Physics education in the UK

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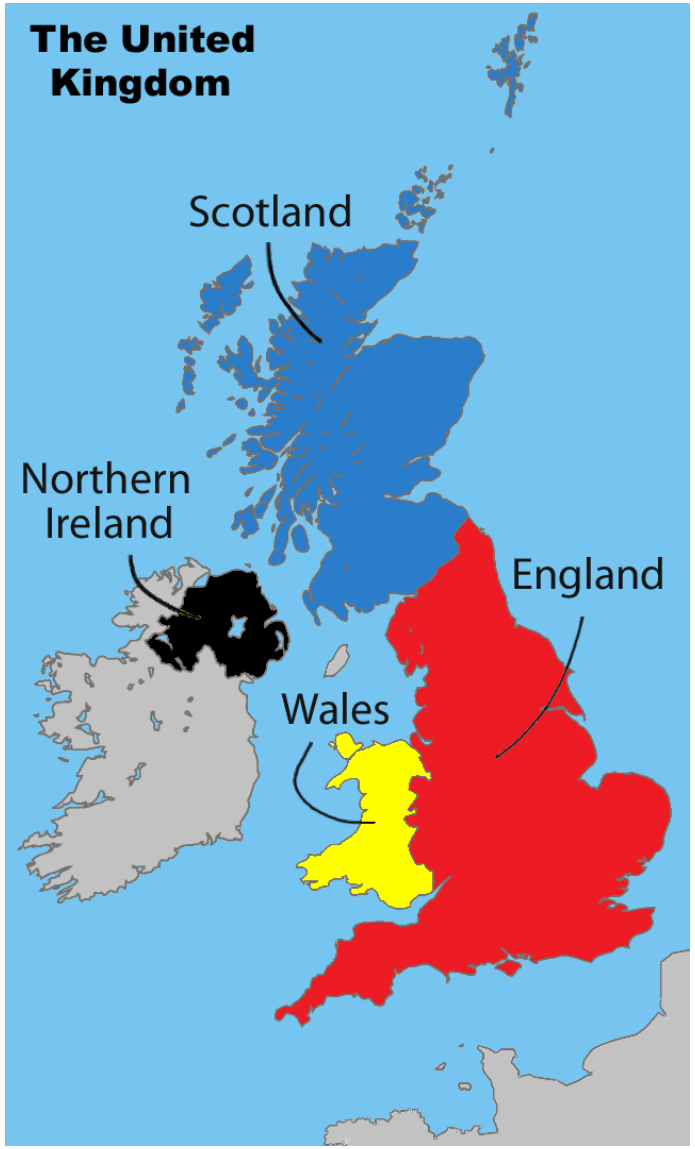
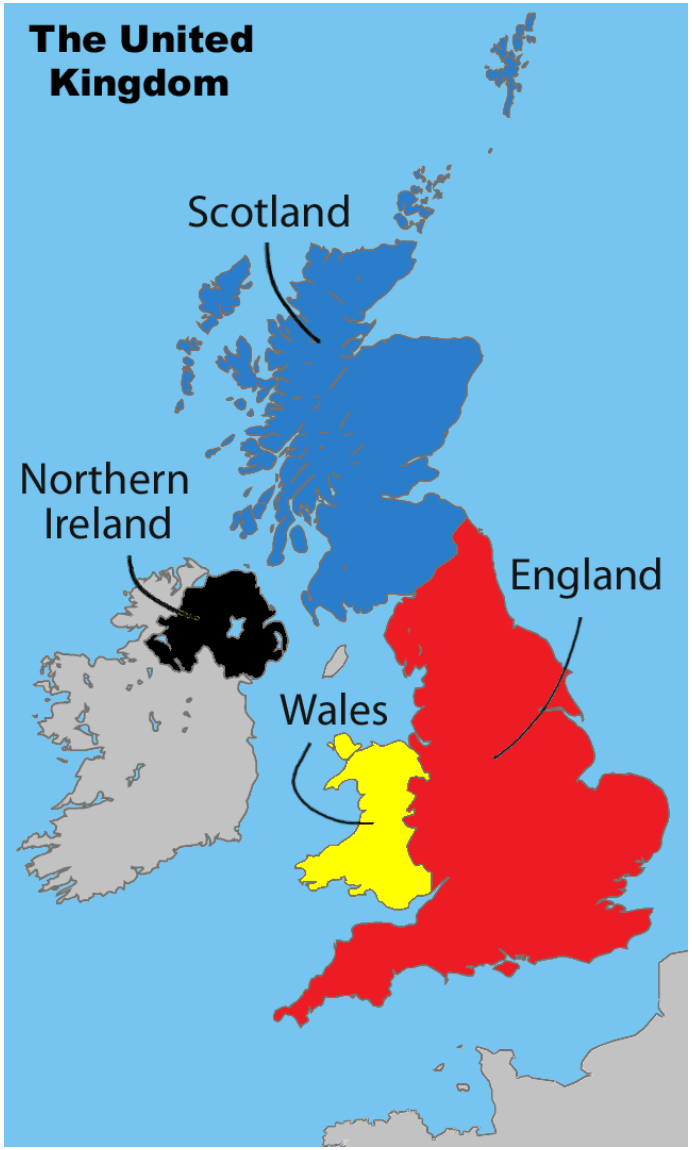


