Armagh Observatory
Operational Plan
2004/2005

Business Plan for Period 1 April 2004 to 31 March 2005

Prepared by the Director

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Executive Summary

The Observatory has achieved considerable success during the past year (2003/2004). The total (unaudited) value of external grant receipts for the period is £270,000, significantly above the target of £250,000 set in April 2003. the number of refereed journal publications has been maintained at the levels of recent years, the number of identified media citations has remained at a high level, and the number of Distinct e-Visitors to the Observatory web-sites (http://star.arm.ac.uk/, http://climate.arm.ac.uk/ and http://arpc65.arm.ac.uk/∼spm/) continues to show a healthy year-on-year increase. Taken together these results demonstrate a satisfactory growth in the profile and external impact of the Armagh Observatory, despite a slight decline in the total number of research-active staff.

The trends versus calendar year of these key performance indicators are shown in Table 1, where it should be noted that all items refer to calendar year except external grant income (i.e. external grant income for 2003 refers to the financial year 2003/2004). Note also that the entries for 2003 (Financial Year 2003/2004) represent unaudited amounts at the time of writing (May 2004), although it is not expected that they will change significantly.

Calendar Year	External Grant Income (£000s)	Refereed Journal Publications	Identified Media Citations	Distinct e-Visitors (DEVs)	RAE Grade	Total DCAL Grant Income (£000s)
1992			–		4	457.3
1993	35	13	–			445.0
1994	58	22	11			425.6
1995	172	19	14			468.5
1996	264	45	45		4	480.0
1997	275	42	108	66,000		473.2
1998	195	43	147	80,000		443.0
1999	293	32	233	134,000		458.5
2000	212	31	233	174,000		538.5
2001	221	32	302	318,000	4	713.5
2002	306	33	267	354,000		733.5
2003	270	34	225	470,000		781.5
2004 Targets:	**250**	**32**	**200**	**500,000**		686.5

Table 1: The yearly trend of various performance indicators versus calendar year, including the total DCAL grant income (including project and slippage funding) received during the corresponding financial year and the total announced budget for 2004/2005, including the recently announced £20,000 for DDA work. Targets for calendar year 2004 (financial year 2004/2005) are expressed in round figures.

Efforts continued throughout 2003 to widen the Observatory's access to funding opportunities that would be similar in magnitude (if not identical) to those available to the university research groups against which the Observatory's research output is frequently compared, for example in the periodic Research Assessment Exercise. Senior management, leading members of the UK astronomical community and officials in the Department of Culture, Arts and Leisure (DCAL) have all been extremely supportive in assisting efforts to increase the Observatory's core funding for astronomical research developments and scientific infrastructure, but there is no tangible progress to report. Indeed, the position if anything has worsened, as the Observatory (in common with many DCAL-funded institutions) faces essentially flat funding for 2004/2005, with no allowance for inflationary pressures. *If a strategy to remedy this situation cannot soon be identified, it will be extremely difficult to improve the Observatory's position in time for the next Research Assessment Exercise.*

Objectives for Financial Year 2004/2005

The announced parliamentary grant-in-aid is £666,500, the same as in 2003/2004. A very significant fraction of the Observatory's overall running costs is related to core items such as salaries and fixed overheads such as heat, light, power, insurance etc. Flat funding for 2004/2005 will put severe stress on the Observatory's ability to maintain its planned programmes of research, outreach and public understanding of science. However, the announced grant-in-aid excludes any additional in-year funding for work associated with the Observatory buildings and grounds (e.g. the recently announced £20,000 for necessary work to ensure compliance with the Disability Discrimination Act), and other contingencies, and an

important objective for the year must be to obtain further recurrent funding to sustain the Observatory's operations.

The allocated funds will be directed towards achieving the following objectives during 2004/2005, namely to:

- maintain existing high-quality research programmes;
- obtain grants and additional external funding to support new research projects;
- strengthen the Observatory's research capability in solar system and stellar astrophysics;
- strengthen the Observatory's access to research infrastructure such as CosmoGrid, the Southern African Large Telescope (SALT), and obtain high-bandwidth connections to the internet through the Northern Ireland Metropolitan Area Network (NIMAN);
- widen access to the heritage material in its possession; and
- advance plans for a new Library, Archive and Historic Scientific Instruments Building.

Targets for these objectives, which together span the Observatory's principal areas of activity (research, public understanding of science, outreach, student training, and heritage), are indicated in Table 1. Similarly, a detailed breakdown of actual expenditure for 2000/2001, 2001/2002 and 2002/2003, together with unaudited actuals for 2003/2004 and projected income and expenditure for 2004/2005, are given in Table 2 (p.8). The Table shows a balanced budget, but at the expense of significant cuts in a number of items.

