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Academic Physics Staff in UK Higher Education Institutions

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Summary

- The number of staff in the physics cost centre has risen from about 3500 in 2003/04 to around 4200 in 2009/10. This equates to a rise of 19%, which is in line with the 21% rise in the total number of staff working in all academic cost centres over the same period.
- The number of professors in physics has risen from 485 in 2003/04 to 650 in 2009/10, an increase of 34%, while the number of senior lecturers and lecturers has essentially stayed at about 980. The number of researchers in the physics cost centre has risen from 1790 in 2003/04 to 2180 in 2009/10, an increase of 22%, which is in line with the 21% rise in the number of researchers across all cost centres.
- Overall, 40% of physics staff on permanent academic grades (lecturers, senior lecturers and professors) are professors: physics has double the proportion of professors compared with the sector average.
- In physics, overall there were 1685.6 category A staff submitted to RAE 2008 by 42 HEIs and 1625 permanent academic staff were listed in the 2007/08 HESA staff data. In 24 HEIs the number of category A staff is higher than the number of permanent academic staff recorded under the physics cost centre.
- The proportion of staff that is female in physics has risen from 13% in 2003/04 to 16% in 2009/10, but remains significantly lower than the sector average of 41%.
- The proportion of lecturers that is female is comparable with the proportion of undergraduates that is female: 19.8% of lecturers and 21.7% of undergraduates were female in 2007/08.
- For academic staff in physics, 19% of men and 6% of women are professors, and 26% of men and 25% of women are senior lecturers or lecturers. 55% of men and 69% of women are researchers.
- Staff in the physics cost centre are on average younger than staff across all cost centres, and women are on average younger than men at all grades in physics and across all cost centres. In the physics cost centre, male permanent academic staff are on average 46.2 years old and women are 42.1 years old.
- When the age of staff is taken into account, women are less likely to have progressed to professorial level than men in all cost centres.
- Physics has a lower proportion of UK nationals at professorial level (61%) than the average across all cost centres (76%), a similar proportion at senior lecturer/lecturer level (81% versus 83%) and a lower proportion at the research level (50% versus 57%).
- The proportion of male non-UK nationals in physics has risen from 31% in 2003/04 to 40% in 2009/10; the proportion of female non-UK nationals has remained consistently higher rising from 46% in 2003/04 to 51% in 2009/10.
- 94.2% of UK national academic staff in the physics cost centre are white, 2.4% are Asian, 1.5% are Chinese and 0.1% are black.

1: Introduction

1. Assignment of departments to academic cost centres 2001/02, HEFCE (www.hefce.ac.uk/pubs/hefce/2002/02_25.htm).

This report presents an overview of academic physics staff in UK higher education institutions (HEIs) and a number of selected other cost centres. The data source for the report is the Higher Education Statistics Agency (HESA). HESA is the central source for the collection and dissemination of statistics about publicly funded UK higher education.

1.1: Cost centres

HESA requires staff data to be returned with staff assigned to cost centres. The list of cost centres includes physics, mathematics, chemistry, biosciences and electrical, electronic & computer engineering, which are discussed in this report. HEIs are required to map their constituent departments/schools to cost centres, and they can apportion departments across a number of cost centres. This can lead to anomalies: in some cases, HEIs report physics staff although there is no recognised physics department. In other cases staff numbers may not match those in a specific physics department as staff from other departments may have been counted as belonging to the physics cost centre, and/or staff working in a physics department may be assigned to another cost centre.

Cost centres vary greatly in their breadth of coverage, for example, biosciences covers a large range of university departments, including life and health sciences, biomedical science, cancer research, biochemistry and sports science. Full details of the mapping between departments and cost centres are available on the Higher Education Funding Council for England (HEFCE) website¹. In physics the majority of HEIs map their physics departments directly onto the physics cost centre; a few HEIs use more complicated mappings. For example, in 2001/02 – the most recent year for which comprehensive data are available – University College London classified 100% of medical physics and bioengineering, physics and astronomy, and space and climate physics as physics. Liverpool John Moores University classified 100% of the Astrophysics Research Institute and 8% of their School of Engineering as physics.

1.2: Staff grades

Until 2007/08, HESA reported staff data categorised into professors, senior lecturers (including readers), lecturers, researchers and other grades. The definitions of staff grades are shown below:

Professors includes heads of departments, profes-

sors, researchers (former UAP scale grade IV), clinical professors and those appointed professors on a locally determined scale.

Senior lecturers includes principal lecturers, senior lecturers (former UAP/CSCFC scales), researchers (former UAP scale grade III), clinical senior lecturers and those appointed senior or principal lecturers on a locally determined scale.

Lecturers includes lecturers, senior lecturers (former PCEF scale), clinical lecturers and those appointed lecturers on a locally determined scale.

Researchers includes all research grades (former PCEF/CSCFC/UAP scale) not listed above and those researchers appointed on a locally determined scale.

Other grades includes other grades of academic staff not listed above.

Since 2008/09 this breakdown of grades has not been used, although professors are identifiable through a specific marker. To identify grades of staff the subsequent methodology has been used. For staff who are not identified as professors, the employment function field is used as follows: staff identified as teaching and research are classified as “senior lecturers/lecturers”; staff identified as research only are classified as “researchers”; and staff identified as teaching only, or neither teaching nor research, are classified as “other grades”. It is likely that some staff will be classified incorrectly using this methodology, in particular senior researchers may be assigned to the “researcher” category rather than “professors” or “senior lecturers/lecturers” and some teaching-only staff may be assigned to the “other grades” category rather than “senior lecturers/lecturers”. Nonetheless, the data compared well with previous years. It was not possible to distinguish between senior lecturers (readers) and lecturers.

Staff numbers are presented as full-time equivalents (FTEs) not as headcounts. HESA requires that where numerical totals are published they are rounded to the nearest five. Any totals less than five may not be published. All proportions and ratios presented in the report are calculated using unrounded figures.

In this report a number of different terms are used to signify different groupings of academic grades. The term permanent academic staff refers to professors, senior lecturers and lecturers; the term academic staff refers to professors, senior lecturers, lecturers and researchers; and the term all staff refers to all academic staff grades and other grades.

2: Physics staff in UK HEIs

2.1: The number of staff

The number of staff in the physics cost centre has risen from about 3500 in 2003/04 to around 4200 in 2009/10 (see table 1). This equates to a rise of 19%, which is in line with the 21% rise in the total number of staff working in academic cost centres over the same period of time. By contrast, the number of staff working in the mathematics cost centre rose by 38%, in chemistry by 14%, in electrical, electronic & computer engineering by 6%, and in biosciences by 13%.

In physics, there has been an increase in the number of permanent academic staff. The number of professors in physics has risen from 485 in 2003/04 to 650 in 2009/10, an increase of 34%, while the number of senior lecturers and lecturers has essentially stayed at about 980. A similar pattern is observed across all cost centres: the number of senior lecturers and lecturers has barely changed (77 900 in 2003/04 and 76 195 in 2009/10), but the number of professors has increased by 29%. The data suggest that the increase in the total number of permanent academic staff has been matched by the increase in the number of staff promoted to professor. It is not clear why the number of professors has continued to rise: there had been a steady rise in the number of professors for around two decades. It is possible that the increased promotion rates to professorial level are driven by HEIs wishing to retain their current staff and to attract new staff by offering them status and higher salaries, and that this change had been brought about by successive research assessment exercises.

