An Institute of Physics report | **January 2010**

Survey of Academic Appointments in Physics

2004–2008

United Kingdom and Ireland

IOP Institute of Physics

Contents

Executive summary

- In the UK, 47 of a possible 48 physics departments (i.e. those with a significant proportion of physics academics) participated in this survey. In the Republic of Ireland, eight of 11 departments responded – these results are presented separately in Appendix A.
- Just over 1850 academics are engaged in physics research as reported by UK physics departments. Of this total, 88% are male and 12% are female. These figures compare with a 91:9% gender ratio in the previous (2004) survey.
- 74% of the total staff numbers are experimentalists, 26% are theoreticians.
- The overall breakdown by academic grade is as follows: 32% are professors, 27% are readers/senior lecturers, 18% are lecturers, 11% are research fellows, and the remaining 12% are university teachers/teaching fellows, experimental officers and other staff. (Postgraduate students, postdoctoral researchers, technical and administrative staff, and visiting academics were excluded from the survey.)
- The three most populated of the defined "physics research areas" are: astronomy, astrophysics, cosmology and space physics (23% of the total community); high energy and particle physics (15%); and surfaces, interfaces and materials (9%).
- Over the five-year survey period since the last survey, 268 staff departed and 499 arrived – a net gain of 231 staff members, representing some 12% of the current community.
- The physics research areas gaining most staff members over the five-year survey period were astronomy, astrophysics, cosmology and space physics (net gain of 60 individuals), and high energy and particle physics (51).
- As a percentage of the total staff headcount within that research area, biophysics and biological physics has seen the largest increase with a net gain of 15 staff members (30% of its current community).
- Within the most populated academic grades (professors, readers/senior lecturers, lecturers and research fellows) the split across nationalities is approximately the same, with 43–48% of staff from the UK, 32–40% from the EU and 16–20% non-EU.
- The most common reason for staff departing remains retirement (119 = 44% of the total), although female staff members only account for one of these 119 retirements. Moving to another academic post accounted for the second largest group of departures with just over 30% of both male and female staff.

1: Introduction

1.1: Aims and objectives

Following two previous surveys carried out in 1999 and 2004, the Institute of Physics commissioned this survey to determine the current state of the academic physics community in the UK and the Republic of Ireland. Its objectives were three-fold:

- to establish the current breakdown of the community in terms of gender, grade and research activity, and compare this with previous surveys;
- to discover the movements into and out of the community over the last five years; and
- to help inform policy activities of the Institute.

1.2: Parts of the survey

The first part of this survey provides a snapshot of the UK physics community at the survey's reference date (1 December 2008) followed, in the second part, by a summary of the changes to the staff complement since the last survey in 2004 – a survey period of five years.

The snapshot is provided in section 3, which presents aggregated data for all departments indicating the staff numbers at each academic grade. This is followed by a breakdown of these numbers by research area in terms of grade, gender and experimental/theoretical divide. These numbers all relate to the reference date. This section includes, where appropriate, brief comparison with the same data sets from the 2004 survey.

The second part, covered in section 4, presents the changes in staff numbers in each of those key research areas over the survey period to determine which areas have gained and lost staff. The available data set is then examined more closely to offer a detailed description of the age, gender, grade and experimental/theoretical profile of those leaving and arriving.

This report covers departments in the UK – England, Northern Ireland, Scotland and Wales. The results for the Republic of Ireland are presented in Appendix A.

The previous survey in this series was conducted throughout 2004 and published as the *Survey of Academic Appointments in Physics 1999–2004 – United Kingdom & Ireland* in February 2005 (www.iop.org/activity/policy/Publications/file_4148.pdf). This survey was based on an earlier briefing paper published in November 1999, entitled *Physics Statistics 3: New Academic Appointments*.

1.3: Acknowledgements

This survey would not have been possible without the input of a large number of heads of department, departmental secretaries, departmental administrators and other support staff. Their efforts and willing co-operation in obtaining the data presented are gratefully acknowledged. The results of this survey refer to staff in standard academic departments – specialist and cross-disciplinary research units of a quasi-independent nature are not within the scope of this report.

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2: The data-gathering process

2.1: Methodology

The survey was carried out entirely by e-mail. No departmental visits were conducted and no corroborative evidence was sought in addition to the raw data provided by each department. The survey was conducted over a period of 10 months; forms were initially sent out in December 2008 and the last completed returns were submitted in October 2009.

2.2: The survey form

The survey form (Appendix B) was divided into four sections: sections 2 and 3 contribute to the first part of the survey, section 4 to the second part.

- Section 1: departmental contact details.
- Section 2: a broad snapshot of staff numbers at departmental level as of 1 December 2008 in terms of seven academic grade groupings (professor, reader and senior lecturer, lecturer, experimental and senior experimental officer, researcher holding a personal fellowship, university teacher/teaching fellow, temporary academic staff) and gender.
- Section 3: a more detailed breakdown by research area (according to a defined set of broad research categories) as of 1 December 2008 in terms of the six academic grades, gender and an indication of whether staff members were mainly experimentalists or theoreticians – on the last characteristic, departments were asked to make their own judgement in each case and no definitions were offered.
- Section 4: a list of all staff arriving and departing permanently from the department during the survey period, 2004–2008. Staff names were not required but departments were asked to supply details of their academic grade, gender, age at arrival/departure, reason for departure and their main research area, including an indication of whether they were experimentalists or theoreticians.

2.3: Quality of the data

Out of a possible 48, 47 relevant UK departments participated in the survey, which indicates that the results can be treated with a reasonably high level of confidence (see Appendix C). For the purposes of completeness, approximate figures for the non-participating department have been obtained from the departmental website for section 3 only (departmental and research-level staff numbers). No data were made available for this department for section 4 (staff movements).

Newcastle University no longer has a physics department and as such did not participate in this survey.

3: Analysis of the current situation

Table 1: Aggregate data for all UK physics departments

Academic grade	Gender (M/F)	Absolute numbers		Percentage of total		Percentage per grade
Professor	M	559.2	598.6	30	32	93
	F	39.4		2		7
Reader and senior lecturer	M	434	494	23	27	88
	F	60		3		12
Lecturer	M	266	336	14	18	79
	F	70		4		21
Experimental and senior experimental officer	M	123	130	7	7	95
	F	7		0		5
Researcher holding a personal fellowship	M	175	211.5	9	11	83
	F	36.5		2		17
University teacher (non-research)/ teaching fellow	M	19.5	28.5	1	2	68
	F	9		0		32
Temporary academic staff	M	49	53.5	3	3	92
	F	4.5		0		8
Total		**1852.1**	**1852.1**	**100**	**100**	

Figure 1: Breakdown by academic grade at departmental level

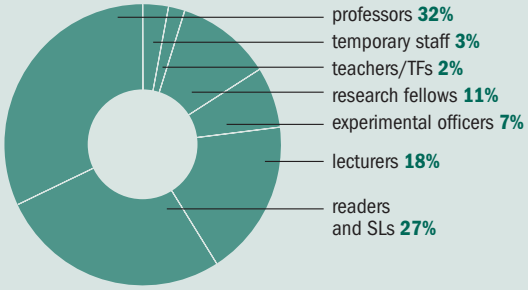


Figure 2: Comparison of overall breakdown by academic grade, 2008 vs 2004

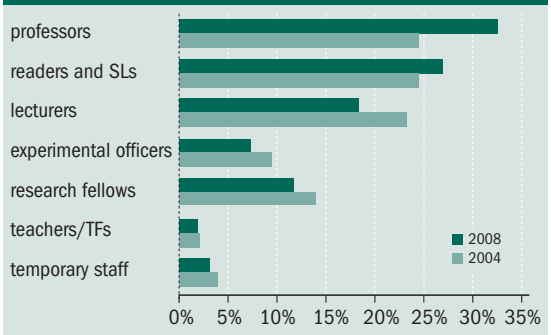
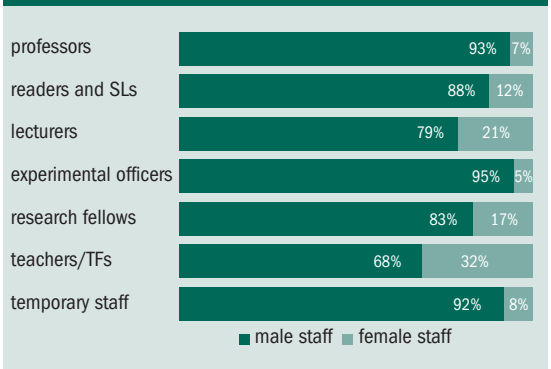


Figure 3: Breakdown of each academic grade by gender



This analysis is divided into two parts: the departmental-level overview and the more detailed research-level view. The first view aggregates the data across all departments in the UK in terms of gender and the following seven academic-grade groupings:

1. Professor
2. Reader and senior lecturer (SL)
3. Lecturer
4. Experimental and senior experimental officer
5. Researcher holding a personal fellowship (e.g. Royal Society or EPSRC)
6. University teacher/teaching fellow (TF)
7. Temporary academic staff

The second view breaks these numbers down into 16 "physics research areas" based loosely on the Physics & Astronomy Classification Scheme (PACS; www.aip.org/pacs) – and also adds the experimental/theoretical dimension to each gender within each grade for all of the 16 research areas.

