11	13
Fixed-term contract staff	4	3
Agency staff	1	1
	16	17

Included within permanent staff numbers is the corporation's Administrator whose salary is apportioned on a 50:50 basis between the Observatory and Planetarium.

#### Costs

	2007	2006
	£	£
<b>Permanent staff</b>		
Wages and salaries	367,642	396,924
Social security costs	29,254	32,586
Pension costs	39,887	31,119
	436,783	460,629
<b>Fixed-term contract staff costs</b>		
Wages and salaries	86,460	72,681
Social security costs	7,505	5,776
Pension costs	6,401	3,689
	100,366	82,146
<b>Total permanent and fixed-term contract staff</b>	537,149	542,775
Agency staff costs	15,733	15,787
<b>Total staff costs</b>	552,882	558,562

Permanent staff costs include 50% of the salary costs of the corporation's Administrator and the costs of cleaning and security costs shared with the Planetarium.

### Average student numbers and related costs

	2007	2006
	Number	Number
PhD students	9	10
	2007	2006
	£	£
Student maintenance grants	110,408	116,390

### 8 Income and expenditure summary

	2007	2006
	£	Restated £
<b>Gross income</b>	952,434	929,060
<b>Expenditure</b>		
Direct charitable expenditure (note 3)	846,860	806,235
Fund raising and publicity (note 4)	-	-
Management and administration of the corporation (note 6)	154,042	146,184
	1,000,902	952,419
Other finance income	18,000	1,000
<b>Surplus/(deficit) for the year</b>	(30,468)	(22,359)

# Armagh Observatory

## 9 Tangible fixed assets

	Freehold Land & buildings £	Exhibits and grounds £	Astropark £	Furniture Fittings £	Office Eqpt. £	Equipment & Historic telescopes £	Total £
<b>Cost or valuation</b>							
At 1/4/06	2,124,782	102,667	367,490	86,017	97,253	768,776	3,546,985
Revaluation	1,833,294	-	-	-	-	-	1,833,294
Additions	1,538	-	-	-	-	61,157	62,695
Disposals	-	-	-	-	(7,696)	(22,310)	(30,006)
Transfers	79,074	(79,074)	-	-	-	-	-
<b>At 31 March 2007</b>	<b>4,038,688</b>	<b>23,593</b>	<b>367,490</b>	<b>86,017</b>	<b>89,557</b>	<b>807,623</b>	<b>5,412,968</b>
<b>Depreciation</b>							
At 1/4/06	1,103,738	5,172	202,122	76,389	78,142	587,166	2,052,729
Reduction on revaluation	(456,702)	-	-	-	-	-	(456,702)
Charge for year	29,130	1,871	18,375	1,369	3,096	42,624	96,465
Disposals	-	-	-	-	(7,696)	(22,310)	(30,006)
Transfers	3,233	(3,140)	-	(1)	(2)	(90)	-
<b>At 31 March 2007</b>	<b>679,399</b>	<b>3,903</b>	<b>220,497</b>	<b>77,757</b>	<b>73,540</b>	<b>607,390</b>	<b>1,662,486</b>
<b>Net book value</b>							
<b>At 31 March 2007</b>	<b>3,359,289</b>	<b>19,690</b>	<b>146,993</b>	<b>8,260</b>	<b>16,017</b>	<b>200,233</b>	<b>3,750,482</b>
<b>Net book value</b>							
<b>At 31 March 2006</b>	<b>1,021,044</b>	<b>97,495</b>	<b>165,368</b>	<b>9,628</b>	<b>19,111</b>	<b>181,610</b>	<b>1,494,256</b>

Tangible fixed asset additions of £62,695 as shown above were funded as follows:

	£
DCAL grant	Buildings, domes and telescopes restoration, Human Orrery and other capital projects
	13,120
	Capital grant
	6,500
	In-year capital grant
	13,030
	Skills and Science Funding Package
	23,425
Research grants	PPARC
	6,620
	<b>62,695</b>

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

	2007 £	2006 £
Cost	659,419	580,345
Aggregate depreciation	(130,919)	(116,078)
<b>Net book value based on historic cost</b>	<b>528,500</b>	<b>464,267</b>

Depreciation on fixed assets for the year was £96,465 (2006: £86,257).

Land and buildings include grounds and buildings with a net book value of £2,604,463 at 31 March 2007 which were donated to the corporation in 1790 by Archbishop Richard Robinson, the founder of the corporation and dwellings with a net book value of £270,000 at 31 March 2007.

# Armagh Observatory

## 10 Debtors

	2007	2006
	£	£
Grant debtors	762	2,970
Prepayments	37,071	28,414
Sundry debtors	1,844	-
	39,677	31,384

## 11 Creditors: amounts falling due within one year

	2007	2006
	£	£
Trade creditors	58,444	36,133
Accruals	35,150	15,474
Deferred income	51,742	76,263
Other creditors	-	537
	145,336	128,407

## Analysis of deferred income

	2007	2006
	£	£
Balance at 1 April	76,263	57,667
Transfer to statement of financial activities	(49,678)	(44,416)
Transfer from statement of financial activities	25,157	63,012
Balance at 31 March	51,742	76,263

## 12 Government grants reserve

	Land and buildings	Exhibits and grounds	Astropark	Furniture Fittings	Equipment & Historic Office Eqpt. telescopes	Total	
	£	£	£	£	£	£	
Balance at 1 April	326,468	98,473	165,368	9,628	19,115	181,610	800,662
Additions	1,538	-	-	-	-	61,157	62,695
Amortised	(15,330)	(978)	(18,375)	(1,369)	(3,096)	(42,624)	(81,772)
Transfers	85,749	(85,749)	-	-	-	-	-
Balance at 31 March	398,425	11,746	146,993	8,259	16,019	200,143	781,585

## Armagh Observatory

### 13 Unrestricted funds

	2007 £
Balance at 1 April	151,667
Prior year adjustment	(68,000)
Balance at 1 April as restated	83,667
Incoming resources	813,433
Resources expended	(859,021)
Other finance income	18,000
Adjustment to the statement of total recognised gains and losses	(346,000)
Balance at 31 March	(289,921)

The unrestricted funds reserve includes a deficit of £422,000 (2005/2006: £68,000) in respect of pension scheme liabilities of the pension fund.