The number of researchers in the physics cost centre has risen from 1790 in 2003/04 to 2180 in 2009/10, an increase of 22%, which is in line with the 21% rise in the number of researchers across all cost centres.

The figures presented in table 1 have been compared with the data presented in the most recent *Survey of Academic Appointments in Physics*², which had a census date of 1 December 2008 corresponding to the academic year 2008/09. Table 2 shows the aggregate staff numbers in UK physics departments drawn from the survey report and, for comparison, HESA staff data for 2007/08.

The survey collated data from 47 physics departments, while the HESA staff data includes data from physics cost centres in 53 HEIs. The numbers of professors compare well: 599 from the staff survey and 635 from the HESA data for 2008/09. To compare the numbers of readers and senior lecturers, and lecturers, HESA data from 2007/08 need to be used because the data for 2008/09 are not broken down in this way. There are 494 readers and senior lecturers reported in

the survey and 585 in the HESA data for 2007/08. For lecturers, the figures are 336 from the survey and 420 for the HESA data for 2007/08.

The HESA staff data are comparable with the survey results but are consistently higher. This is probably related to a number of factors. There are more HEIs included in the HESA data than covered by the survey, and the use of cost centres by HESA rather than departments means that more staff will be covered. It is likely that some of those staff classified in the survey as “Researcher holding a personal fellowship” in the survey data are included among permanent academic grades in the HESA data.

The proportions of staff that are female at each grade reported in the survey are also in line with the HESA data (see figure 3).

The survey of academic appointments in physics focuses on new appointments rather than on promotions. The net change in permanent academic staff leaving and arriving between March 2004 and December 2008 was an increase of 131.

HESA data show that the net change in permanent academic staff numbers in physics cost centres between 2003/04 and 2008/09 was 145, which is comparable with the results from the survey of academic appointments in physics.

Figure 1 presents data on the distribution of sizes of physics cost centres. The size of individual physics cost centres varies greatly, from HEIs with fewer than 10 staff to very large departments with well over 200 staff.

Table 3 shows the proportion of staff in physics cost centres at each grade. As discussed above, since 2003/04 the proportion of professors has increased and the proportion of senior lecturers/lecturers has fallen. Overall, 40% of physics staff on permanent academic grades are professors. The proportion of permanent academic staff who are professors in individual HEIs ranges from 9% to 62% (figure 2).

The data in table 4 show the proportions of permanent academic staff at different grades in selected cost centres. The proportion of staff at professorial level has increased in all cost centres from 2003/04; the smallest rise is in chemistry with the largest in physics. It is notable that the proportion of staff that is at professor level is higher in the selected science, technology, engineering and mathematics (STEM) cost centres than across all cost centres; physics has twice the proportion of professors compared with the sector average. It is important that the reasons underlying this are understood. Is it that physicists are more in demand abroad and they can demand higher salaries?

² *Survey of Academic Appointments in Physics 2004–2008*, Institute of Physics, 2010 (www.iop.org/publications/iop/2010/page_38419.html).

2: Physics staff in UK HEIs

Table 1: The number of staff in selected cost centres by grade 2004/05 to 2009/10

Subject	Grade	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	% change*
Physics	Professor	485	515	570	590	620	635	650	34
	Senior lecturer	590	600	570	555	585	975	975	-1
	Lecturer	390	380	375	400	420			
	Researcher	1790	1745	1900	1995	2125	2210	2180	22
	Other grades	255	265	350	330	350	390	360	41
	Total staff	3510	3505	3765	3865	4100	4210	4170	19
Mathematics	Professor	560	585	620	685	755	720	710	27
	Senior lecturer	645	640	640	695	750	1480	1540	3
	Lecturer	855	885	910	930	975			
	Researcher	480	470	525	630	715	685	705	47
	Other grades	370	775	875	850	870	1090	1080	192
	Total staff	2910	3355	3570	3790	4065	3975	4035	39
Chemistry	Professor	380	375	400	420	455	460	450	18
	Senior lecturer	485	510	505	530	565	1025	1070	13
	Lecturer	465	425	440	485	490			
	Researcher	1465	1510	1645	1715	1760	1725	1675	14
	Other grades	330	365	325	290	250	355	370	12
	Total staff	3125	3185	3315	3435	3525	3565	3565	14
Electrical, electronic & computer engineering	Professor	390	440	440	445	465	475	465	19
	Senior lecturer	565	645	700	785	855	1505	1550	1
	Lecturer	970	1030	1025	810	710			
	Researcher	1205	1320	1275	1340	1370	1395	1345	12
	Other grades	490	530	440	355	355	420	495	1
	Total staff	3620	3970	3885	3730	3760	3790	3855	6
Biosciences	Professor	1005	1020	1060	1100	1190	1220	1220	21
	Senior lecturer	1455	1425	1530	1645	1710	3380	3385	5
	Lecturer	1780	1735	1590	1650	1715			
	Researcher	5295	5190	5325	5330	5515	5815	5875	11
	Other grades	865	1320	1285	1255	1210	1360	1315	52
	Total staff	10 395	10 695	10 785	10 980	11 340	11 775	11 790	13
All cost centres	Professor	13 255	14 195	15 190	16 165	17 895	17 220	17 055	29
	Senior lecturer	24 425	25 700	27 865	33 280	36 560	74 250	76 195	-2
	Lecturer	53 475	54 390	52 675	50 980	50 985			
	Researcher	32 760	33 005	34 430	36 280	37 565	39 200	39 685	21
	Other grades	23 675	30 295	31 385	30 200	28 695	45 210	45 440	92
	Total staff	147 585	157 585	161 540	166 910	171 700	175 880	178 375	21

*% change is calculated based on the data for 2003/04 and 2009/10.

Source: HESA staff data.

2: Physics staff in UK HEIs

Table 2: The aggregate data for all UK physics departments as at 1 December 2008 and HESA staff data for 2007/08

Academic grade	Staff numbers	
	From survey	HESA data 2007/08
Professor	599	620
Reader and senior lecturer	494	585
Lecturer	336	420
Experimental and senior experimental officer	130	–
Researcher holding a personal fellowship	212	–
University teacher (non-research)/teaching fellow	289	–
Temporary academic staff	534	–

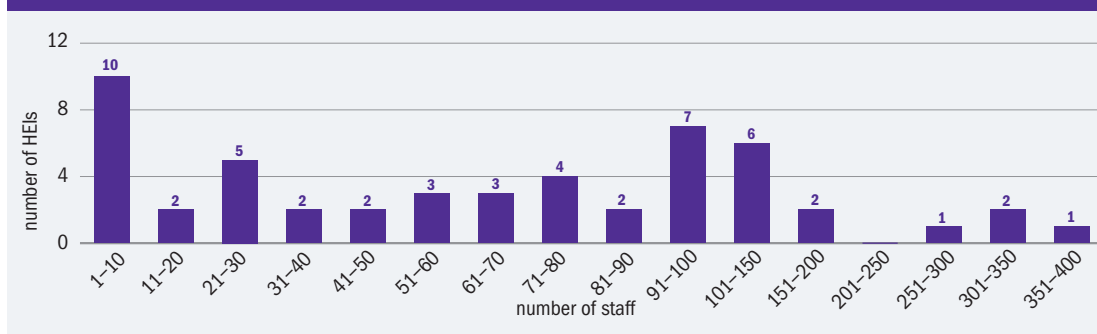
Source: *Survey of Academic Appointments in Physics 2004–2008* and HESA staff data.