In addition to attempting to maintain the level and quality of astronomical research carried out at the Observatory, the key additional task for the year is again to widen the Observatory's access to research development funds and to lay a strong foundation for the forthcoming Research Assessment Exercise benchmark. This will involve working with the DCAL not just to provide an adequate level of core funding for astronomical research, but also to obtain the further funds necessary for the recruitment of additional research staff and to maintain and improve the Observatory's access to high-quality research infrastructure.

1 Institutional Background

Vision

The Vision of the Armagh Observatory is:

> *"To maintain and build on its position as a thriving astronomical research institute, and to continue to expand our understanding of the Universe and of humanity's place in it."*

The Mission 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."*

The Armagh Observatory (see http://star.arm.ac.uk/) is the oldest continuously functioning astronomical research institute in the UK and Ireland, having been in existence for more than 210 years. Founded by Archbishop Richard Robinson in 1790 as part of his dream to see a University of Armagh, the Georgian Grade A listed building and nineteenth and twentieth-century telescope domes stand 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 Astropark, which is managed by the Observatory, includes two sundials, a number of outdoor exhibits and interpretation panels (see http://star.arm.ac.uk/astropark/), and scale models of the solar system and the larger Universe, constructed to linear and exponential scales respectively.

The principal function of the Armagh Observatory, which is a statutory third-level institution funded by the Northern Ireland Department of Culture, Arts and Leisure (DCAL), is to undertake original research of a world-class academic standard that broadens and expands our understanding of astronomy and related sciences. Current key programmes focus on Stellar Astrophysics, the Sun, Solar System astronomy, and Solar System – Earth relationships including climate and the Near-Earth Object (NEO) hazard to civilization. The Observatory also 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 plays a key role together with the Armagh Planetarium in promoting the public understanding of astronomy and related sciences.

The Armagh Observatory participates in the UK Research Assessment Exercise (RAE), held in 1992, 1996, and 2001. This gives external partners, such as UK charities and the research councils, information upon which to base their funding allocations. The RAE also provides a measure by which the Observatory can gauge its performance against corresponding groups in university departments. Staff at the Observatory achieved a Grade 4 in the Physics Unit of Assessment in each of the 1992, 1996, and 2001 RAEs, corresponding to "Quality that equates to attainable levels of national excellence in virtually all of the research activity submitted, showing some evidence of international excellence."

In addition to this primary research role, staff at the Observatory have 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 two hundred years of continuous astronomical activity in Armagh. The main historic buildings of the Observatory have unique architectural features and together house one of the most valuable scientific collections, including books, instruments and archives, in Northern Ireland.

The scientific and architectural heritage provided by astronomy at Armagh is a highly significant asset, and the entire collection of scientific artefacts, instruments and historic telescopes spans virtually every aspect of modern astronomy. In many cases, the underlying motivation and reasons for the developments of astronomy at a particular time can be explained with reference to discoveries at Armagh, or to artefacts and other items held within the Library and Archives. This gives astronomers at Armagh a unique opportunity to explain both the development of their subject over more than two hundred years and the context in which modern research is carried out.

In summary, the Armagh Observatory is a modern research institute with a rich heritage. It provides exceptionally strong opportunities to explain the reasons for mankind's long fascination with the celestial sphere, extending from roots more than five thousand years ago to the most recent results of the space age. The Observatory's position, located conveniently close to the centre of the City of Armagh, means that it is well placed to contribute to a greater understanding of the role of scholarship, covering both education and research, in the development of Armagh, and for future economic development of the region. It provides opportunities in education and lifelong learning to people of all ages and from all backgrounds, and has an important role to play in explaining and expanding Northern Ireland's scientific and built heritage for the benefit of present and future generations.

2 Review of Financial Year 2003/2004

The principal objectives for 2003/2004 were to:

- maintain existing high-quality research programmes – done;
- obtain grants and additional external funding to support new research projects – done;
- strengthen the Observatory's research capability in solar system and stellar astrophysics;
- restore and widen access to the heritage material in its possession – done;
- progress plans for a new Library, Archive and Historic Scientific Instruments Building – in progress; and
- improve the Observatory's access to necessary research infrastructure, such as computer facilities and high-bandwidth access to the internet through the Northern Ireland Metropolitan Area Network (NIMAN) – in progress.

The key task for the year was to continue to work with the DCAL with the aim of widening the Observatory's access to research development funds and so strengthening the Observatory's research capability. This would have enabled the Observatory to recruit additional research astronomers, thereby maintaining (or even increasing) the number of active research staff to participate in the next Research Assessment Exercise (RAE). It is unfortunate that no funding could be obtained for new staff positions during the reporting year, but there remains a compelling argument to widen the Observatory's access to general research development funds. Moreover, the Observatory has participated in the RAE for more than a decade, but has never benefited from access to the performance related additional funding enjoyed by comparable research groups in the university sector. Indeed, it is recognized that the Observatory's position in this respect is doubly difficult owing to its small size: unlike larger institutions there are very limited opportunities to transfer resources *within* the organization. Lack of access to research development funds continues to put the Armagh Observatory at a considerable disadvantage so far as long-term developments are concerned.