#### **Prior year adjustment and impact of the change in accounting for pensions (FRS17)**

The prior year adjustment relates to the implementation of FRS 17. This has resulted in an increase in direct expenditure of the corporation of £26,000 (2005/2006: £39,000), an increase in finance income of £18,000 (2005/2006: £1,000), a decrease in the net funds movement of £8,000 (2005/2006: £38,000) and a decrease in the total recognised gains and losses of £346,000 (2005/2006: increase of £129,000).

	£
<b>Analysis of prior year adjustment:</b>	
Adjustment to the corporation's opening funds at 1 April 2005	(159,000)
Adjustment to the corporation's net movement in funds for the year ended 31 March 2006	(38,000)
Adjustment to the statement of recognised gains and losses for the year ended 31 March 2006	129,000
	(68,000)

It is the policy of the Armagh Observatory to retain a reasonable level of unrestricted cash reserves for future cash needs and other contingencies. Grants for research purposes together with other grants for specific purposes are normally received in arrears. During the period between the expenditure being incurred and receipt of the corresponding grants, such projects must be funded from unrestricted funds. It is therefore necessary to retain an amount of cash reserves from such funds. In addition a contingency fund is required for development opportunities and possible exceptional expenditure not anticipated in the annual budget.

The balance of unrestricted cash reserves after adjusting for the pension liability of £422,000 is £132,079 at 31 March 2007 and provides funds for 1.3 months of expenditure forecasted for 2007/2008. The Observatory considers this level of unrestricted cash reserves to be reasonable and will seek to maintain it over 2007/2008.

This policy will be reviewed by the Director on an annual basis at the end of the financial year.

	£
<b>Unrestricted cash reserves at 31 March 2007</b>	
Balance on unrestricted reserves at 31 March 2007	(289,921)
Pension scheme liability	422,000
Cash reserves at 31 March 2007	132,079

# Armagh Observatory

## 14 Restricted funds

	Balance 1/4/2006	Incoming resources	Resources expended	Transfer between funds	Transfer from defrd. income	Transfer to defrd. income	Balance 31/3/2007
	£	£	£	£	£	£	£
<b>DCAL grants</b>							
Buildings, Domes and Telescopes, Human Orrery and other capital projects	-	-	(13,120)	(131)	13,251	-	-
SALT	5,031	-	-	-	-	-	5,031
Capital	-	6,500	(6,500)	-	-	-	-
In-year capital grant	-	14,967	(13,030)	-	-	(1,937)	-
Skills and Science Funding Package	-	124,955	(63,754)	(61,201)	-	-	-
	5,031	146,422	(96,404)	(61,332)	13,251	(1,937)	5,031
<b>Other grants</b>							
Environment and Heritage Service	1,531	-	-	(1,531)	-	-	-
PPARC grants	1,349	147,258	(99,147)	(59,788)	30,734	(20,406)	-
Programme for Research in Third Level Institutions - Cosmogrid project	-	-	(4,689)	(316)	5,005	-	-
Lindsay Scholarship Fund	2,037	7,699	-	(7,699)	-	-	2,037
Miscellaneous travel grants	-	1,292	(1,292)	-	-	-	-
The Royal Society	-	5,041	(2,915)	-	688	(2,814)	-
Miscellaneous grants	-	1,860	(129)	(1,731)	-	-	-
	4,917	163,150	(108,172)	(71,065)	36,427	(23,220)	2,037
<b>Donations</b>							
	225	-	-	-	-	-	225
	10,173	309,572	(204,576)	(132,397)	49,678	(25,157)	7,293

## **Armagh Observatory**

### **DCAL Grants**

The Observatory received capital grant of £6,500 and a further in-year capital grant of £14,967 from the DCAL during the year for expenditure on equipment.

The Observatory received funding of £124,955 from the Skills and Science Funding Package. The overall objective of this funding programme is to enhance investment in skills and training programmes for employment for young people, to tackle economic inactivity, increase the skills of the working age population and improve the science base to compete more effectively in highly skilled international markets and to complement this with targeted investment in research and development and promoting links between industry and the research base.

### **Other Grants and Receipts**

#### **PPARC research and visitor grants**

The Observatory received funding from the Particle Physics and Astronomy Research Council (PPARC) to fund a number of research projects during the year:

- Solar Transient Events and their importance for Coronal Heating and Solar Wind Acceleration.
- The Origin of Hot Stellar Remnants.
- A Fresh Look at the Sun: New Opportunities with the Launch of Solar-B.

These grants fund salary, travel and other direct costs of the research project and provide a contribution towards certain indirect running costs of the Observatory based on 46% of grant-aided salary costs.

#### **PPARC system manager support grant**

The PPARC provided a grant of £10,634 towards the salary and other costs of the computer systems manager.

#### **Programme for Research in Third Level Institutions – Cosmogrid project**

The aim of the project, led by the Dublin Institute for Advanced Studies, is to study natural phenomena occurring in the cosmos using powerful computers connected by modern Grid technology. The project is funded by the Irish Higher Education Authority under the National Development Plan as part of the Programme for Research in Third Level Institutions. The Armagh Observatory is one of a number of collaborating institutions in this programme and will receive €370,180 over five years for staff and equipment to support its contribution to the project.

#### **Lindsay Scholarship Fund**

The Astronomical Science Group of Ireland (ASGI), whose membership includes the Armagh Observatory, the Dublin Institute for Advanced Studies (DIAS) and the main universities in Ireland, agreed at its Autumn 2003 meeting to create a postgraduate studentship called the Lindsay Scholarship, after Dr E.M. Lindsay, Director of the Observatory from 1937 until his death in 1974. Surplus funds arising from the National Astronomy Meeting, held in Dublin in 2003 and hosted by the ASGI, will be used as seed funding for the scholarship and the Observatory and the DIAS will share the additional costs. The first Lindsay Scholar has been appointed and will carry out a PhD research programme at the Observatory. During the year £7,699 was received from the DIAS in respect 50% of the second year's costs of the scholarship.