Table 3: The proportion of staff in physics cost centres at each grade in HEIs 2004/05 to 2009/10

Year	Professor	Senior lecturer	Lecturer	Researcher	Other grades
2003/04	14%	17%	11%	51%	7%
2004/05	15%	17%	11%	50%	8%
2005/06	15%	15%	10%	50%	9%
2006/07	15%	14%	10%	52%	9%
2007/08	15%	14%	10%	52%	9%
2008/09	15%	23%		53%	9%
2009/10	16%	23%		52%	9%

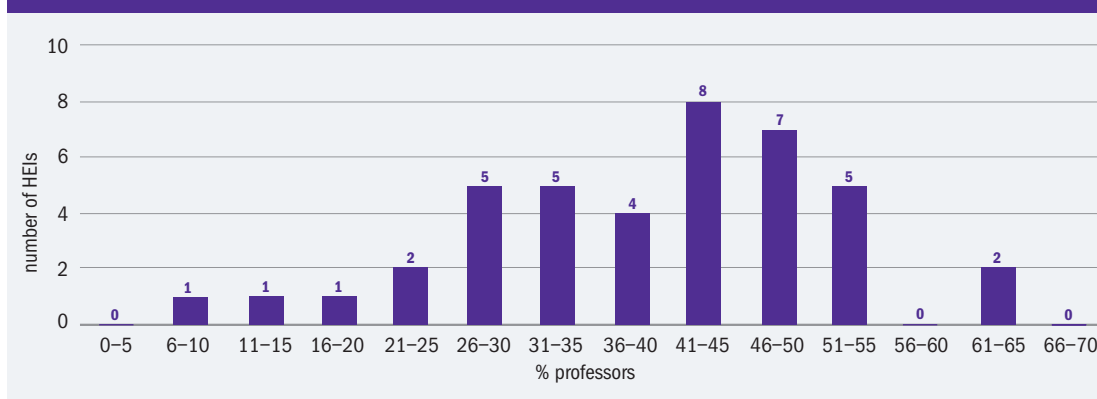
Source: HESA staff data.

Figure 1: Number of staff in individual physics cost centres by HEI in 2009/10



Source: HESA staff data.

Figure 2: Proportion of permanent academic staff in physics cost centres who are professors by HEI in 2009/10



Source: HESA staff data.

Table 4: The proportion of staff at each permanent academic grade in selected cost centres 2004/05 to 2009/10

Subject	Grade	Proportion of staff at each grade						
		2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Physics	Professor	33%	34%	38%	38%	38%	39%	40%
	Senior lecturer	40%	40%	38%	36%	36%	61%	60%
	Lecturer	27%	25%	25%	26%	26%		
Mathematics	Professor	27%	28%	29%	30%	30%	33%	32%
	Senior lecturer	31%	30%	29%	30%	30%	67%	68%
	Lecturer	42%	42%	42%	40%	39%		
Chemistry	Professor	29%	29%	30%	29%	30%	31%	30%
	Senior lecturer	36%	39%	38%	37%	37%	69%	70%
	Lecturer	35%	32%	33%	34%	32%		
Electrical, electronic & computer engineering	Professor	20%	21%	20%	22%	23%	24%	23%
	Senior lecturer	29%	30%	32%	38%	42%	76%	77%
	Lecturer	50%	49%	47%	40%	35%		
Biosciences	Professor	24%	24%	25%	25%	26%	27%	26%
	Senior lecturer	34%	34%	37%	37%	37%	73%	74%
	Lecturer	42%	42%	38%	38%	37%		
All subjects	Professor	15%	15%	16%	16%	17%	19%	18%
	Senior lecturer	27%	27%	29%	33%	35%	81%	82%
	Lecturer	58%	58%	55%	51%	48%		

Source: HESA staff data.

3. Follow Up Study of the Finances of Chemistry and Physics Departments in UK Universities 2007/2008, Institute of Physics and Royal Society of Chemistry, 2010 (www.iop.org/publications/iop/2010/page_44092.html).

4. Category A staff eligible for submission includes all academic staff on the payroll with research and/or teaching as their primary function.

The most recent report of the *Study of the Finances of Chemistry and Physics Departments in UK Universities 2007/2008*³ showed that both chemistry and physics departments were operating in deficit overall. The relatively high proportion of professors in physics is likely to make staff costs in physics departments higher than other departments, which may have implications in the future.

2.2: Physics staff and the RAE 2008

42 separate research units made submissions under the physics unit of assessment (UoA) in the Research Assessment Exercise 2008 (RAE 2008). The submission date for the exercise was 31 December 2007.

Comparisons can be made relatively easily between cost centres and UoAs for physics, chemistry and mathematics. These data are shown in table 5 together with comparisons between the total category A staff⁴ submitted in all UoAs and the total staff in all cost centres. In making comparisons it needs to be borne in mind that HEIs do not necessarily submit staff in specific cost centres to the equivalent UoA.

It appears from the data in table 5 that physics is unusual in having more category A staff than staff listed

in the 2007/08 HESA staff data.

The information in table 6 shows a comparison by HEI of category A staff submitted to the physics UoA and the number of staff listed in the physics cost centre in the 2007/08 HESA staff data. In 24 of the 40 HEIs where there are HESA staff data to compare with the number of category A staff submitted, the number of category A staff is higher than the number of permanent academic staff recorded in the physics cost centre. Overall, considering only the 40 HEIs where there is HESA staff data to compare with the number of category A staff submitted, there are 1677.1 category A staff and 1555 permanent academic staff listed under the physics cost centre.

An HEI-by-HEI examination of the chemistry UoA submissions shows a similar pattern: in the 18 of the 32 HEIs where there are HESA staff data to compare with the number of category A staff submitted, the number of category A staff is higher than the number of permanent academic staff recorded under the chemistry cost centre. In fact, overall, considering only the 32 HEIs where there are HESA staff data to compare with the number of category A staff submitted, there are 1140.9 category A staff and 1110 permanent academic staff listed under

Table 5: Number of category A staff submitted under selected UoAs in the RAE 2008 and HESA staff data for the equivalent cost centres for 2007/08

Unit of assessment(s)	Category A staff	Cost centre	2007/08 HESA permanent academic staff FTEs	Ratio of Category A FTEs to HESA FTEs
Physics	1685.6	Physics	1625	1.04
Chemistry	1150.9	Chemistry	1510	0.76
Applied mathematics Pure mathematics Statistics and operational research	1924.1	Mathematics	2480	0.78
All UoAs	52 409.2	All cost centres	105 440	0.50
All UoAs: Russell Group	25 582.3	All cost centres: Russell Group	31 575	0.81
All UoAs: 1994 Group	9 391.5	All cost centres: 1994 Group	12 630	0.74
All UoAs: UK except Russell Group & 1994 Group	17 435.5	All cost centres: UK except Russell Group & 1994 Group	59 720	0.29

Source: RAE 2008 and HESA staff data.

the chemistry cost centre, giving a ratio of 1.03, which is in line with that observed for physics (1.08).