3.1: Departmental-level view

Section 2 of the survey form was used to collect data for this departmental-level overview of the UK physics community. The total staff number engaged in researching and teaching physics on the reference date (1 December 2008) was 1852 as reported by the UK physics departments. Of this total, 1626 (88%) are male and 226 are female (12%). This compares with a 91:9% gender split as reported in the previous (2004) survey.

Table 1 presents the breakdown of the academic grades by gender in terms of absolute numbers and percentages; percentages are given both as a proportion of the total staff number, 1852, and as a proportion of the staff numbers within each grade.

For example, the 559 male and 39 female profes-

Figure 4: Breakdown of total staff complement by gender

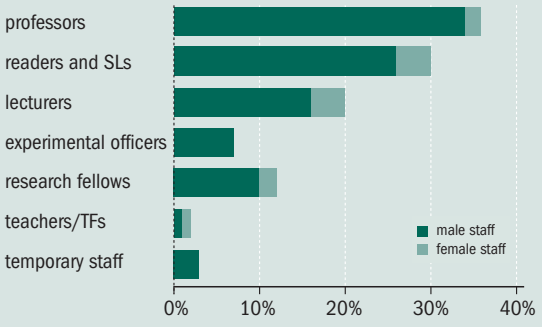


Figure 5: Comparison of gender breakdown across all grades, 2008 vs 2004

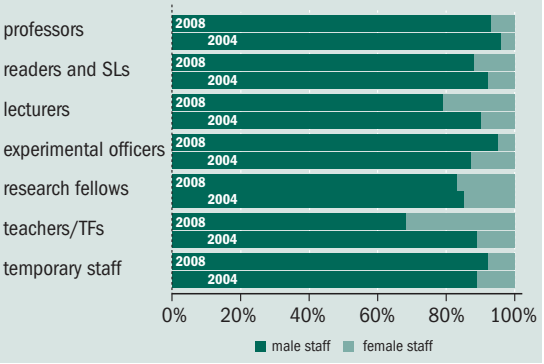


Table 2: Female staff percentage – comparison with other subjects

Grade	% female staff, all subjects (2006/2007)[1]	% female staff in physics (current survey)
Professor	17	7
Senior lecturer	37	12
Lecturer	47	21
Researcher	46	17

[1] *Physics staff statistics* – draft report prepared for the Institute of Physics, February 2009, People Science & Policy Ltd.

Table 3: Total staff numbers per physics research area in descending order, 2008 vs 2004

Research area	2008 data			2004 data	
	Number	%	Rank	%	Rank
Astronomy, astrophysics, cosmology and space physics	432.1	23.3	1	19.2	1
High energy and particle physics	278.2	15.0	2	11.2	2
Surfaces, interfaces and materials	171	9.2	3	7.3	6
Optics and lasers	131.7	7.1	4	9.2	3
Soft condensed matter	116	6.3	5	3.7	10
Semiconductors	110.9	6.0	6	8.4	4
Magnetism, metals, quantum fluids and superconductivity	107.1	5.8	7	7.5	5
Mathematical physics including string theory and quantum gravity	103.9	5.6	8	4.6	8
Atomic and molecular physics	96	5.2	9	6.6	7
Nuclear physics	70	3.8	10	3.3	11
University teacher (non-research)	51.5	2.8	11	3.8	9
Biophysics and biological physics	50	2.7	12	1.9	13
Atmospheric physics, geophysics and environmental physics	40	2.2	13	1.9	14
Plasma physics	38.5	2.1	14	2.4	12
Medical physics	14.7	0.8	15	1.6	15
Electrical and electronic physics	9	0.5	16	0.9	16
Thermal physics and fluid dynamics	2	0.1	17	0.3	17
Other	29	1.6	N/A	5.9	N/A
Total	**1851.6**	**100**			

sors represent 30% and 2%, respectively, of the overall total but 93% and 7%, respectively, within the professorial grade. (Percentages are given to the nearest whole number.)

The overall total of 1852 obtained here compares well with the total headcount of 1731 of Category A staff across all UK institutions in unit of assessment 19 (physics) in the 2008 Research Assessment Exercise (RAE; www.rae.ac.uk). The latter figure is lower because not all academic staff will have been taken into consideration within the RAE, and some staff members within physics departments will have entered other units of assessment.

At this stage we can briefly compare the results of the present survey and the 2004 survey, as given in figure 2. Note that the overall proportion of staff at the professorial and reader/senior lecturer level has increased, with a fall at all other levels. Further analysis of the changes within this period will be given in section 4.

We can again make a brief comparison with the 2004 data, as shown in figure 5. The proportion of female staff has increased substantially at the lecturer (21% vs 10%) and teacher/teaching fellow (32% vs 11%) grades, with small variations at other levels.

We can also compare the figures obtained here with similar data across all higher-education subjects, as shown in table 2.

Although the percentage of female staff in physics is increasing, there is clearly some ground to cover before the proportion is in line with the average across all subjects.

Figure 6: Staff percentages by research area

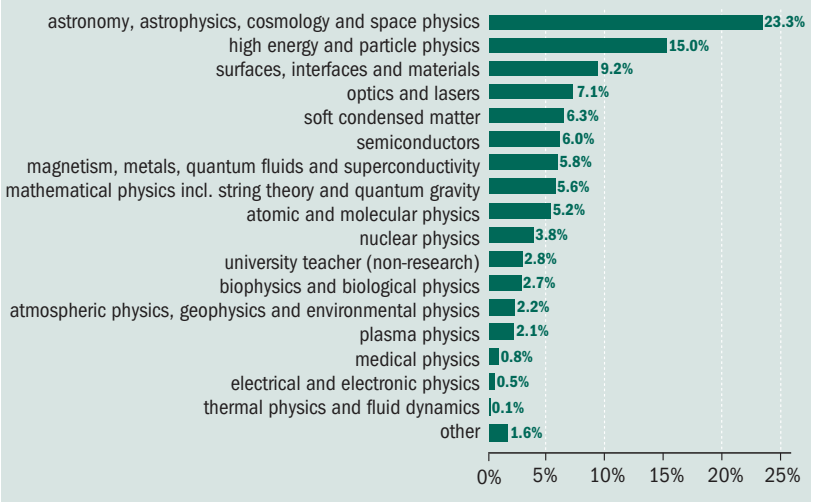


Table 5: Gender divide between experimentalists and theoreticians, 2008 vs 2004

	2008 data			2004 data	
	Staff numbers	Percentage of total	Percentage of category (E or T)	Percentage of total	Percentage of category (E or T)
Male experimentalists	1201.5	64.9	88.3	67.3	91.2
Female experimentalists	158.5	8.6	11.7	6.5	8.8
Male theoreticians	425.7	23.0	86.6	23.5	89.7
Female theoreticians	65.9	3.6	13.4	2.7	10.3
Total	**1851.6**	**100**		**100**	

3.2: Research-group-level view

In section 3 of the survey form, departments were asked to allocate staff members to one or more of a defined set of physics research areas. These categories were loosely based on the Physics & Astronomy Classification Scheme. (A number of respondents indicated that the defined research areas originally selected are now out of date. These will be reviewed for the next edition of the survey.)

The nature of physics research makes it difficult to categorise researchers within one research area, but for the purposes of this survey staff have generally been classified according to the area or group to which they devote the majority of their time. In some cases fractions were used to indicate a split of time across two or more research areas, and these have been included in the totals.

Table 3 presents the results of this division into these physics research areas, with the numbers from 2004 included for comparative purposes. The top two ranking research areas remain the same, with astronomy, astrophysics, cosmology and space physics; and high energy and particle physics now accounting for more than 35% of the community. Surfaces, interfaces and materials has risen from sixth to third in the rankings, and a possible reason for this is discussed in the concluding comments (section 5).

Optics and lasers (third to fourth) occupies the next spot, and soft condensed matter (tenth to fifth) has seen substantial growth.

The "other" category at the end of the list covers staff working in research areas including quantum information, acoustics, radiation detection and signal processing. As noted previously, the defined categories are becoming somewhat outdated, and there is justification for the development of a revised list for the next edition of this survey. (For the purposes of direct comparison with previous surveys, both current and revised research categories will be used in the next edition.) Nanoscience and quantum information are two significant research areas specifically highlighted by a number of respondents, and staff members in these areas have typically been allocated to surfaces, interfaces and materials; and optics and lasers or mathematical physics including string theory and quantum gravity, respectively, or placed in the other category.