In addition to these high-level objectives, the Observatory has continued to play a major community role in astronomy (e.g. its involvement in the Astronomical Science Group of Ireland and in helping to organize the UK National Astronomy Meeting and UK Solar Physics Meeting 2003 in Dublin Castle in April 2003). The Observatory has also played a leading role in promoting the public awareness of astronomy and related sciences, especially through talks and public lectures, the release of media information sheets about its work, the appearance of staff or their work in various mass-media, and the provision of information through web-pages and links displayed on the Observatory's principal web-site (http://star.arm.ac.uk/). The Observatory's commitment to the Southern African Large Telescope project has continued with the support of the DCAL, and the largely HLF and DCAL-funded project to restore the historic telescopes and telescope domes has progressed satisfactorily, with completion planned during 2004/2005.

2.1 Performance

The principal function of staff at the Armagh Observatory is to advance knowledge and understanding of astronomy and related sciences by pursuing high-quality scientific research, and by attracting visitors and research assistants (at postgraduate and postdoctoral levels) as well as external grant income to the City of Armagh. The Observatory's programme of public understanding of science, outreach and student training also makes a significant contribution to government strategies to raise interest in science and technology throughout the community, and especially amongst young people. These activities help to counter negative stereotypes about science and technology, and contribute to greater scientific literacy amongst the general population.

In these ways, the work of the Armagh Observatory promotes a strong, positive image of Northern Ireland and of Armagh City and District on the world stage, and makes a distinctive contribution to external impressions of the region. The work of the Observatory also attracts visitors to Armagh, in particular to the Armagh Astropark, the main Observatory building, its telescopes and surrounding landscaped grounds, and to the wealth of resources accessible from its principal astronomical and meteorological web-sites (http://star.arm.ac.uk/ and http://climate.arm.ac.uk/).

As proxy indicators of performance in each of the Observatory's principal areas of activity (research, public understanding of science, outreach, student training, and heritage) records are maintained of (A) External Grant Income (per financial year); (B) the number of Refereed Journal Publications (per calendar year); (C) the number of Identified Media Citations (per calendar year); and (D) the number of

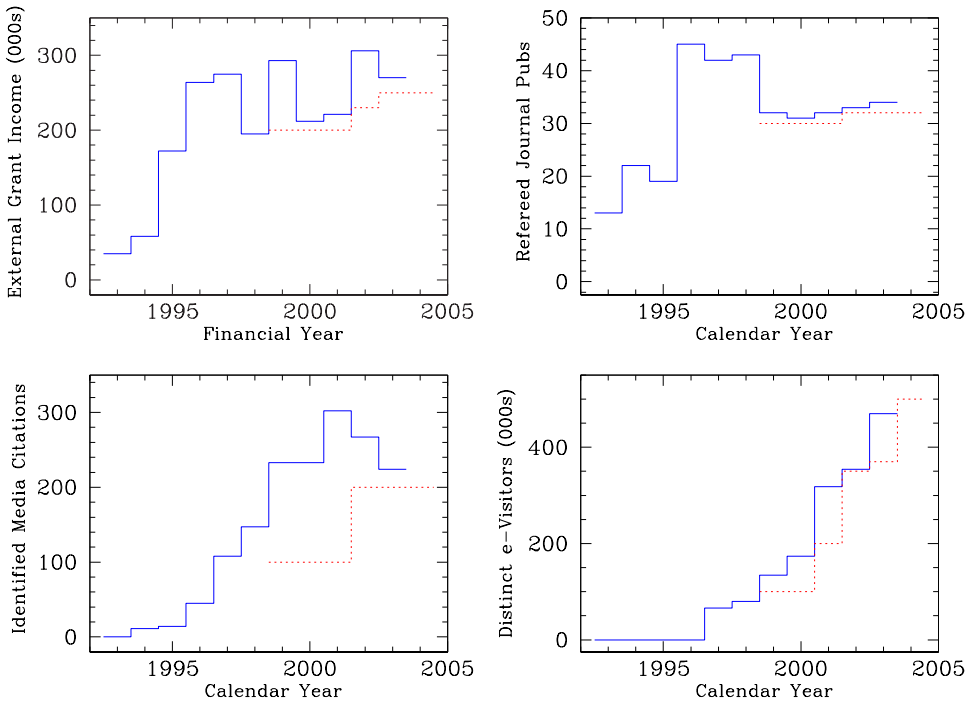

Figure 1: Histograms showing the trends in various performance indicators for the Armagh Observatory during the past decade. Dotted lines indicate corresponding Business Plan targets.