Considering the HEIs where the number of category A staff are lower than the number of permanent academic staff recorded under the relevant cost centre, there are a number of reasons why this is the case. Although the RAE 2008 guidance encouraged HEIs to submit the work of all their researchers, HEIs were ultimately free to select which academic staff to include in their submissions. This means that the volume of category A staff for a given HEI will be smaller than the volume of academic staff as derived from the HESA data. This latter grouping will include both academic staff not involved in research and research-active academic staff not returned to RAE 2008. In addition, there are

differences in the census dates for the reporting of category A staff to RAE 2008 (31 October 2007) and the HESA 2007/08 staff return (31 July 2008).

One reason why the number of category A staff might be greater for physics and chemistry than HESA staff numbers is that some research staff are included as category A staff. This might apply in particular to college lecturers working at the universities of Cambridge and Oxford. Examination of the data in table 6 shows that both Cambridge and Oxford have significantly larger numbers of category A staff than staff listed in the HESA staff data; 61 and 45, respectively. Similar patterns are observed in the chemistry data with 21 and 23 more category A staff listed for Cambridge and Oxford, respectively.

2: Physics staff in UK HEIs

Table 6: Number of category A staff submitted by HEIs under the physics UoA in the RAE 2008 and HESA staff data for the physics cost centre for 2007/08

HEI	Permanent academic staff**	FTE Category A staff submitted	Ratio of Category A FTEs to HESA FTEs
University of Cambridge	80	141.25	1.8
University of Oxford	95	140.1	1.5
Imperial College London	120	126.8	1.1
University College London	95	101.03	1.1
University of Manchester	85	82.8	1.0
Durham University	55	69.5	1.3
University of Edinburgh***	55	60.5	1.1
University of Warwick	50	51	1.0
Queen's University Belfast	50	50	1.0
University of Bristol	40	46	1.1
University of Glasgow	45	45.75	1.1
University of Southampton	35	45.3	1.3
University of Leicester	35	45	1.2
University of Nottingham	40	44.45	1.1
University of Birmingham	40	43.6	1.1
University of Leeds	40	35.5	0.9
Queen Mary, University of London	40	34.98	0.9
University of Liverpool	35	34.6	1.0
Cardiff University	25	32.3	1.3
University of St Andrews	30	32.2	1.0
University of Strathclyde	45	31.67	0.7
University of Sheffield	30	31.5	1.1
University of Exeter	30	28	0.9
University of Hertfordshire	30	28	1.0
Royal Holloway, University of London	25	27.96	1.1
University of Surrey	25	27.2	1.1
Lancaster University	30	26.4	0.8
University of York	30	26	0.9
University of Central Lancashire	5	22.2	4.4
Swansea University	20	20.75	1.1
University of Bath	25	20.2	0.8
University of Sussex	20	20	1.1
Heriot-Watt University	30	19.5	0.7
Aberystwyth University	15	18.33	1.2
Loughborough University	40	17.1	0.4
Liverpool John Moores University	15	16.5	1.0
King's College London	15	16.4	1.0
Keele University	10	10	0.9
Armagh Observatory	–	7.5	–
University of the West of Scotland	10	3.7	0.4
University of Kent	20	3	0.2
University of Brighton	–	1	–
Total	1555	1685.6	1.08

*All values have been round to the nearest five. **Permanent academic staff are lecturers, senior lecturers and professors. ***HESA staff data for 2006/07 has been used because data for 2007/08 was not in line with other years' data.

Source: RAE 2008 and HESA staff data.

2: Physics staff in UK HEIs

Table 7: The proportion of academic staff that is female* in selected cost centres 2003/04 to 2009/10

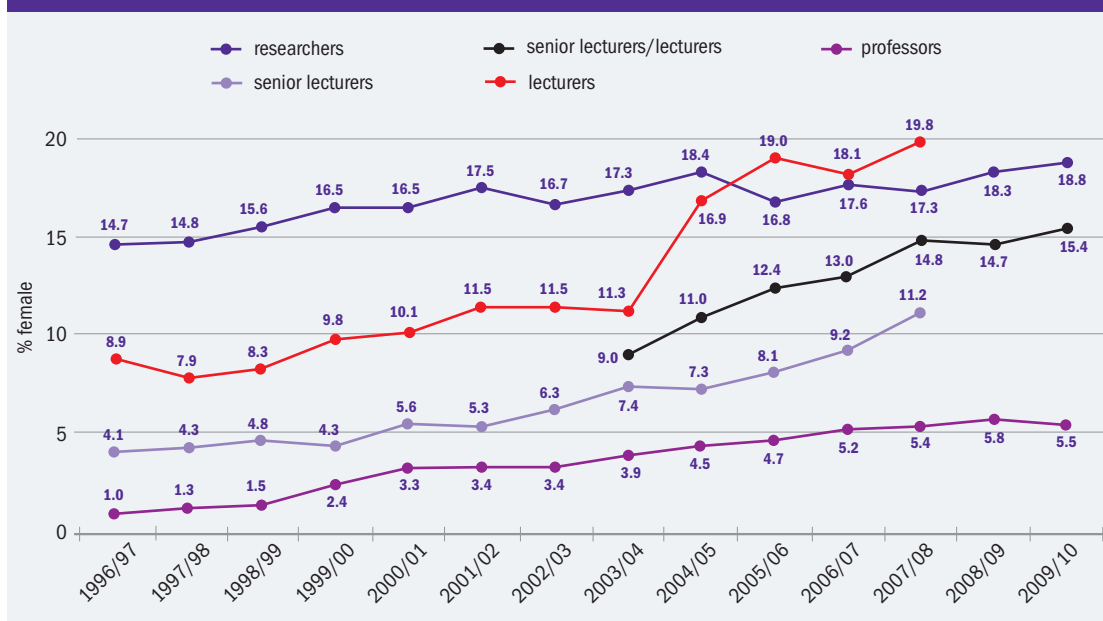
Cost centre	Proportion of academic staff that is female						
	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Physics	13%	14%	14%	14%	15%	16%	16%
Mathematics	15%	16%	17%	18%	19%	18%	17%
Chemistry	21%	22%	23%	24%	24%	26%	24%
Electrical, electronic & computer engineering	11%	12%	13%	12%	12%	12%	12%
Biosciences	38%	39%	40%	40%	41%	42%	41%
All cost centres	39%	40%	40%	41%	41%	43%	41%

*Academic staff comprises professors, senior lecturers, lecturers and researchers.