## Armagh Observatory

### 15 Analysis of transfer between funds

The transfer from restricted to unrestricted funds comprises funds received from the PPARC and Cosmogrid projects which are to be used as a contribution to the general running costs of the Observatory, the DIAS contribution to the costs of the Lindsay Scholar and funds from the Skills and Science Funding Package for studentship costs and supervisory salaries.

### 16 Designated funds

	2007 £	2006 £
<b>Revaluation of land and buildings</b>		
Balance at 1 April	54,824	45,894
Transfer to donated assets reserve	(8,930)	-
Revaluation of land and buildings	294,783	8,930
Transfer to donated assets reserve	-	-
Balance at 31 March	340,677	54,824
<b>Donated assets reserve</b>		
Balance at 1 April	623,050	636,850
Transfer from revaluation of land and buildings	8,930	-
Revaluation of donated land and buildings	1,995,213	-
Amortised	(14,693)	(13,800)
Balance at 31 March	2,612,500	623,050
<b>Total designated funds at 31 March</b>	<b>2,953,177</b>	<b>677,874</b>

Buildings and grounds with a net book value at 31 March 2007 of £2,604,463 (2006: £623,000) were donated to the corporation in 1790 by Archbishop Richard Robinson, the founder of the corporation.

The corporation's land and buildings were revalued at 31 March 2007 by the Valuation & Lands Agency, an Agency within the Department of Finance and Personnel on the following bases:

#### Land and buildings

Operational land and buildings which are unique due their specialised nature and design  
Operational non-specialised land and buildings  
Other land and buildings

#### Basis of valuation

depreciated replacement cost  
existing use value  
market value

### 17 Analysis of net assets between funds

	Designated Funds £	Unrestricted Funds £	Restricted Funds £	Total Funds £
Tangible assets	3,734,762	8,427	7,293	3,750,482
Current assets	-	268,988	-	268,988
Current liabilities	-	(145,336)	-	(145,336)
Pension liability	-	(422,000)	-	(422,000)
<b>Net assets</b>	<b>3,734,762</b>	<b>(289,921)</b>	<b>7,293</b>	<b>3,452,134</b>

### 18 Analysis of net funds

	1 April 2006 £	Cash Flow £	31 March 2007 £
Cash at bank and in hand	41,150	(19,983)	21,167
Liquid resources	201,993	6,151	208,144
<b>Net funds</b>	<b>243,143</b>	<b>(13,832)</b>	<b>229,311</b>

Liquid resources comprise short term deposits held at the bank.

## Armagh Observatory

### 19 Reconciliation of net cash flow to movement in net funds

	2007 £	2006 £
<b>(Decrease)/increase in cash in financial year</b>	(19,983)	(23,500)
(Decrease)/increase in deposits	6,151	16,435
<b>(Decrease)/increase in net funds in the year</b>	(13,832)	(7,065)
Net funds at 1 April	243,143	250,208
<b>Net funds at 31 March</b>	229,311	243,143

### 20 Pension scheme

An actuarial valuation of the NILGOSC scheme was carried out at 31 March 2004. At this date there was a deficit in the scheme, which will have to be recovered by increasing employers' contribution rates. Since the date of the last valuation in 2001, the scheme has suffered from reduced investment returns arising from the fall in the global stock market and the return on the scheme's assets since 2001 has been significantly lower than the long-term returns anticipated in valuing the liabilities in 2001. The funding level (ratio of assets to past service liabilities) at 31 March 2004 is 85% compared to 121% at 31 March 2001. This corresponds to a past service deficit of £392.1 million.

Employers' contribution rates increased from 8.5% to 11.0% in the year ending 31 March 2007, and will increase to 13.0% in the year ending 31 March 2008.

The NILGOSC actuary, Hymans Robertson LLP, has provided the following details for the purposes of accounting for the Observatory's share of the scheme deficit in accordance with FRS 17.

#### Financial assumptions

	31/3/2007	31/3/2006	31/3/2005
Rate of increase in salaries	4.7%	4.6%	4.4%
Rate of increase in pensions in payment	3.2%	3.1%	2.9%
Discount rate	5.4%	6.0%	6.5%
Inflation assumption	3.2%	3.1%	2.9%

#### The market value of assets in the scheme and expected rates of return

	Long term rate of return 31/3/2007 %	Value at 31/3/2007 £k	Long term rate of return 31/3/2006 %	Value at 31/3/2006 £k	Long term rate of return 31/3/2005 %	Value at 31/3/2005 £k
Equities	7.8%	1,899	7.4%	1,998	7.7%	1,545
Bonds	4.9%	356	4.6%	269	4.8%	266
Property	5.8%	259	5.5%	174	5.7%	178
Cash	4.9%	29	4.6%	31	4.8%	39
	7.2%	2,543	6.9%	2,472	7.1%	2,028

#### The following amounts were measured in accordance with the requirements of FRS 17

	31/3/2007 £k	31/3/2006 £k	31/3/2005 £k
Total market value of assets	2,543	2,472	2,028
Present value of scheme liabilities:			
Present value of unfunded scheme liabilities	-	-	-
Present value of scheme liabilities	2,965	2,540	2,187
Total value of scheme liabilities	2,965	2,540	2,187
Deficit in the scheme	(422)	(68)	(159)

## Armagh Observatory

### Analysis of amount charged to operating profit in respect of the scheme

	Year to 31/3/2007	Year to 31/3/2006	Year to 31/3/2005
	£k	£k	£k
Current service cost	71	76	68
Past service cost	-	-	-
	71	76	68

### Analysis of amount charged to other finance expenses

	Year to 31/3/2007	Year to 31/3/2006	Year to 31/3/2005
	£k	£k	£k
Expected return on scheme assets	169	141	135
Interest on scheme liabilities	(151)	(140)	(135)
Net return	18	1	-