Distinct e-Visitors (DEVs) to its web-sites (per calendar year). Although other data are recorded for internal management and statistical purposes (e.g. numbers of presentations, seminars, grants, and so on), a detailed annual analysis of such indicators is less informative than a thorough periodic assessment of the Observatory's research performance in the round, making allowance for the available resources and the Observatory's relatively small size compared to many of the university departments and research institutes with which the Observatory is often compared. The Observatory has participated in the Research Assessment Exercise (RAE) since 1992, and during this period has maintained a Quality Research (QR) rating of Grade 4. In the 2001 RAE this grade corresponded to: "Quality that equates to attainable levels of national excellence in virtually all of the research activity submitted, showing some evidence of international excellence."

The trends of the Observatory's principal performance indicators are shown in Table 1 (p.1) and Figure 1. Note that all items refer to calendar year, with the exception of financial matters (e.g. external grant income for 2003 refers to the financial year 2003/2004 and so on). Figure 1 shows that during the past decade all the Observatory's key performance indicators have generally been on ascending trajectories, in every case producing a result better than the target set the previous year. There is a danger that systematic underfunding could undermine this record of success.

So far as particular indicators are concerned, the Observatory's total non-DCAL income (£284,000) slightly exceeds the value for external grant income alone (£270,000); the number of refereed journal publications is a lower limit to the total number of refereed papers, which is a subset of the Observatory's entire research output; the number of identified media citations is a lower limit to the actual number of mentions of the Observatory or its staff in various mass-media; and the number of Distinct e-Visitors (DEVs) is the number of distinct hosts served by the Observatory's web-site. This too is a lower limit, owing to caching by big servers and sharing or repeat visits from the same IP number. (For comparison, the number of 'hits' on the Observatory's web-sites, defined as the number of successful page requests, was approximately 8 million during calendar year 2003.)

Total external grant income during 2003/2004, namely £270,000, was above the target figure of £250,000 set in April 2003, being significantly boosted by income associated with the largely HLF-funded telescope domes and historic telescopes restoration project. As a group, the five Research Astronomers at Armagh have continued to attract into the Observatory more external funding in terms of non-DCAL grant income than their gross DCAL-funded salary costs. This statistic alone demonstrates the potential for growth with the presence of additional research staff. The target for external grant income for 2004/2005 has again been set at £250,000, the same as the previous year, but with competition for

research grants remaining strong this promises to be an extremely tough target.

The number of refereed journal publications in 2003 has been maintained at the levels of recent years, the slight increase in each of the past several years being an encouraging but possibly not statistically significant result. Similarly, the number of identified media citations has remained at a high level, substantially above the target of 200 per year, and the number of DEVs continues to show a healthy year-on-year increase. This demonstrates a satisfactory growth in the profile and external impact of the Armagh Observatory, despite the slight decline in the total number of research-active staff.

In summary, the yearly trend of key performance indicators (Table 1, p.1, and Figure 1, p.5) shows that despite devoting considerable effort to restoring several historic telescopes and telescope domes, and improving the fabric of the main Grade A listed building, Observatory staff have maintained a high level of research activity and an exceptionally high public profile. For such a small research group, the frequency with which members of staff appear in or are quoted in newspapers and other media is probably second to none, and during each of the past five years has exposed reports of astronomy at Armagh to tens of millions of people world-wide. It would be a significant loss for the City of Armagh if these systematic improvements in performance were placed in jeopardy through lack of sufficient core funding for the institution.

2.2 New TSN Action Plan

New Targeting Social Need (TSN) is a key part of the Programme for Government. It is a vehicle by which Ministers seek to tackle deprivation and to reduce inequalities in the life experiences of citizens in terms of poverty, health, housing, educational and economic opportunity, and disability.

Following a decision by the DCAL during 2003 to consolidate the TSN policies of the agencies, NDPBs and Statutory Bodies that it currently supports, the Armagh Observatory and Armagh Planetarium policies on New Targeting Social Need were incorporated into an overarching DCAL joint policy. For convenience we have continued to make the Armagh Observatory's New TSN policy available on the internet and in hard copy on request to the Observatory. The New TSN Policy for 2004, which was updated most recently in January 2004, is shown in Appendix A and is also available on the internet at http://star.arm.ac.uk/TSN.html.