The percentage breakdown by research area for 2008 is presented graphically in figure 6.

The absolute numbers of staff in each research area, divided by grade, gender and experimental/theoretical profile are given in table 4.

Finally in this section, from these data we can also obtain the total numbers of experimentalists and theoreticians by gender, as given in table 5.

Considering the relative percentages within each category, we find that female staff members are marginally more likely to be theoreticians than experimentalists. The 2004 percentages are included for comparison, and we can see that the proportion of female staff has increased in both categories over this five-year period.

Table 4: Staff per research area by grade, gender and experimental/theoretical profile

Research area	Professor				Reader and senior lecturer				Lecturer				Research fellow				Experimental and senior experimental officer				All other grades				Total all grades	2008 percentages
	M		F		M		F		M		F		M		F		M		F		M		F			
	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T		
Surfaces, interfaces...	37.5	11	4.5	0	37	8	3	1	14.5	5	5	2	11.5	3	2	0	13	0	0	0	12	1	0	0	171	9.2%
Mathematical physics...	0	40.4	0	3.5	0	32	0	1	0	14	0	3	0	7	0	0	1	0	1	0	0	1	0	0	103.9	5.6%
Soft condensed matter	16	20	3	1	19	8	2	0	11	7	2	0	11	7	1	3	4	0	1	0	0	0	0	0	116	6.3%
Optics and lasers	39.7	6	1	0	27	6	1	0	18.5	6	2	3	11.5	2	1	0	3	0	0	0	4	0	0	0	131.7	7.1%
Semiconductors	41	8	4	0.4	15	7	4	0	9	3	2	1	8	0	0.5	0	7	0	0	0	0	1	0	0	110.9	6.0%
Plasma physics	13	0.5	0	0	10	1	0	0	8	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	38.5	2.1%
Thermal physics...	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.1%
Nuclear physics	16	7	0	0	14	1	2	1	5	3	1	0	2	4	0	0	7	0	2	0	4	0	1	0	70	3.8%
Medical physics	5.5	0.2	1	0	2	0	1	0	1	0	2	1	0	0	0	0	1	0	0	0	0	0	0	0	14.7	0.8%
Bio/biological physics	9	2	0	1	9	3	0	0	11	0	2	1	7	1	2	0	1	0	0	0	1	0	0	0	50	2.7%
Magnetism, metals...	31.1	9	0	0	19	2	3	0	7	6	3	1	11	8	1	1	4	0	0	0	1	0	0	0	107.1	5.8%
High energy and PP	58.7	14.5	3	2	64	9	9	0	42	8	8	3	16	6	7	1	26	0	1	0	0	0	0	0	278.2	15.0%
Atmospheric physics...	9	2	2	1	8	0	3	0	3	1	2	0	0	1	1	0	5	0	1	0	1	0	0	0	40	2.2%
Atomic and molecular...	25	13	2	1	15	4	1	4	4	8	2	2	8	1	1	0	4	0	1	0	0	0	0	0	96	5.2%
Astro and astrophysics	88	25.1	8	1	78	20	11	7	38	16	15	0	37	7	9	5	41	1	0	0	22	2	1	0	432.1	23.3%
Electrical and elec...	1	0	0	0	0	0	0	0	2	5	0	0	0	0	0	0	1	0	0	0	0	0	0	0	9	0.5%
Teacher (non-research)	0	1	0	0	3	2	1	4	5	1	2	3	0	0	0	0	1	0	0	0	10	10	5.5	3	51.5	2.8%
Other	2	5	0	0	4	7	0	1	1	0	0	2	0	2	0	1	2	1	0	0	0	0	1	0	29	1.6%
	394.5	164.7	28.5	10.9	325	109	41	19	180	86	48	22	126	49	25.5	11	121	2	7	0	55	15	8.5	3	1851.6	100.0%
	559.2		39.4		434		60		266		70		175		36.5		123		7		70		11.5			

4: Analysis of changes over the last five years

Table 6: Arriving staff by academic grade

Grade	Current (Mar 2004 – Dec 2008)			Previous (Oct 1999 – Mar 2004)		
	M	F	Total	M	F	Total
Professor	52	4	56	37	1	38
Reader and SL	70	10	80	20	4	24
Lecturer	174	51	225	129	28	157
Experimental officer	10	1	11	4	1	5
Research fellow	104	20	124	60	17	77
Other (temp acad staff, university teacher [non-research], etc)	2	1	3	N/A	N/A	N/A
Total	**412**	**87**	**499**	**250**	**51**	**301**

Figure 7: Arriving staff across academic grades

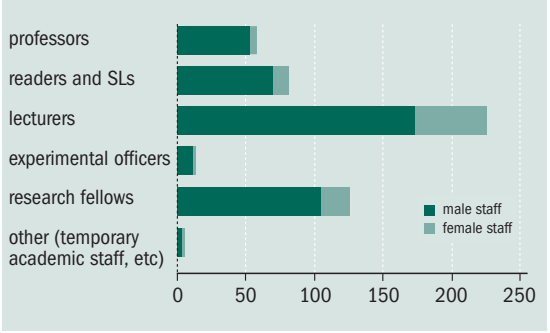


Table 7: Average age on arrival by academic grade

Grade	Average age on arrival	
	M	F
Professor	46.5	50.5
Reader and senior lecturer	38.0	41.4
Lecturer	34.2	34.1
Experimental officer	35.7	33.0
Research fellow	33.2	34.1
Other (temp acad staff, university teacher [non-research], etc)	28.0	28.0

In section 4 of the survey form, respondents were asked to provide data about staff numbers joining or permanently leaving their departments over the survey period.

Each of these staff members was again categorised by defined research area, age, gender, grade and their experimental/theoretical profile. Arriving staff members were additionally classified by nationality (UK, EU or non-EU).

Across all surveyed departments, over the last five years, 499 staff arrived and 268 departed. This represents a net gain of 231, some 12% of the total community in 2008, indicating significant growth. This compares favourably with the previous survey, in which movements over a similar five-year period (1999–2004) resulted in growth of only 1% (although four departments were unable to provide data).

4.1: Arriving staff

Table 6 presents a breakdown by academic grade of all staff joining the surveyed departments over the five-year survey period and compares that with the results of the previous (2004) survey.

The most common grades for arriving staff are lecturer and research fellow, which between them accounted for 70% of arriving staff members. The overall female/male ratio for arriving staff has remained constant, with female staff making up 17% of the arriving complement in both surveys. The highest proportion of female staff arriving is at lecturer level with 23% of the total (i.e. 51/225).

The average age of arriving staff in each grade is given in table 7.

If the lecturer grade is considered to be the main recruiting grade, then the average age of appointment is 34 across both male and female staff. This compares with an average age of 35 for the same grade in the 2004 survey. The average appointment age for both senior grades (professor and reader/senior lecturer) is higher for women than for men, although of course the former figure is based on a relatively small number of staff (four at professor level and 10 at reader/senior lecturer), so should be viewed with caution.

Table 8 divides the defined physics research areas into their experimental/theoretical components and lists the absolute numbers of staff members arriving in each area by gender. It is worth noting the relatively high numbers of female staff arriving in cosmology and space physics, especially experimental.

In this section, respondents were also asked to categorise joining staff members by nationality – UK, EU or non-EU. The results of this part of the survey are given in table 9, with staff numbers divided by academic grade. Note that nationalities were not provided for all arriving staff members, hence the figures represent 87% of the total arrivals (i.e. 432/499).

As illustrated, within the most populated academic grades the split across nationalities is approximately the same, with 43–48% of staff from the UK, 32–40% from the EU and 16–20% non-EU.