### Statement of total recognised gains and losses (STRGL)

	Year to 31/3/2007	Year to 31/3/2006	Year to 31/3/2005
	£k	£k	£k
Actual return less expected return on scheme assets	(30)	376	55
Experience gains and losses arising on scheme liabilities	1	(1)	-
Change in assumptions underlying the present value of the scheme liabilities	(317)	(246)	-
Actuarial gain/(loss) recognised in the STRGL	(346)	129	55

### Movement in the deficit during the year

	Year to 31/3/2007	Year to 31/3/2006	Year to 31/3/2005
	£k	£k	£k
Deficit in the scheme at 1 April	(68)	(159)	(167)
Movement in the year:			
Current service cost	(71)	(76)	(68)
Employer contributions	45	37	21
Past service costs	-	-	-
Net return on assets	18	1	-
Actuarial gain/(loss)	(346)	129	55
Deficit in the scheme at 31 March	(422)	(68)	(159)

### Details of experience gains and losses

	Year to 31/3/2007	Year to 31/3/2006	Year to 31/3/2005
Difference between the expected and actual return on scheme assets:			
Amount £k	(30)	377	55
Percentage of scheme assets	(1.2%)	15.3%	2.7%
Experience gains and losses on scheme liabilities:			
Amount £k	1	(1)	-
Percentage of the present value of the scheme liabilities	0.0%	0.0%	0.0%
Total amount recognised in the STRGL:			
Amount £k	(346)	129	55
Percentage of the present value of the scheme liabilities	(11.7%)	5.1%	2.5%

## Armagh Observatory

### 21 Commitments

There were no outstanding capital commitments at 31 March 2007 (2006: £nil).

### 22 Investment in Southern African Large Telescope Project

	2007	2006
	£	£
Total investment at 31 March	185,096	185,096
Provision for impairment at 31 March	(185,096)	(185,096)
Net book value at 31 March	-	-

The Southern African Large Telescope (SALT) project involved the construction of a 10-metre class telescope with related buildings at the Sutherland Outstation of the South African Astronomical Observatory in Northern Cape Province. The main objective is to advance science and education in South Africa through the promotion of deep-sky astronomy, and by participating in the project the Armagh Observatory has attained rights to use the telescope.

### 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 during the year. The Armagh Observatory 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 the Department of Culture, Arts and Leisure, the Central Procurement Directorate, and the Particle Physics and Astronomy Research Council.

### 24 Financial Instruments

The Observatory has no borrowings and relies primarily on grants for its cash requirements, and is therefore not exposed to liquidity risks. The Observatory also has no deposits which are sufficiently material to create interest rate risk and as all material assets and liabilities are denominated in sterling there is no currency risk.

## Armagh Planetarium

### Statement of financial activities for the year ended 31 March 2007

	Notes	Unrestricted funds 2007 £	Restricted funds 2007 £	Total funds 2007 £	Total funds 2006 Restated £
<b>Incoming resources</b>					
DCAL grants	2	395,400	359,706	755,106	2,587,290
Other grants and receipts	2	2,994	6,845	9,839	15,479
Admissions		127,495	-	127,495	-
Rents		2,702	-	2,702	2,600
Interest receivable		53	-	53	87
Miscellaneous income		418	-	418	50
Outreach income		13,671	-	13,671	15,038
Shop and mail order gross profit	22	16,885	-	16,885	8,109
Transfer to deferred income		-	(5,300)	(5,300)	(9,777)
Transfer from deferred income		-	17,596	17,596	1,104
Transfer between funds		37,453	(37,453)	-	-
<b>Total incoming resources</b>		<b>597,071</b>	<b>341,394</b>	<b>938,465</b>	<b>2,619,980</b>
<b>Resources expended</b>					
Direct expenditure of the corporation	3	452,031	40,384	492,415	305,966
Fundraising and publicity	4	15,253	-	15,253	5,493
Management and administration of the corporation	5	162,421	178,847	341,268	1,872,784
Capital expenditure		1,438	122,163	123,601	418,404
<b>Total resources expended</b>		<b>631,143</b>	<b>341,394</b>	<b>972,537</b>	<b>2,602,647</b>
<b>Net incoming/(outgoing) resources for the year before cost of capital</b>					
		(34,072)	-	(34,072)	17,333
Cost of capital		-	(136,941)	(136,941)	(71,909)
<b>Net movement in funds after cost of capital</b>		<b>(34,072)</b>	<b>(136,941)</b>	<b>(171,013)</b>	<b>(54,576)</b>
Cost of capital reversed		-	136,941	136,941	71,909
<b>Net movement in funds before other finance income</b>		<b>(34,072)</b>	<b>-</b>	<b>(34,072)</b>	<b>17,333</b>
Other finance income/(cost) - pension scheme		9,000	-	9,000	(1,000)
<b>Net movement in funds after other finance income</b>		<b>(25,072)</b>	<b>-</b>	<b>(25,072)</b>	<b>16,333</b>
Balances brought forward at					
1 April as previously stated		(28,275)	-	(28,275)	16,392
Prior year adjustment		(272,000)	-	(272,000)	(61,000)
Balances brought forward restated		(300,275)	-	(300,275)	(44,608)
<b>Balances carried forward at 31 March</b>	13, 14	<b>(325,347)</b>	<b>-</b>	<b>(325,347)</b>	<b>(28,275)</b>

All amounts above relate to continuing operations of the corporation.

The income and expenditure summary is included at Note 7.

Cost of capital at 3.5% has been charged on the average net assets of the corporation.

As this is a notional charge the cost of capital is reversed in the Statement of Financial Activities.