Source: HESA staff data.

Figure 3: Proportion of staff that is female in the physics cost centre at each grade 1996/97 to 2009/10

Source: HESA staff data.



2.3: Gender balance of staff

The proportion of academic staff that is female in selected cost centres is shown in table 7. The proportion of staff that is female in physics has risen from 13% in 2003/04 to 16% in 2009/10, but remains significantly lower than the sector average of 41%.

Figure 3 shows the proportion of staff that is female in the physics cost centre by grade between 2003/04 and 2009/10. The proportion of staff that is female has risen at all grades; there have been large proportionate rises albeit from relatively low baselines. The proportion of lecturers that is female has been higher than that of the proportion of researchers that is female since 2005/06 and comparable with the proportion of undergraduates that is female – 19.8% of lecturers and 21.7% of undergraduates were female in 2007/08.

Figure 4 shows the distribution for individual physics

cost centres of the proportions of staff that are female by grade. In line with the overall increases in the proportions of women at each grade increasing numbers of cost centres have larger proportions of staff that are female. However, 20 (51%) out of the 39 physics cost centres with five or more professors did not have any female professors in 2009/10.

Figure 5 shows how the populations of men and women are distributed between grades in the physics cost centre and across all cost centres. Across all cost centres in 2009/10, 18% of men and 6% of women are professors. Likewise, 55% of men are senior lecturers or lecturers compared with 60% of women, and 27% of men and 34% of women are researchers. For women there is one professor for every 10 senior lecturers or lecturers, whereas for men the ratio is 1:3.

Figure 4: Proportion of staff that is female* in individual physics cost centres 2003/04, 2006/07 and 2009/10



*Proportion of staff that is female have only been calculated for where there were more than five staff at a specific grade.

Professors: 2003/04, 12 excluded out of 46; 2006/07, 16 excluded out of 48; 2009/10, 10 excluded out of 48.

Senior lecturers/lecturers: 2003/04, 11 excluded out of 50; 2006/07, 11 excluded out of 50; 2009/10, 14 excluded out of 53.

Researchers: 2003/04, 6 excluded out of 46; 2006/07, 9 excluded out of 46; 2009/10, 7 excluded out of 43.

Academic staff: 2003/04, 9 excluded out of 50; 2006/07, 6 excluded out of 49; 2009/10, 11 excluded out of 53.

**Academic staff includes professors, senior lecturers, lecturers and researchers. Source: HESA staff data.

Figure 5: Distribution of male and female staff between grades in physics and all cost centres 2003/04, 2006/07 and 2009/10



Source: HESA staff data.

Table 8: Percentage of male and female staff at different grades in selected cost centres 2003/04, 2006/07 and 2009/10

Subject	Grade	Male staff			Female staff		
		2003/04	2006/07	2009/10	2003/04	2006/07	2009/10
Physics	Professor	16%	18%	19%	5%	6%	6%
	Senior lecturer/lecturer	32%	27%	26%	21%	24%	25%
	Researcher	52%	54%	55%	74%	70%	69%
Mathematics	Professor	25%	27%	27%	4%	6%	8%
	Senior lecturer/lecturer	56%	52%	50%	73%	72%	62%
	Researcher	18%	21%	23%	23%	23%	30%
Chemistry	Professor	17%	16%	17%	3%	3%	4%
	Senior lecturer/lecturer	37%	34%	34%	23%	27%	32%
	Researcher	46%	50%	49%	74%	70%	64%
Electrical, electronic & computer engineering	Professor	14%	14%	15%	3%	5%	6%
	Senior lecturer/lecturer	49%	48%	46%	46%	44%	45%
	Researcher	37%	38%	39%	51%	52%	49%
Biosciences	Professor	15%	16%	17%	3%	4%	4%
	Senior lecturer/lecturer	38%	37%	35%	27%	29%	28%
	Researcher	47%	47%	48%	70%	67%	68%
All subjects	Professor	15%	17%	18%	4%	5%	6%
	Senior lecturer/lecturer	62%	59%	55%	65%	65%	60%
	Researcher	23%	24%	27%	31%	30%	34%

Source: HESA staff data.

Table 9: Proportion of male and female permanent academic staff at professorial level in selected cost centres 2009/10*

Cost centre	Proportion of permanent academic staff at professorial level		
	Male	Female	Overall
Physics	43%	19%	40%
Mathematics	35%	12%	32%
Chemistry	34%	12%	30%
Electrical, electronic & computer engineering	24%	12%	23%
Biosciences	32%	13%	26%
All subjects	24%	9%	18%

*Permanent academic staff are professors, senior lecturers and lecturers.

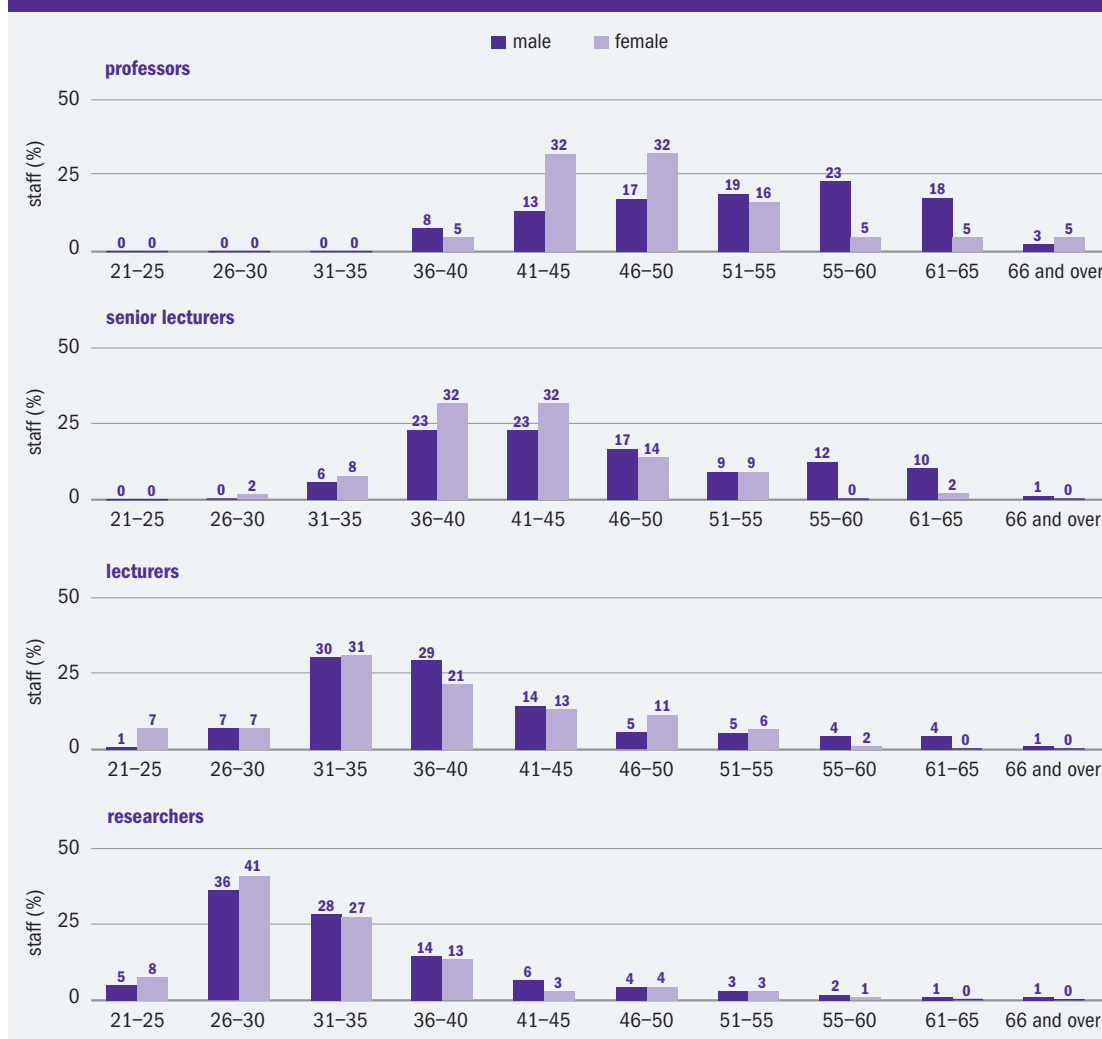
Source: HESA staff data.