Table 8: Arriving staff by research area, experiment/theory and gender

Research area	E/T	M	F	Total
Astronomy, astrophysics, cosmology and space physics	Experimental	62	20	82
High energy and particle physics	Experimental	44	7	51
Astronomy, astrophysics, cosmology and space physics	Theoretical	22	7	29
Surfaces, interfaces and materials	Experimental	24	5	29
High energy and particle physics	Theoretical	24	5	29
Mathematical physics including string theory and quantum gravity	Theoretical	25	2	27
Optics and lasers	Experimental	21	4	25
Atomic and molecular physics	Experimental	22	1	23
Magnetism, metals, quantum fluids and superconductivity	Theoretical	17	3	20
Soft condensed matter	Experimental	11	2	13
Magnetism, metals, quantum fluids and superconductivity	Experimental	11	3	14
Biophysics and biological physics	Experimental	10	3	13
Semiconductors	Experimental	10	2	12
Atmospheric physics, geophysics and environmental physics	Experimental	10	1	11
Atomic and molecular physics	Theoretical	7	2	9
Plasma physics	Experimental	10	0	10
Soft condensed matter	Theoretical	8	1	9
Surfaces, interfaces and materials	Theoretical	7	1	8
University teacher (non-research)	Experimental	3	3	6
Medical physics	Experimental	4	2	6
Biophysics and biological physics	Theoretical	5	1	6
Nuclear physics	Experimental	6	0	6
Optics and lasers	Theoretical	2	1	3
Plasma physics	Theoretical	4	0	4
Semiconductors	Theoretical	3	1	4
Mathematical physics including string theory and quantum gravity	Experimental	2	1	3
Other	Experimental	7	0	7
Atmospheric physics, geophysics and environmental physics	Theoretical	1	1	2
Nuclear physics	Theoretical	1	1	2
University teacher (non-research)	Theoretical	0	0	0
Other	Theoretical	3	2	5
No details		26	5	31
Total		**412**	**87**	**499**

Table 9: Nationalities of arriving staff by academic grade

Grade	Nationality						Total
	UK		EU		non-EU		
	M	F	M	F	M	F	
Professor	20	1	16	2	8	1	48
Reader and SL	28	2	22	4	11	0	67
Lecturer	65	20	64	15	24	10	198
Experimental officer	6	0	1	1	3	0	11
Research fellow	42	7	26	7	16	4	102
Other (temp acad staff, university teacher [non-research], etc)	2	0	3	1	0	0	6
Total	**163**	**30**	**132**	**30**	**62**	**15**	**432**

Table 10: Departing staff by academic grade

Grade	Current (Mar 2004 – Dec 2008)			Previous (Oct 1999 – Mar 2004)		
	M	F	Total	M	F	Total
Professor	85	1	86	84	2	86
Reader and SL	78	3	81	84	2	86
Lecturer	54	9	63	57	7	64
Experimental officer	7	2	9	3	0	3
Research fellow	23	3	26	35	8	43
Other (temp acad staff, university teacher [non-research], etc)	2	1	3	N/A	N/A	N/A
Total	**249**	**19**	**268**	**263**	**19**	**282**

Table 11: Reasons for departure

Reason for departure	Absolute numbers			Percentage of total		
	M	F	Total	M	F	Overall
Retirement	118	1	119	47	5	44
Moved to another academic post	77	6	83	31	32	31
End of contract	8	3	11	3	16	4
Career change/ leaving academia	12	0	12	5	0	4
Early retirement/ voluntary severance	7	1	8	3	5	3
Deceased	5	0	5	2	0	2
Family/health reasons	2	3	5	1	16	2
Other	5	3	8	2	16	3
Not given	15	2	17	6	11	6
Total	**249**	**19**	**268**	**100**	**100**	**100**

Figure 8: Nationalities of arriving staff by academic grade

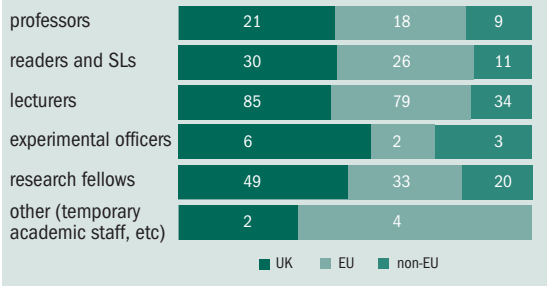
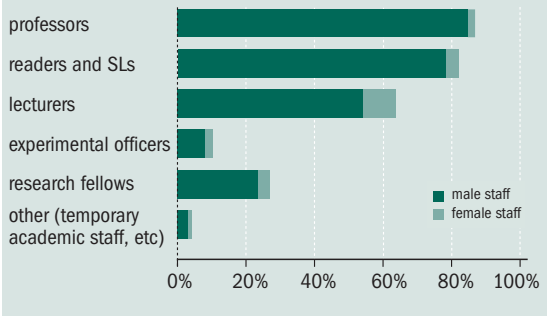


Figure 9: Departing staff by academic grade



4.2: Departing staff

Table 10 presents the number of departing staff by academic grade over the current survey period, and compares this with data from the previous survey. Departures are clearly most common from the two senior grades (professor and reader/senior lecturer), but this merely reflects the high overall numbers of staff within these grades. Taken as a percentage of the overall staff numbers (table 1), the proportion of departing staff members is roughly the same across all of the most populated grades, representing 12–19% of the full staff complement within that grade.

It is worth noting that the absolute numbers of staff departures are very similar in both the current and previous survey periods.

A breakdown of the reasons for departure (across all grades) is presented in table 11.

Overall, retirement remains the most significant reason for departure, accounting for 44% of the total, which is unsurprising given that most departures are among the senior academic grades. However, breaking these numbers down by gender reveals that only one of these 119 retirements was a female staff member. The second most common reason for departure was moving to another academic post, and within this group the gender split is more even, in each case accounting for just over 30% of the total.

Table 12 divides the defined research areas into their experimental/theoretical components and lists the absolute numbers and proportions departing from each area.

Table 12: Departing staff by research area, experiment/theory and gender

Research area	E/T	M	F	Total
Astronomy, astrophysics, cosmology and space physics	Experimental	28	4	32
High energy and particle physics	Experimental	18	2	20
Astronomy, astrophysics, cosmology and space physics	Theoretical	17	2	19
Surfaces, interfaces and materials	Experimental	17	0	17
Magnetism, metals, quantum fluids and superconductivity	Experimental	13	1	14
Semiconductors	Experimental	13	0	13
Optics and lasers	Experimental	12	1	13
Atomic and molecular physics	Experimental	11	0	11
High energy and particle physics	Theoretical	8	1	9
University teacher (non-research)	Experimental	8	0	8
Atomic and molecular physics	Theoretical	8	0	8
Mathematical physics including string theory and quantum gravity	Theoretical	7	0	7
Medical physics	Experimental	7	0	7
Other	Experimental	7	0	7
Soft condensed matter	Experimental	7	0	7
Surfaces, interfaces and materials	Theoretical	6	1	7
Nuclear physics	Experimental	4	1	5
Mathematical physics including string theory and quantum gravity	Experimental	3	0	3
Plasma physics	Experimental	4	0	4
Atmospheric physics, geophysics and environmental physics	Experimental	2	2	4
Biophysics and biological physics	Experimental	2	1	3
Magnetism, metals, quantum fluids and superconductivity	Theoretical	3	0	3
Soft condensed matter	Theoretical	3	0	3
Plasma physics	Theoretical	2	0	2
Atmospheric physics, geophysics and environmental physics	Theoretical	0	0	0
Biophysics and biological physics	Theoretical	1	0	1
Electrical and electronic physics	Experimental	1	0	1
Nuclear physics	Theoretical	2	0	2
Optics and lasers	Theoretical	1	0	1
Other	Theoretical	2	0	2
Thermal physics and fluid dynamics	Experimental	1	0	1
University teacher (non-research)	Theoretical	1	0	1
No details	Not given	30	3	33
Total		**249**	**19**	**268**

Table 13: Net staff movements by research area

Research area	Arrivals					Departures					Net change					Total staff in research area	Net change (% of total)
	Exp		Th		Total	Exp		Th		Total	Exp		Th		Total		
	M	F	M	F		M	F	M	F		M	F	M	F			
Astronomy, astrophysics, cosmology and space physics	62	20	22	7	111	28	4	17	2	51	34	16	5	5	+60	432.1	14
High energy and particle physics	44	7	24	5	80	18	2	8	1	29	26	5	16	4	+51	278.2	18
Mathematical physics including string theory and quantum gravity	2	1	25	2	30	3	0	7	0	10	−1	1	18	2	+20	103.9	19
Magnetism, metals, quantum fluids and superconductivity	11	3	17	3	34	13	1	3	0	17	−2	2	14	3	+17	107.1	16
Biophysics and biological physics	10	3	5	1	19	2	1	1	0	4	8	2	4	1	+15	50	30
Optics and lasers	21	4	2	1	28	12	1	1	0	14	9	3	1	1	+14	131.7	11
Atomic and molecular physics	22	1	7	2	32	11	0	8	0	19	11	1	−1	2	+13	96	14
Surfaces, interfaces and materials	24	5	7	1	37	17	0	6	1	24	7	5	1	0	+13	116	11
Soft condensed matter	11	2	8	1	22	7	0	3	0	10	4	2	5	1	+12	171	7
Atmospheric physics, geophysics and environmental physics	10	1	1	1	13	2	2	0	0	4	8	−1	1	1	+9	40	23
Plasma physics	10	0	4	0	14	4	0	2	0	6	6	0	2	0	+8	38.5	21
Other	7	0	3	2	12	7	0	2	0	9	0	0	1	2	+3	29	10
Semiconductors	10	2	3	1	16	13	0	0	0	13	−3	2	3	1	+3	110.9	3
Nuclear physics	6	0	1	1	8	4	1	2	0	7	2	−1	−1	1	+1	70	1
Electrical and electronic physics	0	0	0	0	0	1	0	0	0	1	−1	0	0	0	−1	14.7	−7
Medical physics	4	2	0	0	6	7	0	0	0	7	−3	2	0	0	−1	9	−11
Thermal physics and fluid dynamics	0	0	0	0	0	1	0	0	0	1	−1	0	0	0	−1	2	−50
University teacher (non-research)	3	3	0	0	6	8	0	1	0	9	−5	3	−1	0	−3	51.5	−6
No details	0	0	26	5	31	0	0	30	3	33	0	0	−4	2	−2	N/A	N/A
	257	54	155	33	499	158	12	91	7	268	99	42	64	26	231	1851.6	12

4.3: Net movements

Finally in this section, we can take the data on staff arrivals and departures presented in table 8 and table 12 and calculate the net movements within each research area, as given in table 13 and presented graphically in figure 10.