### Statement of total recognised gains and losses

	2007 £	2006 Restated £
Net movement in funds for the year	(25,072)	16,333
Surplus on revaluation of land and buildings	3,756,724	-
Net movement on government grant reserve	(12,345)	305,000
Actuarial gain/(loss) on pension scheme	(272,000)	13,000
Total recognised gains and losses relating to the year	3,447,307	334,333
Prior year adjustment - FRS 17	19	(71,000)
Total gains and losses recognised since the last annual report	3,376,307	

## Armagh Planetarium

### Balance sheet at 31 March 2007

	Notes	2007 £	2006 Restated £
<b>Tangible assets</b>	8	5,962,347	2,218,886
<b>Current assets</b>			
Stock	9	10,663	14,981
Debtors and prepayments	10	35,926	24,301
Cash at bank and in hand	17, 18	148,434	51,751
		195,023	91,033
<b>Creditors: amounts falling due within one year</b>	11	(188,289)	(50,145)
<b>Net current assets/liabilities</b>		6,734	40,888
<b>Net assets excluding pension liability</b>		5,969,081	2,259,774
<b>Pension liability</b>	19	(333,000)	(71,000)
<b>Net assets</b>		5,636,081	2,188,774
<b>Funds</b>			
Unrestricted reserves	13	(325,347)	(28,275)
Government grant reserve	12	1,325,347	1,337,692
Designated	15	4,636,081	879,357
		5,636,081	2,188,774

The financial statements on pages 37 to 51 were approved on 11 July 2007 and were signed by:

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Dr Tom Mason, Accounting Officer for the Armagh Planetarium

## Armagh Planetarium

### Cash flow statement for the year ended 31 March 2007

	Notes	2007 £	2006 Restated £
<b>Net cashflow from operating activities</b>		108,453	23,063
<b>Returns on investments and servicing of finance</b>			
Interest received		53	87
Interest paid and similar charges		(2,823)	(1,730)
Other finance income - pension scheme		(9,000)	1,000
		(11,770)	(643)
<b>Capital expenditure</b>			
Purchase of tangible assets		(123,601)	(418,404)
Capital grants received		123,601	418,404
		-	-
<b>Net cash inflow/(outflow) before financing</b>		96,683	22,420
<b>Financing</b>			
Repayment of principal under hire purchase agreements		-	-
<b>Increase in cash</b>	17, 18	96,683	22,420

### Net cash flow from operating activities

	2007 £	2006 Restated £
Net incoming resources per statement of financial activities	(25,072)	16,333
Interest received	(53)	(87)
Interest paid and similar charges	2,823	1,730
<b>Operating surplus for the year</b>	(22,302)	17,976
Depreciation	136,864	114,154
Deferred credit release	(135,946)	(113,404)
Pension service costs	(1,000)	9,000
Increase in stock	4,318	(651)
(Increase)/decrease in debtors	(11,625)	(8,659)
Increase/(decrease) in creditors	138,144	4,647
<b>Net cash inflow from operating activities</b>	108,453	23,063

# Armagh Planetarium

## Notes to the financial statements for the year ended 31 March 2007

### 1 Accounting policies

These financial statements are prepared on the going concern basis under the historical cost convention, as modified by the revaluation of certain tangible fixed assets, and in accordance with The Audit and Accountability (Northern Ireland) Order 2003, and directions made thereunder by the Department of Culture, Arts and Leisure and applicable accounting standards. The principal accounting policies are set out below.

#### Tangible fixed assets

The cost of tangible fixed assets is their replacement 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 rates used are as follows:

	%
Digistar	10
Furniture and fittings	10 - 15
Office equipment	15 - 25
Scientific equipment	15 - 25
Land and buildings	2
Exhibits	10 - 25
Vehicles	25

Land and buildings are included in the balance sheet at depreciated replacement cost, estimated value in use or market value.

#### Government grants

The Government Financial Reporting Manual requires that grants are to be shown as a movement in reserves rather than as income. However, as the corporation is required to prepare accounts in accordance with the SORP for charities, the DCAL has given the corporation permission to continue to treat grants as income.

Grants that relate to specific capital expenditure are treated as deferred income which is then credited to the income and expenditure account over the related asset's useful life. Other grants are credited to the statement of financial activities when received.

#### Pension scheme

The corporation provides pension benefits to its employees by participating in the Northern Ireland Local Government Officers' Superannuation Committee (NILGOSC) Pension Scheme, 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 corporation'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. This is a change in accounting policy due to the implementation of FRS 17 in 2006/2007. Prior year figures have been restated accordingly.

#### Leased assets

Where assets are financed by leasing agreements that give rights approximating to ownership ('finance leases') the assets are treated as if they had been purchased outright. The corresponding leasing commitments are shown as obligations to the lessor. Depreciation is charged to the profit and loss account on a straight-line basis over the shorter of the lease terms and the useful lives of equivalent owned assets. Lease payments are treated as consisting of capital and interest elements and the interest is charged to revenue in proportion to the reducing capital element outstanding.

# Armagh Planetarium

## Fund accounting

The corporation 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 Governors in furtherance of the objects of the corporation. In addition to expenditure on the provision of services, such funds may be held in order to finance capital investment and working capital.

## Stocks

Stocks 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 stocks.

## 2 Incoming Resources

The accounts reflect the receipt of the following grants:

### Grants from the Department of Culture, Arts and Leisure (DCAL)

	Unrestricted funds 2007 £	Restricted funds 2007 £	Total funds 2007 £	Total funds 2006 £
Recurrent grant	390,000	-	390,000	390,000
In-year recurrent grant	5,400	-	5,400	-
Capital grant	-	6,436	6,436	6,404
Refurbishment of buildings and purchase of equipment	-	178,847	178,847	2,190,886
Skills and Science Funding Package	-	174,423	174,423	-
	395,400	359,706	755,106	2,587,290

### Other grants and receipts

	Unrestricted funds 2007 £	Restricted funds 2007 £	Total funds 2007 £	Total funds 2006 £
Friends of the Planetarium	945	-	945	732
Discover Primary Science	-	6,021	6,021	-
British Association of Planetaria meeting	2,049	-	2,049	-
EU Socrates Programme - Hands on Universe project	-	-	-	11,290
The Association for Science Education - Dill-Faulkes Project	-	650	650	3,000
Miscellaneous travel grants (restricted)	-	174	174	-
UNESCO travel grant (restricted)	-	-	-	457
	2,994	6,845	9,839	15,479