2.3 Objectives for Financial Year 2004/2005

The announced parliamentary grant-in-aid is £666,500, the same as in 2003/2004. A very significant fraction of the Observatory's overall running costs is related to core items such as salaries and fixed overheads such as heat, light, power, insurance etc. Flat funding for 2004/2005 will put severe stress on the Observatory's ability to maintain its planned programmes of research, outreach and public understanding of science. However, the announced grant-in-aid excludes any additional in-year funding for work associated with the Observatory buildings and grounds (e.g. the recently announced £20,000 for necessary work to ensure compliance with the Disability Discrimination Act), and other contingencies, and an important objective for the year must be to obtain further recurrent funding to sustain the Observatory's operations. If flat funding were to continue for another year it cannot be emphasized too strongly that the Observatory's ability to sustain a genuinely high level of research activity could be cast into question, resulting in loss of morale and a possibly vicious circle of decline from which it might be difficult to recover.

The allocated funds will be directed towards achieving the following objectives during 2004/2005, namely to:

- maintain existing high-quality research programmes;
- obtain grants and additional external funding to support new research projects;
- strengthen the Observatory's research capability in solar system and stellar astrophysics;
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- advance plans for a new Library, Archive and Historic Scientific Instruments Building.

Targets for these objectives, which together span the Observatory's principal areas of activity (research, public understanding of science, outreach, student training, and heritage), are indicated in Table 1.

In addition to maintaining the level and quality of astronomical research carried out at the Observatory, the key task for the year is to widen the Observatory's access to research development funds and to lay a strong foundation for the forthcoming Research Assessment Exercise benchmark. This will involve working with the DCAL not just to provide an appropriate level of core funding for astronomical research, but also to obtain the additional funds necessary for the recruitment of additional research staff and to maintain and improve the Observatory's access to high-quality research infrastructure.

3 Alignment of Armagh Observatory and DCAL Objectives

3.1 Cultural Capital

A key theme underlying the DCAL Strategic Plan is the concept of Cultural Capital: the notion that the largely creative Culture, Arts and Leisure sector produces products not just for immediate consumption and short-term economic benefits but for long-term utilization and as a contribution to the social and economic development (and external perception) of Northern Irish society as a whole.

Astronomers at Armagh Observatory have active research interests which encompass a very wide range of solar and stellar astrophysics, as well as solar system astronomy and solar-terrestrial physics including climate, and they regularly publish in excess of 30 refereed papers *per year* in international scientific publications. Their total research output includes a somewhat greater number of unrefereed journal articles, papers in conference proceedings, and a variety of research notes and public information sheets. These outputs, as well as the Observatory's growing library, historic archives and its collection of clocks, valuable scientific instruments, and other artefacts, both ancient and modern, provide Northern Ireland with a rich scientific heritage and a unique cultural and educational resource.

In short, the Observatory's main function as an astronomical research institute is to *produce and sustain* Cultural Capital. The work is long-term, and makes a primary contribution to mankind's accumulated knowledge of the world in which we live. This activity contributes, within Northern Ireland, to the generation of a more confident, scientifically literate, informed and prosperous community.

In addition to this primary research activity, the Armagh Observatory also makes a significant contribution to facilitating access to this growing reservoir of knowledge through a vibrant programme of outreach and public understanding of science, for example by conducting tours of the historic building, grounds and Astropark, and by arranging a variety of talks, seminars and public lectures. Access to the Observatory's astronomical and meteorological heritage is also provided electronically through its two principal web-sites: http://star.arm.ac.uk/ and http://climate.arm.ac.uk/. During calendar year 2003, these 'gateways' to the Observatory recorded approximately 8 million hits from some 470,000 Distinct e-Visitors.

The DCAL seeks to create a confident, informed and vibrant community, and to protect, nurture and grow Northern Ireland's cultural capital so that it can be enjoyed both today and tomorrow. The Observatory's achievements in astronomical research, as well as its efforts to promote greater public understanding of science, assist the achievement of these aims and objectives. The Armagh Observatory thus contributes to greater confidence and economic prosperity for the whole region.

3.2 Heritage and the Environment

An important further responsibility of the astronomers at Armagh is the care and maintenance of the Observatory grounds and historic buildings, notably the Armagh Astropark, the historic Grade A listed main Building and telescope domes, as well as the library, archives and historic scientific instruments. These provide a rich addition to the ecclesiastical and built heritage of the City of Armagh, and an important synergy with the other libraries and museums in the City, helping to provide Armagh with a 'critical mass' in such areas. This provides Armagh with a unique blend of potential visitor attractions, helping to raise the city's profile and to attract 'intellectual' tourists and other visitors to the region from all over the world.

For example, during 2003 the Observatory contributed to the UK and Ireland-wide Archive Awareness Month and the EU-wide European Heritage Open Days (see http://star.arm.ac.uk/publicevents/), activities which together attracted more than 100 visitors to the Observatory. The Archive Awareness Campaign provided an opportunity for partnership with the Armagh Public Library (also founded in the late 18th century by Primate Robinson), whilst the European Heritage Open Days provided an opportunity for the Observatory to develop links with the five other specialist library collections in Armagh.