In terms of absolute numbers, by far the largest increases have been in astronomy, astrophysics, cosmology and space physics (+60), and high energy and particle physics (+51). However, this is somewhat misleading because they represent the two largest communities; a more meaningful measure of growth is given in the final column of table 13, which shows net movement as a percentage of current total staff numbers in each research area. By this measure, biophysics and biological physics as a research area has seen the largest proportional increase, with an increase of 15 representing 30% of its current staff complement.

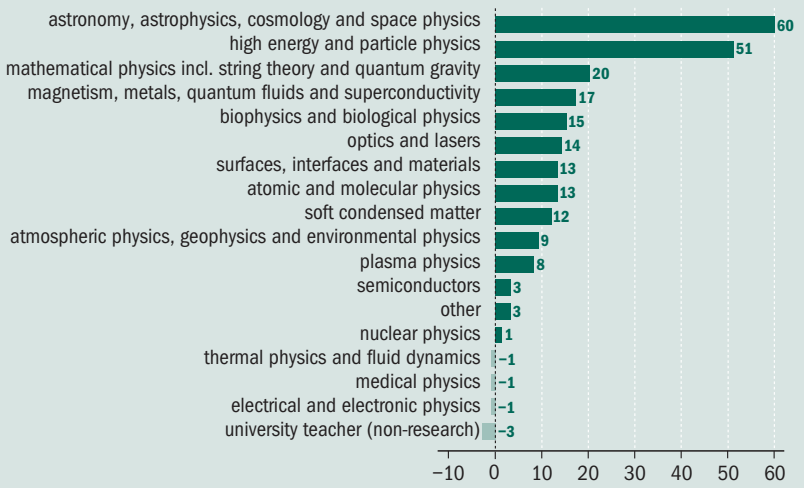
In addition to those research areas already mentioned, other growth areas include: atmospheric physics, geophysics and environmental physics; plasma physics; mathematical physics including string theory and quantum gravity; magnetism, metals, quantum fluids and superconductivity; atomic and molecular physics; optics and lasers; surfaces, interfaces and materials; and soft condensed matter.

Other research areas have seen little growth or a fall in numbers, but in these cases the absolute total numbers are relatively small, so we should not infer too much from these fluctuations.

Taking physics as a whole, we see a substantial increase in the numbers of both experimentalists (+141) and theorists (+90), making for a net gain overall of 231 staff over the five-year survey period, which repre-

sents some 12% of the current total staff complement. Note that the actual increase in total staff numbers is likely to be somewhat lower than this figure. This section should exclude internal transfers between grades (i.e. promotions), but analysis of the figures suggests that a number of promotions from research fellow to lecturer have been reported as new appointments (without record of the corresponding "departure"). The extent of this inconsistency is unclear. Comparison of total staff numbers reported in 2008 and 2004 indicates an overall increase of approximately 100. This compares favourably with the results of the previous (2004) survey, which reported only a 1% increase in staff numbers over the five-year period, 1999–2004.

Figure 10: Net staff movements by research area



5: Concluding comments

Since the previous edition of this survey in 2004, astronomy, astrophysics, cosmology and space physics; and high energy and particle physics have reinforced their positions as the two most heavily populated fields within the UK physics community. They also account for the largest number of new arrivals, between them accounting for 38% of new appointments (191 of 499 new staff members over the five-year survey period).

Surfaces, interfaces and materials has risen from sixth to third in the rankings. As noted previously, this may be partly due to the lack of a unique category for those working in the field of nanoscience.

The community as a whole has seen significant growth over the five-year survey period, with a net gain of 231 members of staff, representing some 12% of the current total staff complement. The research areas contributing most strongly to this growth are the two fields mentioned above, with 60 and 51 additional staff members, respectively, but in percentage terms biophysics and biological physics has seen the largest increase with a net gain of 15 staff members (30% of its current community).

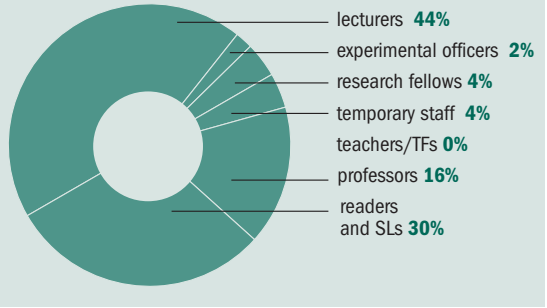
Taking into account both staff population and growth rate, other significant research areas are mathematical physics including string theory and quantum gravity; magnetism, metals, quantum fluids and superconductivity; atomic and molecular physics; optics and lasers; surfaces, interfaces and materials; and soft condensed matter.

The overall proportion of female staff continues to rise, with women now occupying 12% of staff positions, as compared with only 9% in 2004. However, this proportion is still low in comparison with overall higher-education figures. In terms of new appointments, the field of astronomy, astrophysics, cosmology and space physics is notable because almost 25% of arriving staff members are female (27 of 111).

Three-quarters of the community are primarily experimentalists, one-quarter theoreticians. This ratio remains the same as that reported in the previous survey.

Appendix A: Republic of Ireland

Figure 11: Republic of Ireland – staff breakdown by academic grade



Eight of the 11 relevant departments in the Republic of Ireland contributed to this survey. They were:

- Dublin City University, School of Physical Sciences
- Dublin Institute of Technology, School of Physics
- NUI Galway, School of Physics
- NUI Galway, Applied Mathematics (formerly Mathematical Physics)
- NUI Maynooth, Experimental Physics
- Trinity College Dublin, Physics
- University College Dublin, Physics
- University of Limerick, Physics

These departments accounted for a total of 170 staff between them. The three non-participating departments were:

- University College Cork, Physics
- University College Dublin, Mathematical Sciences
- NUI Maynooth, Mathematical Physics

Current staff information obtained from their websites suggests that these three departments represent a total of approximately 50 staff unaccounted for in this survey. The results presented in this section therefore cover roughly 80% of the total figures for the Republic of Ireland, and as such should be treated with some caution. (Note that the previous survey covered 62% of the Republic of Ireland figures.)

Table 14 presents the overall breakdown by academic grade and gender. The first three grade levels (professor, reader/senior lecturer and lecturer) account for almost 90% of total staff numbers. 80% of all staff are male, 20% female, with the greatest proportion (29%) of female staff at lecturer level.

A comparison with the data presented in the 2004 survey shows that there has been a significant change at professorial level, which now accounts for some 16% of total staff numbers, as opposed to only 6% in 2004. Because there have been more departures than new arrivals at this level (table 16), this indicates a number of internal promotions throughout the survey period.

Table 15 provides a breakdown of each academic grade by gender and experimental/theoretical research. Overall, experimental work accounts for 86% of the research being carried out.

A breakdown of total staff numbers by research area

Table 14: Republic of Ireland – staff breakdown by academic grade

Academic grade	Gender (M/F)	Absolute numbers		Percentage of total		Percentage per grade
Professor	M	24.5	26.5	14	16	92
	F	2		1		8
Reader and senior lecturer	M	42	51	25	30	82
	F	9		5		18
Lecturer	M	53	74.5	31	44	71
	F	21.5		13		29
Experimental and senior experimental officer	M	4	4	2	2	100
	F	0		0		0
Researcher holding a personal fellowship	M	6	7	4	4	86
	F	1		1		14
University teacher (non-research)/ teaching fellow	M	0	0	0	0	N/A
	F	0		0		N/A
Temporary academic staff	M	7	7	4	4	100
	F	0		0		0
Total		**170**	**170**	**100**	**100**	

Table 15: Republic of Ireland – experimental/theoretical breakdown by academic grade

Grade	Male		Female	
	E	T	E	T
Professor	22.5	2	2	0
Reader and senior lecturer	33	9	9	0
Lecturer	45	8	19.5	2
Advanced research fellow	5	1	1	0
Experimental and senior experimental officer	4	0	0	0
All other grades	2	1	0	0
Total	**111.5**	**21**	**31.5**	**2**
Percentage of total	**67**	**13**	**19**	**1**