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### 3 Direct expenditure of the corporation

	Unrestricted funds 2007	Restricted funds 2007	Total funds 2007	Total funds 2006 Restated
	£	£	£	£
Salaries and wages	299,696	34,117	333,813	223,803
Equipment leasing	6,060	-	6,060	6,060
Travelling and subsistence	17,519	650	18,169	20,255
Equipment maintenance and consumables	41,374	2,210	43,584	25,293
Library and subscriptions	4,888	-	4,888	4,287
Production expenses	8,649	-	8,649	-
Exhibitions and events	27,850	1,907	29,757	13,148
Training	1,559	-	1,559	1,366
Website design	-	1,500	1,500	-
Agency staff	41,212	-	41,212	-
Vehicle expenses	4,224	-	4,224	2,754
Pension service costs	(1,000)	-	(1,000)	9,000
	452,031	40,384	492,415	305,966

### 4 Fundraising and publicity

	Unrestricted funds 2007	Restricted funds 2007	Total funds 2007	Total funds 2006
	£	£	£	£
Advertising and brochures	14,543	-	14,543	5,058
Hospitality	710	-	710	435
	15,253	-	15,253	5,493

### 5 Management and administration of the corporation

	Unrestricted funds 2007	Restricted funds 2007	Total funds 2007	Total funds 2006
	£	£	£	£
Insurance	19,100	-	19,100	19,480
Heat, light and power	44,734	-	44,734	20,937
General property repairs	26,533	-	26,533	12,223
Cleaning services and consumables	13,734	-	13,734	-
Refurbishment of buildings	-	178,847	178,847	1,778,886
Office and café furnishings	7,204	-	7,204	7,952
Postage and telephone	13,473	-	13,473	12,539
General expenses	678	-	678	416
Bank charges	2,823	-	2,823	1,730
Audit	5,177	-	5,177	4,093
Professional fees and licences	12,218	-	12,218	2,880
Management Committee and meetings	871	-	871	988
Rates	312	-	312	276
Stationery	13,214	-	13,214	4,908
Agency staff	-	-	-	1,733
Bad debt provision	(200)	-	(200)	-
Recruitment	1,632	-	1,632	2,993
Depreciation	918	135,946	136,864	114,154
Release from grants reserve	-	(135,946)	(135,946)	(113,404)
	162,421	178,847	341,268	1,872,784

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### 6 Average staff numbers and related costs

#### Average staff numbers

	2007	2006
	Number	Number
Permanent staff	10	8
Agency staff	3	-
	13	8

#### Costs

	2007	2006
	£	£
<b>Permanent staff</b>		
Wages and salaries	281,373	189,891
Social security costs	22,213	15,385
Pension costs	30,227	18,527
	333,813	223,803
Agency staff costs	41,212	1,733
<b>Total staff costs</b>	375,025	225,536

Staff costs relating to the corporation's Administrator are apportioned on a 50:50 basis between the Observatory and Planetarium.

### 7 Income and expenditure summary

	2007	2006
	£	Restated £
<b>Gross income</b>	814,864	2,201,576
<b>Expenditure</b>		
Direct charitable expenditure	492,415	305,966
Fund raising and publicity	15,253	5,493
Management and administration of the corporation	341,268	1,872,784
	848,936	2,184,243
Other finance income	9,000	(1,000)
<b>Surplus for the year</b>	(25,072)	16,333

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### 8 Tangible fixed assets

	Digistar	Freehold Land and buildings	Café	Equipment	Exhibits	Vehicles	Total
	£	£	£	£	£	£	£
<b>Cost or valuation</b>							
At 1/4/06	906,054	3,138,300	14,081	511,597	189,272	14,202	4,773,506
Revaluation	-	2,565,108	-	-	-	-	2,565,108
Additions	-	-	-	26,936	96,665	-	123,601
Disposals	-	-	-	(1,020)	-	-	(1,020)
<b>At 31 March 2007</b>	<b>906,054</b>	<b>5,703,408</b>	<b>14,081</b>	<b>537,513</b>	<b>285,937</b>	<b>14,202</b>	<b>7,461,195</b>
<b>Depreciation</b>							
At 1/4/06	603,333	1,313,106	14,081	445,531	166,204	12,365	2,554,620
Decrease on revaluation	-	(1,191,616)	-	-	-	-	(1,191,616)
Charge for year	37,067	69,217	-	12,292	17,370	918	136,864
Disposals	-	-	-	(1,020)	-	-	(1,020)
<b>At 31 March 2007</b>	<b>640,400</b>	<b>190,707</b>	<b>14,081</b>	<b>456,803</b>	<b>183,574</b>	<b>13,283</b>	<b>1,498,848</b>
<b>Net book value</b>							
<b>At 31 March 2007</b>	<b>265,654</b>	<b>5,512,701</b>	<b>-</b>	<b>80,710</b>	<b>102,363</b>	<b>919</b>	<b>5,962,347</b>
<b>Net book value</b>							
<b>At 31 March 2006</b>	<b>302,721</b>	<b>1,825,194</b>	<b>-</b>	<b>66,066</b>	<b>23,068</b>	<b>1,837</b>	<b>2,218,886</b>

Tangible fixed asset additions of £123,601 as shown above were funded as follows:

	£
Skills and Science Funding Package	115,727
DCAL capital grant	6,436
DCAL Recurrent Grant vired to Capital	1,438
	<b>123,601</b>

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

	2007 £	2006 £
Cost	1,291,239	1,291,239
Aggregate depreciation	(301,795)	(284,210)
<b>Net book value based on historic cost</b>	<b>989,444</b>	<b>1,007,029</b>

### 9 Stocks

	2007 £	2006 £
Finished goods and goods for resale	10,663	14,981

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### 10 Debtors

	2007	2006
	£	£
Trade and grant debtors	9,140	4,930
Sundry debtors	-	250
Prepayments	4,325	5,444
VAT	22,461	13,677
	<u>35,926</u>	<u>24,301</u>