On a different front, following an Observatory initiative in 2002 which drew attention locally to the issue of light pollution and to the problems it produces not just for astronomy and public awareness of the night sky but for saving energy and improving the natural environment as well, the Armagh City and District Council has adopted a motion to minimise light pollution in and around Armagh. It is believed

	Financial Year				
	2004/2005 Budget (£k)	2003/2004 Unaudited (£k)	2002/2003 Actual (£k)	2001/2002 Actual (£k)	2000/2001 Actual (£k)
Incoming Resources					
Required DCAL recurrent grant paid	660.0	627.0	616.0	466.0	452.0
DCAL recurrent grant paid in prior year	–	33.0	–	–	–
Total DCAL recurrent grant	660.0	660.0	616.0	466.0	452.0
Required DCAL capital grant paid	6.5	6.5	7.5	7.5	6.5
SALT grant paid in previous years	40.0	80.0	120.0	120.0	80.0
SALT grant deferred to future years	–	−40.0	−80.0	−80.0	−40.0
DCAL buildings, domes, telescopes funding released	–	77.2	108.2	60.0	–
DCAL buildings, domes, telescopes funding deferred	47.2	−47.2	−77.2	−48.2	–
DCAL funding for NAM 2003 paid in prior year	–	10.0	–	–	–
DCAL funding for Reserves	–	–	–	100.0	–
DCAL funding for DDA Work	20.0	–	–	–	–
Astronomy infrastructure and Human Orrery	–	115.0	–	–	
Grant for IoPI and Orrery Released	21.9	−21.9	–	–	
Total DCAL Grant	795.6	839.6	694.5	625.3	498.5
Interest	3.0	7.4	6.6	4.8	7.5
Rents	3.0	5.3	2.0	1.9	2.0
Miscellaneous income	0.5	1.3	0.5	0.9	0.3
Donations	0.0	0.0	0.0	0.0	0.0
Additional funds from grants	44.3	30.7	42.0	73.1	72.9
Total Incoming Resources	846.4	884.3	745.6	706.0	581.2
Less Resources Expended					
Capital equipment	6.5	6.5	7.5	7.5	6.5
Appropriation of recurrent grant for equipment	0.0	1.2	12.4	7.2	0.0
SALT	37.0	37.0	38.7	39.6	40.0
SALT balance in restricted reserves	3.0	3.0	1.3	0.4	0.0
NAM 2003	–	8.0	–	–	–
NAM 2003 balance in restricted reserves	–	2.0	–	–	–
DCAL buildings, domes, telescopes funding	47.2	30.0	31.0	11.8	–
Disability Discrimination Act (DDA) Costs	20.0	–	–	–	–
Astronomy infrastructure and Human Orrery	21.9	93.1	–	–	–
Insurance	15.0	16.5	15.3	8.4	7.8
Rates	0.3	0.2	–	–	–
Heat, light, power	15.0	12.9	12.2	13.8	15.2
Property repairs and grounds	22.0	32.2	24.4	24.4	32.1
Cleaning costs	8.4	8.0	7.4	7.2	7.2
Total salary costs	548.7	524.7	484.6	463.6	422.1
Student fees	8.0	7.6	6.4	6.7	7.6
Consultancy	–	–	–	–	7.7
Agency costs	2.5	0.6	–	–	–
Staff training	0.0	1.4	1.4	0.3	2.8
Recruitment	1.0	1.2	0.1	0.0	6.4
Travel and subsistence	10.0	22.7	20.8	25.3	18.5
Visitors programme	1.0	5.2	5.0	1.2	3.7
Conferences	1.0	0.0	1.6	0.0	2.1
Hosting meetings and lectures	0.0	0.4	1.0	0.7	1.1
JANET access service charge to 30-Sep-04	1.6	3.1	2.8	2.6	3.0
BT line charge to 30-Sep-04 (inc. estimated penalty)	5.5	10.5	11.6	11.6	11.4
NIMAN from 01-Oct-04 (half-year costs)	15.0	–	–	–	–
Computer consumables	10.0	12.1	11.1	13.2	7.2
Service contracts	4.4	4.1	4.1	3.6	3.7
Library costs	16.1	11.4	20.9	22.2	14.4
Historic books and instruments purchase	–	1.3	–	–	–
Publications	0.0	1.8	0.7	0.7	0.5
UK entertaining	0.0	0.2	0.6	0.6	0.2
Advertising and promotions	0.0	0.8	1.2	1.1	1.4
Public Understanding of Science	0.0	0.0	0.0	0.0	0.0
Stationery	3.6	2.9	3.1	3.1	3.5
Post and telephone	6.0	6.1	5.4	4.8	5.9
Office and miscellaneous equipment	2.4	2.5	2.4	1.7	7.2
General expenses	4.0	4.7	4.3	3.7	5.8
Management Committee and Governors	2.0	1.8	1.1	1.6	2.6
Internal audit	2.0	1.1	1.3	1.2	1.7
External audit	3.0	2.8	2.8	2.6	2.2
Observatory legal fees	1.0	0.6	0.0	0.0	0.9
Other professional fees	1.3	3.6	−0.2	2.3	0.8
Bank interest and other charges	0.0	0.0	0.0	0.0	0.0
CPD Fees	0.0	0.9	–	–	–
Total Resources Expended	846.4	886.7	744.3	694.7	653.2
Surplus = Income − Expenditure	0.0	−2.4	1.3	11.3	−72.0
Transfer to unrestricted reserves	0.0	−2.4	1.3	11.3	−72.0