In physics, 19% of men and 6% of women are professors, and 26% of men and 25% of women are senior lecturers or lecturers. 55% of men and 69% of women are researchers. For women there is one professor for every four senior lecturers or lecturers, whereas for men the ratio is 3:4.

The data in table 8 show the percentages of men and women at different grades in selected cost centres. Similar patterns to those for men and women in physics are displayed by all of the STEM cost centres. In all cases, women are on average at lower grades than men.

It is also interesting to compare the proportions of men and women at the professorial level from among permanent academic staff as shown in table 9. In physics, in 2009/10 43% of male permanent academic staff were professors compared with 19% of women. Of the cost centres examined, physics has the highest proportion of male staff at professorial level, followed

Figure 6: Age of physics staff by grade in 2003/04



Source: HESA staff data.

by mathematics, chemistry and biosciences, which all have around the same proportion. Electrical, electronic & computer engineering has the lowest proportion of men at professorial level at 24%, which is the same as the sector average. Similarly, physics has the highest proportion of women at professorial level at 19%. The other cost centres under consideration all have about the same proportion of women at professorial level, 12 or 13%, which is higher than the sector average of 9%.

Overall, women permanent academic staff are much less likely than men to be professors, but there are differences between cost centres. The overall proportion of permanent academic staff at professorial level is a characteristic of each cost centre. For example, physics has a high proportion of permanent academic staff at professorial level, almost more than twice the sector average, so it is to be expected that it also has the highest proportions of men and women at professorial level. Consequently, what is of interest is the ratio of the proportions of men and women at professorial level.

Of the cost centres under consideration, in physics

and electrical, electronic & computer engineering men are about twice as likely to be professors as women, while in mathematics and chemistry men are about three times more likely than women to be professors, and in biosciences men are about two and a half times more likely than women to be professors. Across all cost centres men are 2.7 times more likely to be professors than women.

2.4: Age of staff

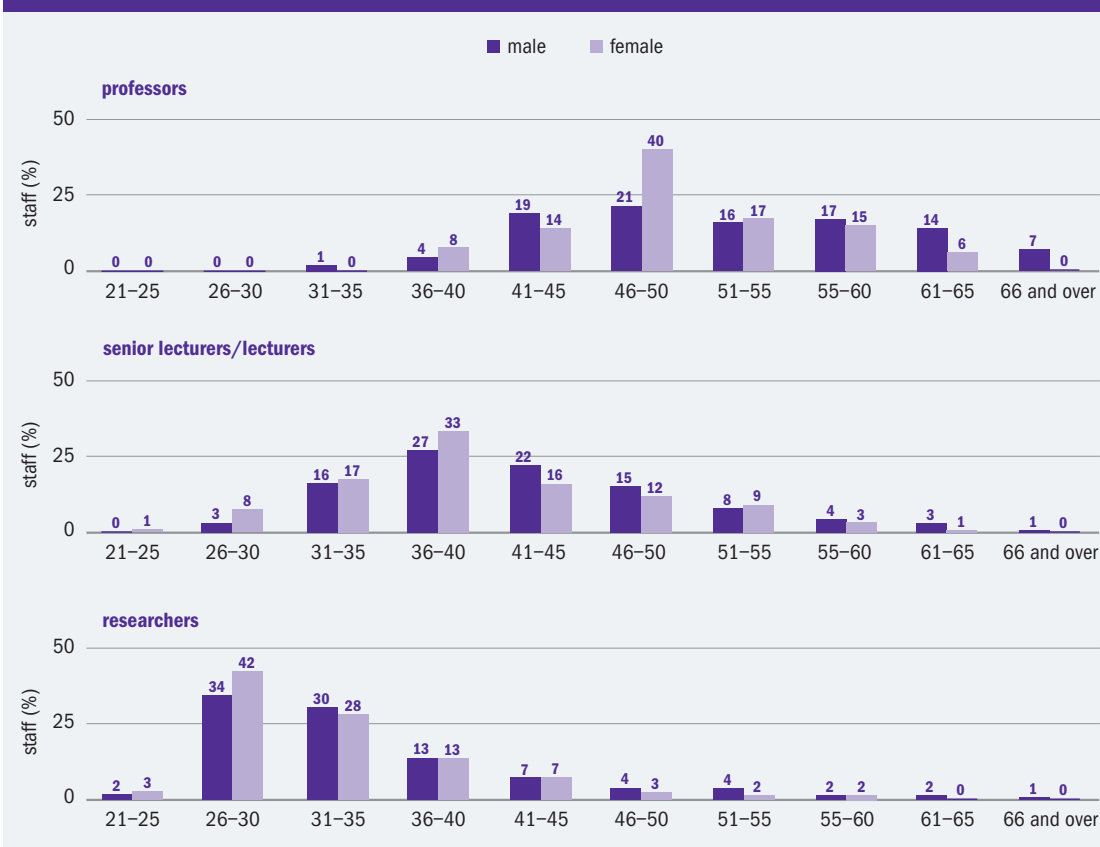
Figure 6 and figure 7 show the distribution by age of male and female physics staff within each grade in 2003/04 and 2009/10, respectively, and figure 8 shows the same distributions across all cost centres in 2009/10. Table 10 presents data on the age distributions of men and women by grade for selected cost centres.

Staff in the physics cost centre are on average younger than staff across all cost centres, and women are on average younger than men at all grades in physics and across all cost centres (table 11).

2: Physics staff in UK HEIs

Source: HESA staff data.

Figure 7: Age of physics staff by grade in 2009/10



Source: HESA staff data.