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

	2007	2006
	£	£
Trade creditors	160,869	13,701
Accruals	22,120	18,848
Deferred income	5,300	17,596
	<u>188,289</u>	<u>50,145</u>

### Analysis of deferred income

	2007	2006
	£	£
Balance at 1 April	17,596	8,923
Transfer to statement of financial activities	(17,596)	(1,104)
Transfer from statement of financial activities	5,300	9,777
Balance at 31 March	<u>5,300</u>	<u>17,596</u>

### 12 Government grants reserve

	Digistar	Buildings and grounds	Equipment	Exhibits	Total
	£	£	£	£	£
Balance at 1 April 2006	302,721	945,837	66,066	23,068	1,337,692
Additions	-	-	26,936	96,665	123,601
Disposals	-	-	-	-	-
Amortised	(37,067)	(69,217)	(12,292)	(17,370)	(135,946)
Balance at 31 March 2007	<u>265,654</u>	<u>876,620</u>	<u>80,710</u>	<u>102,363</u>	<u>1,325,347</u>

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### 13 Unrestricted funds

	<b>2007</b>
	<b>£</b>
Balance at 1 April	42,725
Prior year adjustment	(71,000)
Balance at 1 April as restated	(28,275)
Incoming resources	597,071
Resources expended	(631,143)
Other finance income	9,000
Adjustment to the statement of total recognised gains and losses	(272,000)
Balance at 31 March	(325,347)

The unrestricted funds reserve includes a deficit of £333,000 (2005/2006: £71,000) in respect of pension scheme liabilities of the pension fund.

#### **Prior year adjustment and impact of the change in accounting for pensions (FRS17)**

The prior year adjustment relates to the implementation of FRS 17. This has resulted in an decrease in direct expenditure of the corporation of £1,000 (2005/2006: increase of £9,000), an increase in finance income of £9,000 (2005/2006: decrease of £1,000), an increase in the net funds movement of £10,000 (2005/2006: decrease of £10,000) and a decrease in the total recognised gains and losses of £272,000 (2005/2006: increase of £13,000).

	<b>£</b>
<b>Analysis of prior year adjustment:</b>	
Adjustment to the corporation's opening funds at 1 April 2005	(74,000)
Adjustment to the corporation's net movement in funds for the year ended 31 March 2006	(10,000)
Adjustment to the statement of recognised gains and losses for the year ended 31 March 2006	13,000
	(71,000)

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### 14 Restricted funds

	Balance 1/4/2006	Incoming resources	Resources expended	Transfer between funds	Transfer from defrd. income	Transfer to defrd. income	Balance 31/3/2007
	£	£	£	£	£	£	£
<b>DCAL grants</b>							
Capital	-	6,436	(6,436)	-	-	-	-
Building refurbishment and equipment		178,847	(178,847)	(5,784)	5,784	-	-
Skills and Science Funding Package		174,423	(154,740)	(19,683)			-
<b>Total DCAL grants</b>	-	359,706	(340,023)	(25,467)	5,784	-	-
<b>Other grants and receipts</b>							
EU Socrates Programme - Hands on Universe project	-	-	-	(8,237)	8,237	-	-
Astrogazers project	-	-	-	(895)	895	-	-
Dill Faulkes project	-	650	(650)	(2,680)	2,680	-	-
Miscellaneous travel grant	-	174	-	(174)			-
Discover Primary Science project	-	6,021	(721)	-	-	(5,300)	-
<b>Total other grants and receipts</b>	-	6,845	(1,371)	(11,986)	11,812	(5,300)	-
	-	366,551	(341,394)	(37,453)	17,596	(5,300)	-

#### DCAL grants

DCAL provided funding of £6,436 for the purchase of equipment, £178,847 for the refurbishment of the Planetarium's buildings and £174,423 under the Skills and Science Funding Package.

#### EU Socrates Programme

The Planetarium is participating in a project funded by the European Union Socrates Programme, called Hands on Universe, Europe, Bringing Frontline Interactive Astronomy to the Classroom. The main aim of the project is to renew the teaching of science by re-awakening the interest of the young generation in science through astronomy and the use of new technologies.

#### Dill-Faulkes Robotic Telescope and Astrogazers projects

Astrogazers provides support for school Astronomy clubs and allows pupils to work on projects and to promote their own school and other schools throughout Europe and Ireland.

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The Dill Faulkes Robotic Telescope project will provide schools with observing time on research-grade telescopes in Hawaii and Australia. Funds amounting to £650 were received for the project in the year.

The Planetarium participates in the Discover Primary Science project, funded and managed by Forfás on behalf of the Office of Science and Technology in Ireland. The purpose of the project is to develop an interest in science for primary school children in Ireland. Funds amounting to £6,021 were received for the project in the year.

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### 15 Designated funds

	2007 £	2006 £
<b>Revaluation of land and buildings</b>		
Balance at 1 April	879,357	879,357
Revaluation	3,756,724	-
Balance at 31 March	4,636,081	879,357

The corporation's land and buildings were revalued at 31 March 2007 by the Valuation & Lands Agency, an Agency within the Department of Finance and Personnel on the following bases:

#### Land and buildings

Operational land and buildings which are unique due their specialised nature and design  
Operational non-specialised land and buildings  
Other land and buildings

#### Basis

depreciated replacement cost  
existing use value  
market value

### 16 Analysis of net assets between funds

	Designated funds £	Unrestricted funds £	Restricted funds £	Total funds £
<b>Tangible fixed assets</b>	5,961,428	919	-	5,962,347
Current assets	-	195,023	-	195,023
Creditors: amounts falling due within one year	-	(188,289)	-	(188,289)
Pension	-	(333,000)	-	(333,000)
<b>Net current assets</b>	-	(326,266)	-	(326,266)
Creditors: amounts falling due after more than one year	-	-	-	-
<b>Net assets</b>	5,961,428	(325,347)	-	5,636,081