Table 2: Summary of DCAL income and expenditure funded by the DCAL versus financial year (FY). The Table was last updated on 5 May 2004. Projections for FY 2003/2004 are unaudited at the time of writing. All tabulated values have been rounded to the nearest £100.

that this is the first such formal policy on the island of Ireland. Not only is this good for astronomy, and for the Armagh Observatory, but it aligns closely with the concept of Cultural Capital as providing a *sustainable* resource: the Campaign for Dark Skies saves energy and improves the environment, and helps to ensure the future viability of the Armagh Observatory as a fully functioning astronomical observatory.

3.3 Cross-Cutting Targets

In terms of the key objectives of the Programme for Government, many of the activities of the Armagh Observatory are cross-departmental and cross-cutting. For example, the Observatory has many characteristics of a third-level research institute, with aims and objectives similar to those of a university or university department — and hence a focus in terms of performance on the Research Assessment Exercise. On the other hand, one of the Observatory's principal secondary activities — developing a high-profile programme of public understanding of science — fits well within Education, both at third level (largely through the training of postgraduate PhD students) and secondary level (through the involvement of school children in work-experience placements and occasional educational visits to its Buildings, Grounds and Astropark). The Observatory has an important additional role to play in lifelong learning, for example by facilitating visits by those who wish to know more about astronomy and of humanity's place in the wider Universe, or simply by providing people with greater access to knowledge of astronomy and related sciences through the web-site or by a walk through the Armagh Astropark.

4 Summary

During 2004/2005, the Armagh Observatory will seek to:

- maintain existing high-quality research programmes;
- obtain grants and additional external funding to support new research projects;
- strengthen the Observatory's research capability in solar system and stellar astrophysics;
- strengthen the Observatory's access to research infrastructure such as CosmoGrid, the Southern African Large Telescope (SALT), and obtain high-bandwidth connections to the internet through the Northern Ireland Metropolitan Area Network (NIMAN);
- widen access to the heritage material in its possession; and
- advance plans for a new Library, Archive and Historic Scientific Instruments Building.

Targets for these objectives, which together span the Observatory's principal areas of activity (research, public understanding of science, outreach, student training, and heritage), are indicated in Table 1.

In addition to maintaining the level and quality of astronomical research carried out at the Observatory, the key task for the year is to widen the Observatory's access to research development funds and to lay a strong foundation for the forthcoming Research Assessment Exercise benchmark. This will involve working with the DCAL not just to provide an adequate level of core funding for astronomical research, but also to obtain the additional funds necessary for the recruitment of additional research staff and to maintain and improve the Observatory's access to high-quality research infrastructure.

A Armagh Observatory New TSN Action Plan 2004

The Vision of the Armagh Observatory is:

> *"To maintain and build on its position as a thriving astronomical research institute, and to continue to expand our understanding of the Universe and of humanity's place in it."*

The Mission 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."*

Who We Are

The Armagh Observatory (see http://star.arm.ac.uk/) is the oldest continuously functioning astronomical research institute in Great Britain and Ireland, founded by Archbishop Richard Robinson in 1790 as part of his dream to see a University in the City of Armagh. It stands close to the centre of the City of Armagh together with the Armagh Planetarium in approximately 14 acres of attractive, landscaped grounds that are managed by the Observatory and which include a scale model of the solar system and the Universe known as the Armagh Astropark.

The principal function of the Armagh Observatory, which is a tertiary-level institution funded by the Northern Ireland Department of Culture, Arts and Leisure (DCAL), is to undertake original research of a world-class academic standard that broadens and expands our understanding of astronomy and related sciences. Current key programmes focus on Stellar Astrophysics, the Sun, Solar System astronomy, and Solar System – Earth relationships including the Sun's influence on climate and the impact of interplanetary dust, comets and asteroids on the Earth. The Observatory also 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.