Figure 8: Age of staff in all cost centres by grade 2009/10



Table 10: Age distribution of staff by grade and gender in selected cost centres 2009/10

Subject	Grade	Gender	Percentage of staff in each age band (years)										
			20 and under	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66 and over
Physics	Professor	Male	0.0	0.0	0.0	0.9	3.7	19.2	21.5	16.4	17.3	13.7	7.3
		Female	0.0	0.0	0.0	0.0	8.4	14.0	40.4	16.8	14.7	5.6	0.0
	Senior lecturer/lecturer	Male	0.0	0.5	2.6	15.6	26.7	22.4	15.0	7.9	4.4	3.3	1.5
		Female	0.0	1.3	7.5	17.1	33.2	16.1	12.4	8.6	3.2	0.7	0.0
	Researcher	Male	0.0	2.2	34.2	30.5	13.2	7.5	4.3	3.6	2.3	1.8	0.6
		Female	0.0	3.4	42.4	27.7	12.8	6.6	2.7	2.0	2.1	0.2	0.0
Mathematics	Professor	Male	0.0	0.0	0.0	0.5	6.3	15.4	18.7	19.8	18.4	16.3	4.5
		Female	0.0	0.0	0.0	7.0	7.0	18.4	11.3	18.9	23.4	11.6	2.3
	Senior lecturer/lecturer	Male	0.2	0.6	6.9	18.0	20.0	17.8	12.3	9.5	6.3	6.9	1.5
		Female	0.3	1.4	6.5	21.8	18.9	18.6	10.0	9.9	7.6	3.8	1.1
	Researcher	Male	0.2	3.8	42.1	28.8	12.8	4.6	2.8	1.4	1.5	0.2	2.0
		Female	0.0	9.3	34.9	29.2	13.3	6.4	1.3	4.6	1.0	0.0	0.0
Chemistry	Professor	Male	0.0	0.0	0.0	0.2	7.0	21.4	19.7	16.0	18.7	11.7	5.1
		Female	0.0	0.0	0.0	0.0	12.0	22.9	31.3	21.7	6.0	6.0	0.0
	Senior lecturer/lecturer	Male	0.0	1.4	3.4	13.3	21.7	22.0	17.0	10.3	6.7	3.2	1.1
		Female	0.0	4.0	10.1	20.6	23.8	19.4	10.2	8.2	2.8	0.9	0.1
	Researcher	Male	0.0	2.3	36.5	31.1	13.9	7.1	3.8	2.2	1.3	1.5	0.2
		Female	0.0	3.4	43.8	27.9	11.1	6.9	3.0	2.2	1.3	0.4	0.0
Electrical, electronic & computer engineering	Professor	Male	0.0	0.0	0.0	0.3	3.5	12.9	22.6	25.1	17.5	11.9	6.1
		Female	0.0	0.0	0.0	0.0	7.8	31.4	23.5	19.6	15.7	0.0	2.0
	Senior lecturer/lecturer	Male	0.0	0.6	5.3	12.6	18.3	17.2	16.2	14.3	10.5	4.3	0.6
		Female	0.3	1.1	6.7	19.4	19.7	20.1	17.6	8.0	5.4	1.8	0.0
	Researcher	Male	0.0	4.4	34.0	29.9	14.7	8.0	4.2	2.3	1.5	0.6	0.4
		Female	0.0	3.4	33.0	33.0	15.3	5.9	4.5	4.2	0.2	0.5	0.0
Biosciences	Professor	Male	0.0	0.0	0.0	0.1	2.4	12.7	22.2	22.6	21.9	15.1	3.1
		Female	0.0	0.0	0.0	0.0	2.1	10.7	24.1	29.6	19.8	10.9	2.9
	Senior lecturer/lecturer	Male	0.0	0.4	2.8	8.7	18.0	22.2	17.9	13.1	10.3	5.8	0.8
		Female	0.0	1.5	6.8	13.0	18.1	21.8	16.9	12.4	7.2	2.1	0.2
	Researcher	Male	0.0	2.1	25.7	31.2	17.5	10.4	5.8	3.8	2.1	0.9	0.5
		Female	0.0	3.2	30.0	28.6	16.2	9.6	5.9	3.5	2.0	0.8	0.2
All subjects	Professor	Male	0.0	0.0	0.0	0.4	4.0	13.4	19.2	19.8	22.0	17.0	4.1
		Female	0.0	0.0	0.1	0.4	3.7	13.4	21.8	24.0	22.4	12.1	2.1
	Senior lecturer/lecturer	Male	0.0	0.6	4.3	11.1	17.3	18.0	16.0	13.4	11.7	6.6	1.0
		Female	0.0	0.8	5.6	12.5	17.2	18.6	17.2	14.6	9.7	3.5	0.5
	Researcher	Male	0.0	3.3	28.6	28.7	16.0	9.3	5.4	3.9	2.5	1.6	0.8
		Female	0.0	5.8	28.3	25.8	15.1	9.4	6.6	4.6	2.9	1.2	0.3

Source: HESA staff data.

Table 11: Average age of staff by grade and gender in selected cost centres 2009/10

Cost centre	Average age of staff (years)							
	Professors		Senior lecturers/lecturers		Permanent academic staff		Researchers	
	Male	Female	Male	Female	Male	Female	Male	Female
Physics	51.4	49.5	42.5	40.4	46.2	42.1	35.0	33.2
Mathematics	50.5	50.6	42.5	41.7	46.1	43.1	32.6	33.0
Chemistry	50.1	48.2	43.1	39.5	45.8	40.5	33.9	32.9
Electrical, electronic & computer engineering	51.7	48.7	44.3	41.2	46.3	42.5	34.0	34.0
Biosciences	51.6	52.1	45.4	43.0	48.0	44.3	35.8	35.1
All cost centres	52.9	52.3	42.5	40.4	44.2	42.4	35.8	35.7

Source: HESA staff data.

5. *Mapping the future: Physics and Chemistry Postdoctoral Researchers' Experiences and Career Intentions*, Institute of Physics and Royal Society of Chemistry, 2011 (www.iop.org/publications/iop/2011/page_50579.html).

It is interesting to note that at each grade female physicists are on average about two years younger than male physicists. In mathematics, the average ages of men and women are closer than physics; in fact at professorial and researcher level women are on average slightly older than men. There is more variation in the average ages of men and women by grade in chemistry than physics, and in electrical, electronic & computer engineering the differences between the average ages of men and women at professorial and senior lecturer/lecturer level is three years. There is more variation in the differences in average ages of men and women in biosciences than in physics.

Research looking at postdoctoral researchers in physics and chemistry⁵ showed that women spend less time undertaking postdoctoral research than men, and this is in line with the age data.

2.5: Age and gender profiles of staff

It is often argued that comparisons of the proportions of men and women at different grades do not provide a true picture of the leakage of women from the academic career pipeline because the proportion of women entering university today is higher than in the past. The data in figure 9 show the proportions of male and female permanent academic staff at professorial level in age bands so that better comparisons can be made.

For the 41–50 and 51–60 age bands physics has the highest proportions of male and female staff who are professors. This is in line with the observation that physics has a high proportion of staff at professorial level.