Figure 12: Republic of Ireland – staff breakdown by research area

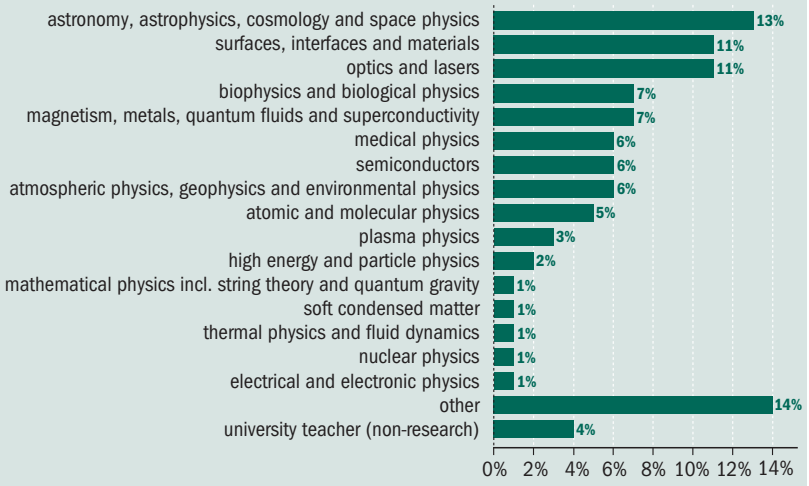


Figure 13: Republic of Ireland – staff breakdown by research area (2004)

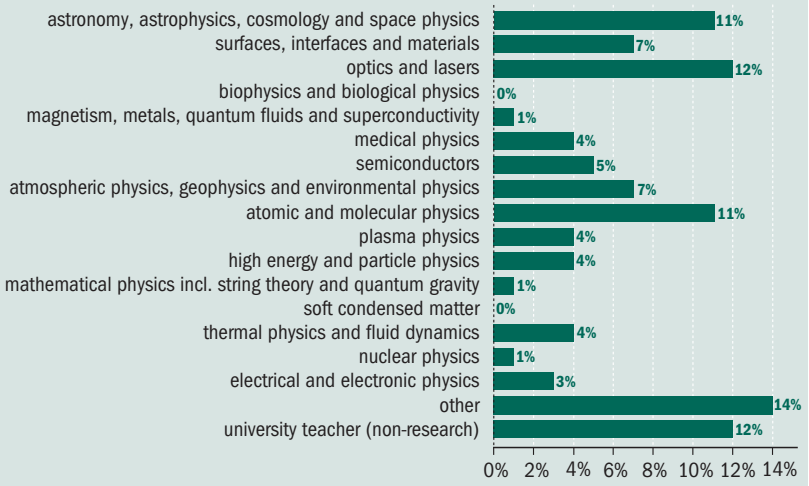


Figure 14: Republic of Ireland – net staff movements by research area

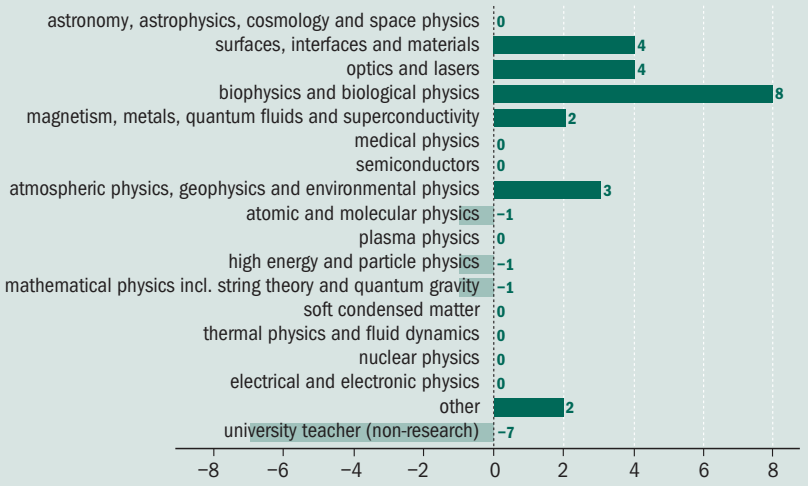


Table 16: Republic of Ireland – arrivals and departures by academic grade

Grade	Arrivals		Departures		Net change	
	M	F	M	F	M	F
Lecturer	18	10	7	2	11	8
Professor	3	1	7	0	−4	1
Reader	5	0	7	1	−2	−1
Total	**26**	**11**	**21**	**3**	**5**	**8**

is provided in figure 12, with data from the previous (2004) survey presented in figure 13 for comparison.

The most notable change is the increase in staff numbers in the field of biophysics and biological physics, for which no staff members were reported in 2004 and now accounts for 7% of all staff. A similar increase has been seen in magnetism, metals, quantum fluids and superconductivity, which has risen from 1 to 7% of the total staff count. As for the UK, the largest number of staff is found in the astronomy, astrophysics, cosmology and space physics category with 13% of the total (up from 11% in 2004), while surfaces, interfaces and materials is now ranked in second place with 11% (up from 7% in 2004) jointly with optics and lasers (down from 12% in 2004).

The greatest drop in staff numbers has been among university teachers, falling from 12% in 2004 to just 4% in 2008. Atomic and molecular physics has also seen a drop in numbers, from 11% of the total in 2004 to just 5% in 2008. In both data sets, the high proportion of researchers in the "other" category is partly due to a number of staff in the optometry department in the School of Physics at Dublin Institute of Technology.

Table 16 provides a breakdown by academic grade and gender of staff arrivals and departures over the five-year survey period. The largest overall change was at lecturer level, with a net gain of 19 staff members (11 male and eight female), while there was a net fall in staff numbers in both professor and reader/SL grades. Of the 24 reported departures across all grades, 21 were due to retirement. Note that no staff movements were reported at any other academic levels.

Table 17 presents arrival and departure data by research area. As indicated previously, the largest net gain in staff has been in the category biophysics and biological physics, with eight new appointments and no departures over the survey period. Optics and lasers; surfaces, interfaces and materials; atmospheric physics, geophysics and environmental physics; and magnetism, metals, quantum fluids and superconductivity, have all seen net increases in staff numbers. There have been seven departures and no new appointments in the university-teacher category.

Finally in this section, these net staff movements are presented graphically in figure 14.

Table 17: Republic of Ireland – arrivals and departures by research area

Research area	Arrivals			Departures			Net change
	Exp	Th	Total	Exp	Th	Total	
Biophysics and biological physics	6	2	8	0	0	0	8
Optics and lasers	4	0	4	0	0	0	4
Surfaces, interfaces and materials	4	1	5	1	0	1	4
Atmospheric physics, geophysics and environmental physics	5	1	6	3	0	3	3
Magnetism, metals, quantum fluids and superconductivity	1	1	2	0	0	0	2
Astronomy, astrophysics, cosmology and space physics	4	1	5	5	0	5	0
Soft condensed matter	0	1	1	0	1	1	0
Plasma physics	0	0	0	0	0	0	0
Semiconductors	1	0	1	1	0	1	0
Nuclear physics	0	0	0	0	0	0	0
Thermal physics and fluid dynamics	0	0	0	0	0	0	0
Medical physics	1	0	1	1	0	1	0
Electrical and electronic physics	0	0	0	0	0	0	0
High energy and particle physics	0	0	0	1	0	1	–1
Mathematical physics including string theory and quantum gravity	0	0	0	0	1	1	–1
Atomic and molecular physics	0	1	1	1	1	2	–1
University teacher (non-research)	0	0	0	7	0	7	–7
Other	3	0	3	1	0	1	2
Total	**29**	**8**	**37**	**21**	**3**	**24**	**13**

Summary

- A significant increase in staff numbers at professorial level has occurred since the previous (2004) survey. Because there have been more departures than arrivals at this level, this increase must be due to a number of internal promotions.
- The university-teacher category has seen the greatest fall in numbers, with seven departures and no new arrivals.
- Astronomy, astrophysics, cosmology and space physics is now the most popular research area in terms of overall staff numbers; this matches the results of the UK survey.
- Also reflecting the UK data, biophysics and biological physics is the fastest growing research area, with eight new appointments and no departures over the survey period.

Appendix B: Survey form

SECTION 1 Contact Details

University/Institution Name	
Department Name	
Person Completing This Form	
Name	
E-mail	
Telephone	

SECTION 2 Broad Departmental Profile

Enter Staff Numbers as of **1st December 2008**	Numbers	
	Male	Female
Professor		
Reader and Senior Lecturer		
Lecturer		
Experimental and Senior Experimental Officer		
Researcher holding a personal fellowship (e.g. EPSRC, STFC, Royal Society, etc.)		
University Teacher/Teaching Fellow		
Temporary Academic Staff (e.g. those on 1-3 year fixed contracts excluding Research Assistants on research grants)		

NOTE: **exclude** all grant funded researchers and visiting staff (i.e. professors/fellows)
include all academic staff and researchers holding a personal fellowship (e.g. EPSRC, STFC, Royal Society, etc.)