What We Do

Astronomy provides a singular perspective on our place in the Universe, addressing fundamental questions such as the origin of the Earth, the origin of Life, and 'Are we Alone?'. Research into astronomy plays an increasingly important role in modern society, for example by:

- attracting and maintaining the interest of young people in science, and towards a scientific way of thinking;
- contributing to a better understanding of global environmental change, for example global warming;
- predicting the effects of asteroid impacts, and the effects of space debris and meteoroids on artificial satellites.

Research interests of Observatory staff currently focus on (i) Stellar and Galactic Astrophysics (including star formation, astrophysical jets, cool stars, hot stars, helium stars, star-spots, stellar flares, circumstellar dust), (ii) the Sun (the dynamic solar atmosphere, chromosphere and corona), (iii) Solar System Astronomy (including celestial mechanics, planetary science, and the dynamical evolution and interrelationships of comets, asteroids and interplanetary dust), and (iv) Solar System – Terrestrial Relationships (including solar variability, climate, accretion of interplanetary dust and Near Earth Objects). In addition, Observatory staff participate in an active programme of education and lifelong learning, via lectures, popular astronomy articles, and interviews with the press, radio and television. Further details concerning the research interests of all the Observatory staff may be obtained from the Observatory web-site at: http://star.arm.ac.uk/.

Astronomy is also a creative cultural activity. It enjoys a high public profile in the printed and electronic media, and in books and film, for example in Hollywood classics such as *2001: a Space Odyssey,* and through blockbusters such as *Armageddon* and *Deep Impact*. The fruits of astronomy have inspired artists and musicians, poets and authors, as well as scientists, engineers and philosophers. They have often provided inspiration for works of art, musical compositions, and theatrical performances.

Astronomy is also a primary source of images and related information for exhibits in science centres, among them the National Space Science Centre in Leicester, the science centre in the Belfast Odyssey Complex, and the Armagh Planetarium. Astronomical topics provide an invaluable supply of source material for education, entertainment and leisure. The subject is frequently featured in books, magazines and television documentaries seen by millions worldwide.

How We Contribute to New TSN

Astronomy is an involving, inspirational activity with the capacity to attract people, especially the young, towards science, engineering and information technology. The Armagh Observatory seeks to develop this interest by promoting wider access to scientific knowledge amongst all sections of the community, and disseminating the results of its scientific research through a programme of public outreach and public understanding of science (PUS). The principal elements of this policy include:

- attracting visitors to Armagh, primarily to the Armagh Astropark and the planned Phenology Garden;
- maintaining and preserving the Observatory's unique meteorological record, the longest in the UK and Ireland from a single site;
- maintaining and preserving the Observatory's *cultural* heritage, for example its listed buildings, library, archives and historic scientific instruments, its telescopes and telescope domes, and the landscaped grounds and Astropark;
- providing talks and presentations to interested persons and groups which together represent individuals of all ages and from all backgrounds;
- partnership with institutions and organizations having similar public education objectives to those of the Armagh Observatory, for example the Astronomical Science Group of Ireland, the Armagh Natural History and Philosophical Society, amateur astronomy organizations, and university research groups;
- answering technical questions about astronomy from members of the public and disseminating astronomical results to the press, radio and television;
- maintaining and developing a web-site to facilitate access to the latest research findings on astronomy and related sciences;

The Armagh Observatory is fully committed to implement the New TSN Policy. The Observatory encourages a culture in which resources in appropriate areas of its activities and interactions with the public are targeted so far as possible on individuals, groups, agencies, and geographical areas that have greatest social need. In this way, the Observatory contributes directly to the Northern Ireland Executive's New TSN Policy and Programme for Government, especially in providing enhanced access and choice for those in education, and lifelong learning opportunities for all.

Armagh Observatory New TSN Action Table 2004

Business Area:	**Astronomy and Related Sciences**
Social Need to be Tackled:	**Access to scientific knowledge amongst socially disadvantaged groups**
Desired Outcome:	**Increased access to scientific knowledge, thereby promoting lifelong learning opportunities amongst individuals and socially disadvantaged groups**
New TSN Objectives:	**Targets or Actions and Time-Scales:**
Objective 1 Improve opportunities among disadvantaged sections of the community to experience scientific research in a high-technology environment, by:	(a) facilitating an ongoing work experience programme for a person with disabilities; and (b) continuing to monitor participation on student programme placements with reference to New TSN.
Objective 2 Improve access to Northern Ireland's scientific and cultural heritage, by:	(a) continuing to promote e-access to astronomical and meteorological information; and (b) continuing to encourage visits by people from socially disadvantaged areas or scientifically disadvantaged backgrounds.

Armagh Observatory
January 2004