In all cost centres and in all three age bands displayed, smaller proportions of women permanent academic staff are at professorial level than men. This suggests that when the age of staff is taken into account, women are less likely to have progressed to professorial level than men. This may be due to a number of factors, including

the possibility that women have spent more time than men caring for children, and that they may have been more reluctant than men to apply for promotion.

2.6: Nationality of staff

Figure 10 presents data on the breakdown by nationality and grade of selected cost centres. All selected STEM cost centres have a lower proportion of UK nationals overall than the average across all cost centres. Physics has a lower proportion of UK nationals at professorial level than the average across all cost centres, a similar proportion at senior lecturer/lecturer level and a lower proportion at researcher level.

Comparison of the nationalities at professorial level and senior lecturer/lecturer levels shows that in all considered subjects a smaller proportion of staff are UK nationals at professorial level. This suggests that non-UK nationals are more likely to move to the UK to take up senior posts, and possibly shows that there is a good deal of proactive recruitment of proven overseas academics.

Comparison of the proportions of UK nationals at professorial level between subjects shows that physics and mathematics have notably lower proportions than the other subjects under consideration.

Figure 11 shows the breakdown of all male and female staff in physics and all cost centres by nationality between 2003/04 and 2009/10. While the profile of nationalities is similar for men and women for all cost centres, there are notable differences in the profiles for men and women in physics. Although the proportion of male non-UK nationals in physics has risen from 31% in 2003/04 to 40% in 2009/2010, the proportion of female non-UK nationals has remained consistently higher rising from 46% in 2003/04 to 51% in 2009/10.

Table 12 gives a ranking of nationalities of physics staff by grade. After UK nationals, German is the next most popular nationality followed by Italian.

Figure 9: Proportion of male and female permanent academic* staff who are professors by age in selected cost centres 2009/10



*Permanent academic staff are professors, senior lecturers and lecturers.

Source: HESA staff data.

Figure 10: Nationality of staff by grade in selected cost centres 2009/10



Source: HESA staff data.

2: Physics staff in UK HEIs

Figure 11: Nationality of all staff 2003/04, 2006/07 and 2009/10



Source: HESA staff data.

Table 12: Ranking of nationalities of physics staff by grade 2009/10

Rank	Professor	Senior lecturer/lecturer	Researcher	Academic staff*
1	United Kingdom	United Kingdom	United Kingdom	United Kingdom
2	Germany	Germany	Germany	Germany
3	United States	Italy	Italy	Italy
4	Italy	Russia	China	United States
5	Australia	United States	France	China
6	Russia	The Netherlands	Russia	Russia
7	The Netherlands	France	India	France
8	Ireland	Greece	United States	India
9	Greece	India	Spain	Greece
10	India	China	Ireland	The Netherlands

*Academic staff are professors, senior lecturers, lecturers and researchers.

Source: HESA staff data.

Table 13: Ethnicity of UK academic staff* in selected cost centres 2009/10

Ethnicity	Physics	Mathematics	Chemistry	Electrical, electronic & computer engineering	Biosciences	All cost centres
White	94.2%	94.0%	93.7%	85.3%	92.5%	92.6%
Asian or Asian British – Indian	1.5%	0.9%	1.3%	1.6%	1.8%	1.6%
Asian or Asian British – Pakistani	0.2%	0.2%	0.5%	0.5%	0.7%	0.5%
Asian or Asian British – Bangladeshi	0.0%	0.2%	0.2%	0.4%	0.2%	0.2%
Other Asian background	0.6%	0.8%	0.8%	2.6%	0.8%	0.8%
Black or Black British – African	0.0%	0.2%	0.3%	0.4%	0.4%	0.5%
Black or Black British – Caribbean	0.0%	0.1%	0.1%	0.4%	0.3%	0.5%
Other Black background	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%
Chinese	1.4%	1.8%	1.5%	5.4%	1.4%	1.3%
Other and mixed ethnic background	1.8%	1.8%	1.6%	3.5%	1.9%	2.0%

*Academic staff are professors, senior lecturers, lecturers and researchers.

Source: HESA staff data.

6. Representation of Ethnic Groups in Chemistry and Physics, Royal Society of Chemistry and Institute of Physics, 2006 (www.iop.org/publications/iop/2006/page_38240.html).

2.7: Ethnicity of staff

Table 13 shows the ethnicities of staff who are UK nationals in selected cost centres. With the exception of electrical, electronic & computer engineering, between 93% and 95% of staff in the selected cost centres are of white ethnicity. In physics small proportions of staff are of Asian or Chinese ethnicity and very few staff are of black ethnicity.

The Institute of Physics and the Royal Society of Chemistry published a report in 2006 presenting a statistical picture of the progress of England and Wales domiciled students from different ethnic groups through the various stages of the educational pipeline into undergraduate physics and chemistry courses⁶. The report showed that the participation of black and ethnic minority students in physics and chemistry through to the doctoral stage varied. In physics, among UK nationals ethnic minority groups are under-represented at the doctoral level relative to the white population. In chemistry, British Indian and Chinese students are relatively well represented at doctoral level but other BME (black and minority ethnic) groups are under-represented.

It is likely to take many years to bring about signifi-

cant changes in the ethnic make-up of physics staff. In order for the proportion of non-white physics staff to increase clearly the proportions of BME students reading physics will have to increase. Strategies to bring this about will vary for different ethnic groups. Among the Asian groups there is a need to increase the number of well qualified potential students who choose to study physics at university, while among black groups, and in particular the male black Caribbean group, the objective is raising educational achievement at Key Stage 3 and above.

Table 14 shows a breakdown of physics staff by grade and ethnicity. Data for the ethnic breakdown of the UK population in 2001 aged 16–64 is also shown for comparison. The data show that there are lower proportions of BME staff at professor and senior lecturer/lecturer level than at researcher level. Part of this is likely to be because of “cohort effects”, that is, for example, the data on ethnicity of professors cannot be compared with that of researchers on the grounds that these cohorts have been drawn from different ethnic distributions in the population, based on their age group.

Table 14: Ethnicity of UK staff in the physics cost centre by grade 2009/10

Ethnicity	Grade				UK population in 2001 aged 16–64
	Professor	Senior lecturer/lecturer	Researcher	Overall	
White	95.3%	96.3%	92.5%	94.2%	91.8%
Asian	2.3%	1.3%	3.2%	2.4%	4.1%
Black	0.2%	0.0%	0.2%	0.1%	2.0%
Chinese	1.0%	1.7%	1.0%	1.5%	0.4%
Other/mixed	1.2%	0.8%	2.7%	1.8%	1.6%

Source: HESA staff data.

The most recent data on the ethnic make-up of the UK population is based on the 2001 census. Data from the 2011 census will be available in 2012. In 2001 91.8% of the UK population of all nationalities aged

16–64 was white, while 97.4% of those aged 65 and over was white. The data show that among UK national physics staff, all BME groups except Chinese are under-represented, and black staff markedly so.

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Statistical Report

Academic Physics Staff in UK Higher Education Institutions

January 2012

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