SECTION 3 Broad Research Profile

M/F = Male/Female E/T = Experimental/Theoretical (please make a judgement)

Staff Numbers 1st December 2008	Professors				Readers and Senior Lecturers				Lecturers				Advanced Research Fellows				Experimental and Senior Experimental Officers				All Other Grades			
	M		F		M		F		M		F		M		F		M		F		M		F	
	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T
Surfaces, Interfaces and Materials																								
Mathematical Physics including String Theory and Quantum Gravity																								
Soft Condensed Matter																								
Optics and Lasers																								
Semiconductors																								
Plasma Physics																								
Thermal Physics and Fluid Dynamics																								
Nuclear Physics																								
Medical Physics																								
Biophysics and Biological Physics																								
Magnetism, Metals, Quantum Fluids and Superconductivity																								
High Energy and Particle Physics																								

NOTE: **exclude** all grant funded researchers and visiting staff (i.e. professors/fellows)
include all academic staff and researchers holding a personal fellowship (e.g. EPSRC, STFC, Royal Society, etc.)

Section 3 continued …

M/F = Male/Female E/T = Experimental/Theoretical (please make a judgement)

Staff Numbers 1st December 2008	Professors				Readers and Senior Lecturers				Lecturers				Advanced Research Fellows				Experimental and Senior Experimental Officers				All Other Grades			
	M		F		M		F		M		F		M		F		M		F		M		F	
	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T
Atmospheric Physics, Geophysics and Environmental Physics																								
Atomic and Molecular Physics																								
Astronomy, Astrophysics, Cosmology and Space Physics																								
Electrical and Electronic Physics																								
University Teacher (non-research)																								
Other (<*Please specify here*>)																								
Other (<*Please specify here*>)																								

SECTION 4 Arrivals/Departures per Research Area

Please complete for **each** staff member arriving **and** departing permanently during the **full** Survey Period Mar 2004 – Dec 2008. No names are required. See codes overleaf.

Exclude internal transfers between grades, e.g. Lecturer (L) to Reader (R).

Grade	M/F	Place an "x" if		Age (on appoint-ment/ departure)	Reason (if departure)	Research codes – see overleaf
		New Appointment (please indicate whether UK, EU or non-EU)	Permanent Departure			
For example						
P	F	x (EU)		45	-	NP (T)
R	M		x	49	Moving to another academic post	AA (E)

NOTES

Research Codes

For Section 4

Include E or T to signify Experimental or Theoretical

Surfaces, Interfaces and Materials	SS (E) or SS (T)
Mathematical Physics including String Theory and Quantum Gravity	SQ (E) or SQ (T)
Soft Condensed Matter	SM (E) or SM (T)
Optics and Lasers	OP (E) or OP (T)
Semiconductors	SC (E) or SC (T)
Plasma Physics	PP (E) or PP (T)
Thermal Physics and Fluid Dynamics	TF (E) or TF (T)
Nuclear Physics	NP (E) or NP (T)
Medical Physics	MP (E) or MP (T)
Biophysics	BP (E) or BP (T)
Magnetism, Metals, Quantum Fluids and Superconductivity	MQ (E) or MQ (T)
High Energy and Particle Physics	HE (E) or HE (T)
Atmospheric Physics, Geophysics and Environmental Physics	AP (E) or AP (T)
Atomic and Molecular Physics	AM (E) or AM (T)
Astronomy, Astrophysics, Cosmology and Space Physics	AA (E) or AA (T)
Electrical and Electronic Physics	EE (E) or EE (T)
University Teacher (non-research)	UT (E) or UT (T)
Other	OT (E) or OT (T)

Grade Codes

Professor	P
Reader/Senior Lecturer	R
Lecturer	L
Experimental/Senior Experimental Officer	E
Researcher holding a personal fellowship (e.g. EPSRC, STFC, Royal Society, etc.)	F

Appendix C: Participating UK departments

Universities in England

- University of Bath, Department of Physics
- University of Birmingham, School of Physics and Astronomy
- University of Bristol, Department of Physics
- University of Cambridge, Department of Physics
- Durham University, Department of Physics
- University of Exeter, School of Physics
- University of Hertfordshire, School of Physics, Astronomy and Mathematics
- University of Hull, Department of Physics
- Keele University, Department of Physics and Astrophysics
- University of Kent, School of Physical Sciences
- University of Central Lancashire, School of Computing, Engineering and Physical Sciences
- Lancaster University, Department of Physics
- University of Leeds, School of Physics and Astronomy
- University of Leicester, Department of Physics and Astronomy
- University of Liverpool, Department of Physics
- Liverpool John Moores University, Astrophysics Research Institute
- London – Imperial College, Department of Physics
- London – King's College, Department of Physics
- London – Queen Mary, Department of Physics
- London – Royal Holloway, Department of Physics
- London – University College, Department of Physics and Astronomy
- Loughborough University, Department of Physics
- University of Manchester, School of Physics and Astronomy
- University of Nottingham, School of Physics and Astronomy
- Nottingham Trent University, School of Science and Technology
- The Open University, Department of Physics and Astronomy
- University of Oxford, Department of Physics
- University of Reading, Department of Physics
- University of Salford, Joule Physics Laboratory
- University of Sheffield, Department of Physics and Astronomy
- University of Southampton, School of Physics and Astronomy
- University of Surrey, Department of Physics
- University of Sussex, Department of Physics and Astronomy
- University of Warwick, Department of Physics
- University of York, Department of Physics

Universities in Scotland

- University of Aberdeen, Department of Physics
- University of Dundee, Division of Electronic Engineering and Physics
- University of Edinburgh, School of Physics and Astronomy
- University of Glasgow, Department of Physics and Astronomy
- Heriot-Watt University, Department of Physics
- University of St Andrews, School of Physics and Astronomy
- University of Strathclyde, Department of Physics
- University of the West of Scotland, School of Engineering and Science

Universities in Wales

- Cardiff University, School of Physics and Astronomy
- Swansea University, Department of Physics

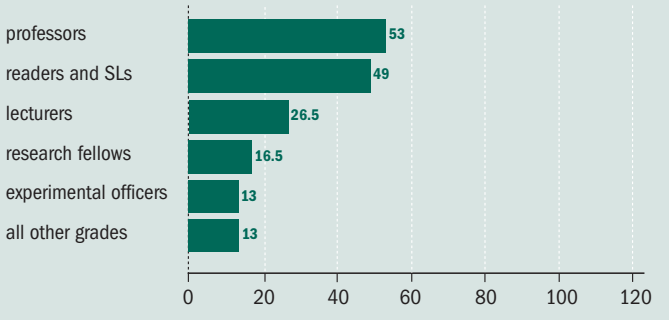
University in Northern Ireland

- Queen's University Belfast, Physics and Astronomy; and Mathematics and Theoretical Physics

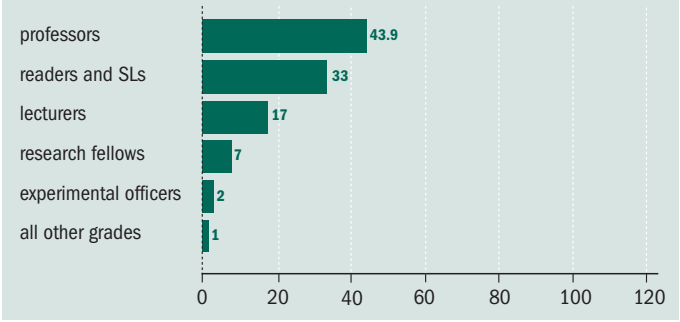
The Institute of Mathematics and Physics at Aberystwyth University was the only department not to participate in the survey.