### 17 Analysis of net cash funds

	1 April 2006 £	Cashflow £	Non cash movement £	31 March 2007 £
Cash at bank and in hand	51,751	96,683	-	148,434
Net funds	51,751	96,683	-	148,434

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

	2007 £	2006 £
Increase/(decrease) in cash in financial year	96,683	22,420
Net funds at 1 April	51,751	29,331
Net funds at 31 March	148,434	51,751

## Armagh Planetarium

### 19 Pension scheme

An actuarial valuation of the NILGOSC scheme was carried out at 31 March 2004. At this date there was a deficit in the scheme, which will have to be recovered by increasing employers' contribution rates. Since the date of the last valuation in 2001, the scheme has suffered from reduced investment returns arising from the fall in the global stock market and the return on the scheme's assets since 2001 has been significantly lower than the long-term returns anticipated in valuing the liabilities in 2001. The funding level (ratio of assets to past service liabilities) at 31 March 2004 is 85% compared to 121% at 31 March 2001. This corresponds to a past service deficit of £392.1 million.

The Planetarium's employer contribution rates were 12.4 % in the year ending 31 March 2007, and will increase to 14.4% in the year ending 31 March 2008.

The NILGOSC actuary, Hymans Robertson LLP, has provided the following details for the purposes of accounting for the Observatory's share of the scheme deficit in accordance with FRS 17.

#### Financial assumptions used by the actuary were:

	31/3/2007	31/3/2006	31/3/2005
Rate of increase in salaries	4.7%	4.6%	4.4%
Rate of increase in pensions in payment	3.2%	3.1%	2.9%
Discount rate	5.4%	6.0%	6.5%
Inflation assumption	3.2%	3.1%	2.9%

#### The market value of assets in the scheme and expected rates of return

	Long term rate of return 31/3/2007 %	Value at 31/3/2007 £k	Long term rate of return 31/3/2006 %	Value at 31/3/2006 £k	Long term rate of return 31/3/2005 %	Value at 31/3/2005 £k
Equities	7.8%	1,085	7.4%	1,100	7.7%	821
Bonds	4.9%	203	4.6%	148	4.8%	140
Property	5.8%	148	5.5%	96	5.7%	97
Cash	4.9%	16	4.6%	17	4.8%	22
	7.2%	1,452	6.9%	1,361	7.1%	1,080

#### The following amounts were measured in accordance with the requirements of FRS 17

	31/3/2007 £k	31/3/2006 £k	31/3/2005 £k
Total market value of assets	1,452	1,361	1,080
Present value of scheme liabilities:			
Present value of unfunded scheme liabilities	1,780		1,149
Present value of scheme liabilities	5	5	5
Total value of scheme liabilities	1,785	5	1,154
Deficit in the scheme	(333)	1,356	(74)

#### Analysis of amount charged to operating profit in respect of the scheme

	Year to 31/3/2007 £k	Year to 31/3/2006 £k	Year to 31/3/2005 £k
Current service cost	27	27	20
Past service cost	-	-	-
	27	27	20

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### Analysis of amount charged to other finance expenses

	Year to 31/3/2007	Year to 31/3/2006	Year to 31/3/2005
	£k	£k	£k
Expected return on scheme assets	95	77	70
Interest on scheme liabilities	(86)	(78)	(70)
Net return	9	(1)	-

### Statement of total recognised gains and losses (STRGL)

	Year to 31/3/2007	Year to 31/3/2006	Year to 31/3/2005
	£k	£k	£k
Actual return less expected return on scheme assets	(17)	204	29
Experience gains and losses arising on scheme liabilities	(1)	4	4
Change in assumptions underlying the present value of the scheme liabilities	(254)	(195)	(5)
Actuarial gain/(loss) recognised in the STRGL	(272)	13	28

### Movement in the deficit during the year

	Year to 31/3/2007	Year to 31/3/2006	Year to 31/3/2005
	£k	£k	£k
Deficit in the scheme at 1 April	(71)	(74)	(91)
Movement in the year:			
Current service cost	(27)	(27)	(20)
Employer contributions	28	18	9
Past service costs	-	-	-
Net return on assets	9	(1)	-
Actuarial gain/(loss)	(272)	13	28
Deficit in the scheme at 31 March	(333)	(71)	(74)

### Details of experience gains and losses

	Year to 31/3/2007	Year to 31/3/2006	Year to 31/3/2005
	£k	£k	£k
Difference between the expected and actual return on scheme assets:			
Value of assets	(17)	204	29
Percentage of scheme assets	1,452	1,361	1,080
	(1.2%)	15.0%	2.7%
Experience gains and losses on scheme liabilities	(1)	4	4
Total present value of liabilities	1,785	5	1,154
Percentage of the present value of the scheme liabilities	(0.1%)	0.3%	0.4%
Total amount recognised in the STRGL:	(272)	13	28
Total present value of liabilities	1,785	5	1,154
Percentage of the total present value of the scheme liabilities	(15.2%)	0.9%	2.5%

## Armagh Planetarium

### 20 Commitments

There were no capital commitments at the 31 March 2007 (2006: £nil).

### 21 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 Planetarium during the year. The Armagh 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 the Department of Culture, Arts and Leisure and the Central Procurement Directorate.

### 22 Shop and mail order trading account

	2007 £	2006 £
<b>Sales</b>	61,949	19,864
<b>Less: cost of sales</b>		
Opening stock	14,981	14,330
Add: Purchases	40,746	12,406
	55,727	26,736
Less: closing stock	(10,663)	(14,981)
	45,064	11,755
<b>Gross profit</b>	16,885	8,109
<b>Gross profit %</b>	27.3	40.8

Note: Other costs relating to the Shop and Mail Order operations are included with other Planetarium costs under resources expended.

### 23 Financial Instruments

The Planetarium has no borrowings and relies primarily on grants for its cash requirements, and is therefore not exposed to liquidity risks. The Planetarium also has no deposits which are sufficiently material to create interest rate risk and as all material assets and liabilities are denominated in sterling there is no currency risk.

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