Appendix D: Charts for UK physics research areas

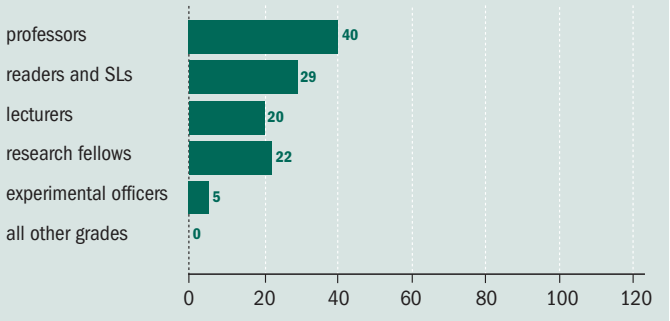
1. Surfaces, interfaces and materials



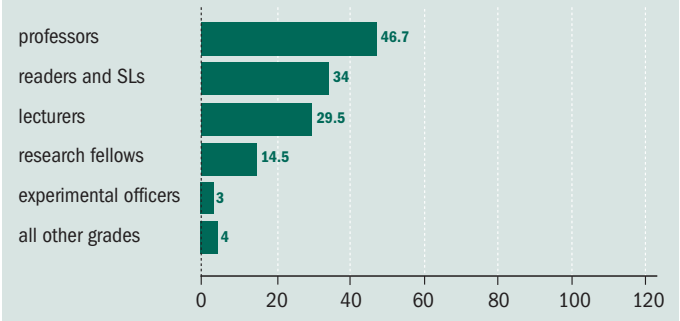
2. Mathematical physics, incl. string theory and quantum gravity



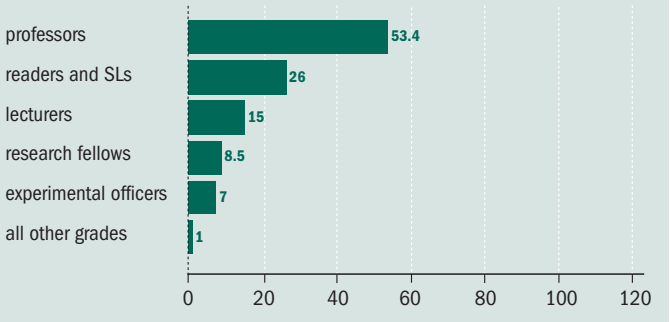
3. Soft condensed matter



4. Optics and lasers

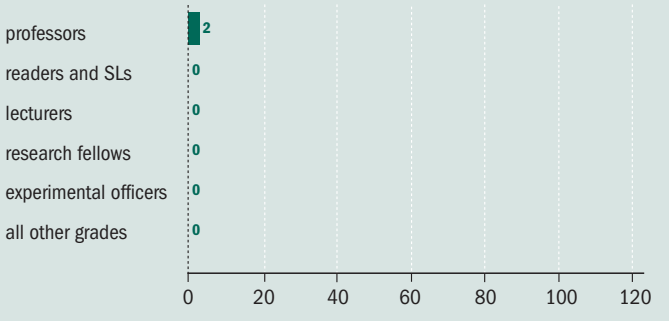


5. Semiconductors

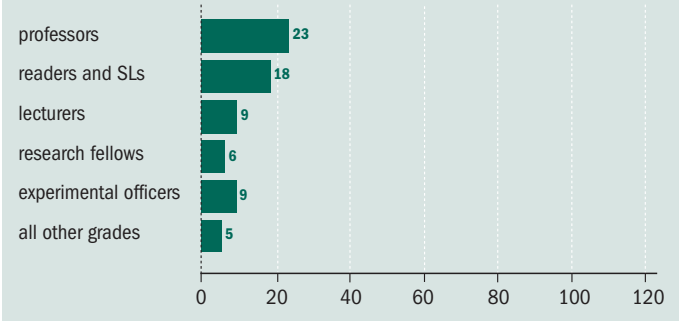


6. Plasma physics

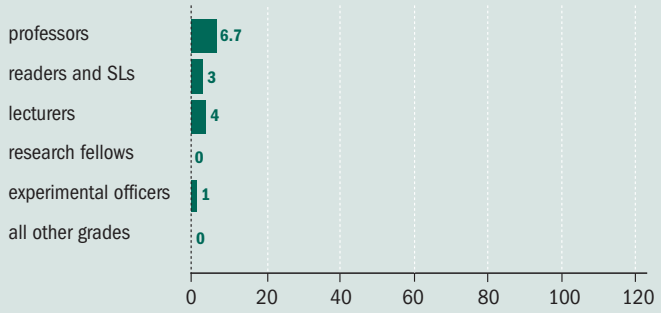
7. Thermal physics and fluid dynamics



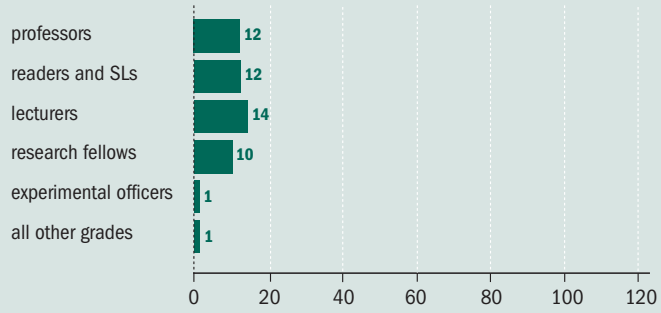
8. Nuclear physics



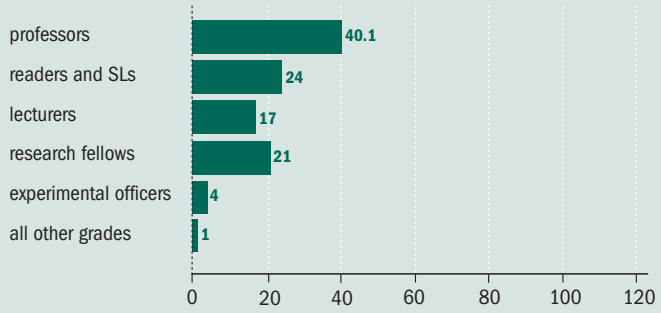
9. Medical physics



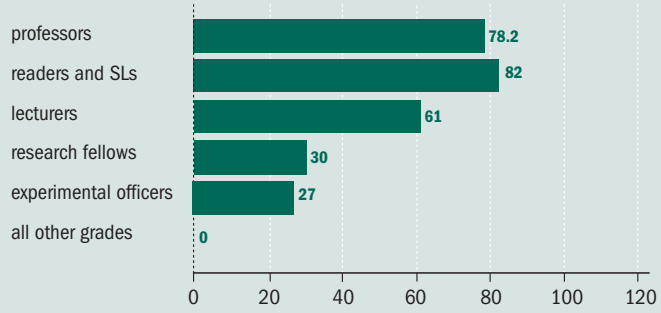
10. Biophysics and biological physics



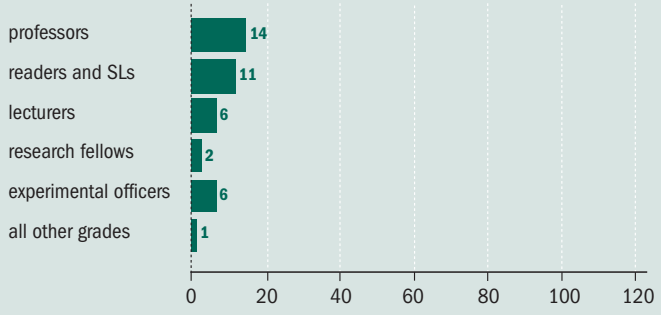
11. Magnetism, metals, quantum fluids and superconductivity



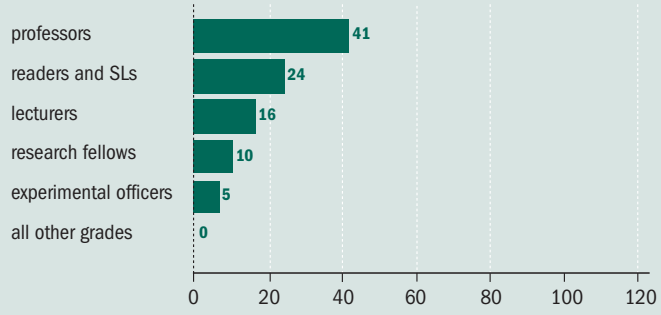
12. High energy and particle physics



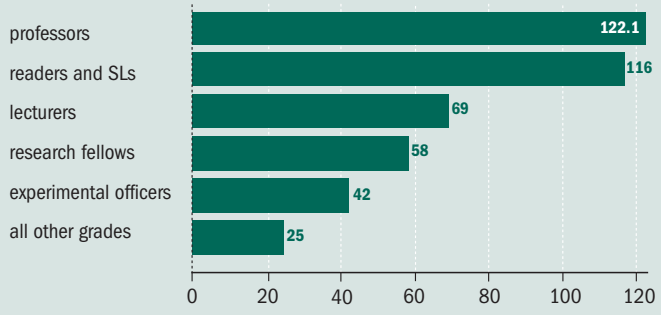
13. Atmospheric physics, geophysics and environmental physics



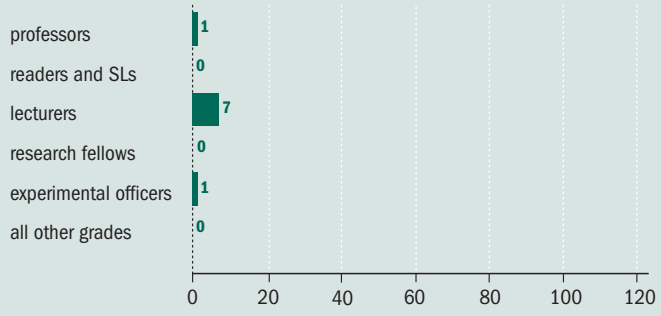
14. Atomic and molecular physics



15. Astronomy, astrophysics, cosmology and space physics



16. Electrical and electronic physics



Survey of Academic Appointments in Physics 2004–2008

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