2011 census	Population ($x10^6$)	18 year olds ($x10^3$)
England	53.01	675
Scotland	5.30	68
Wales	3.06	41
N.Ireland	1.81	25

6.3% aged 15-19 and 6.8% 20-24



16: GCSE

↓

17: A/S levels

↓

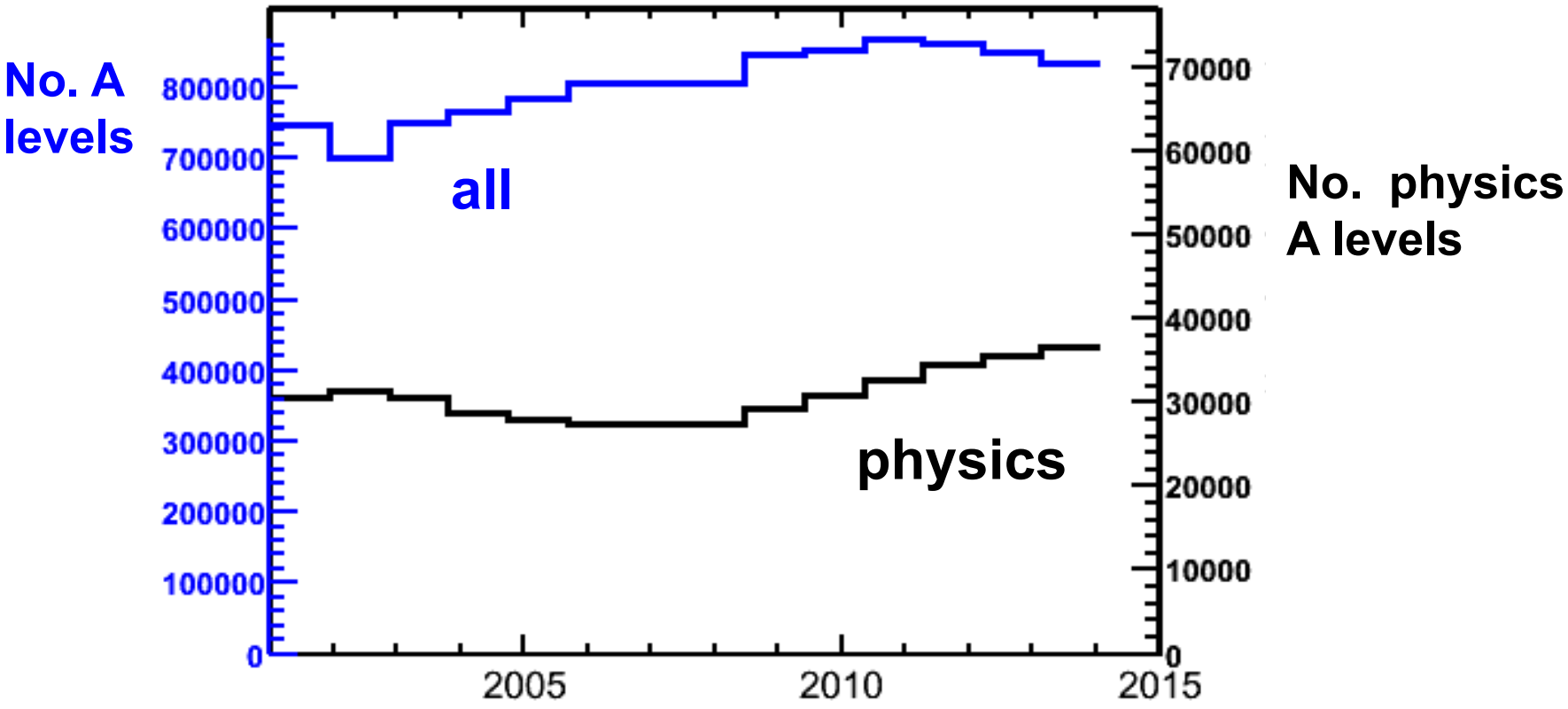
18: A-levels

↓

University

(England, NI, Wales)

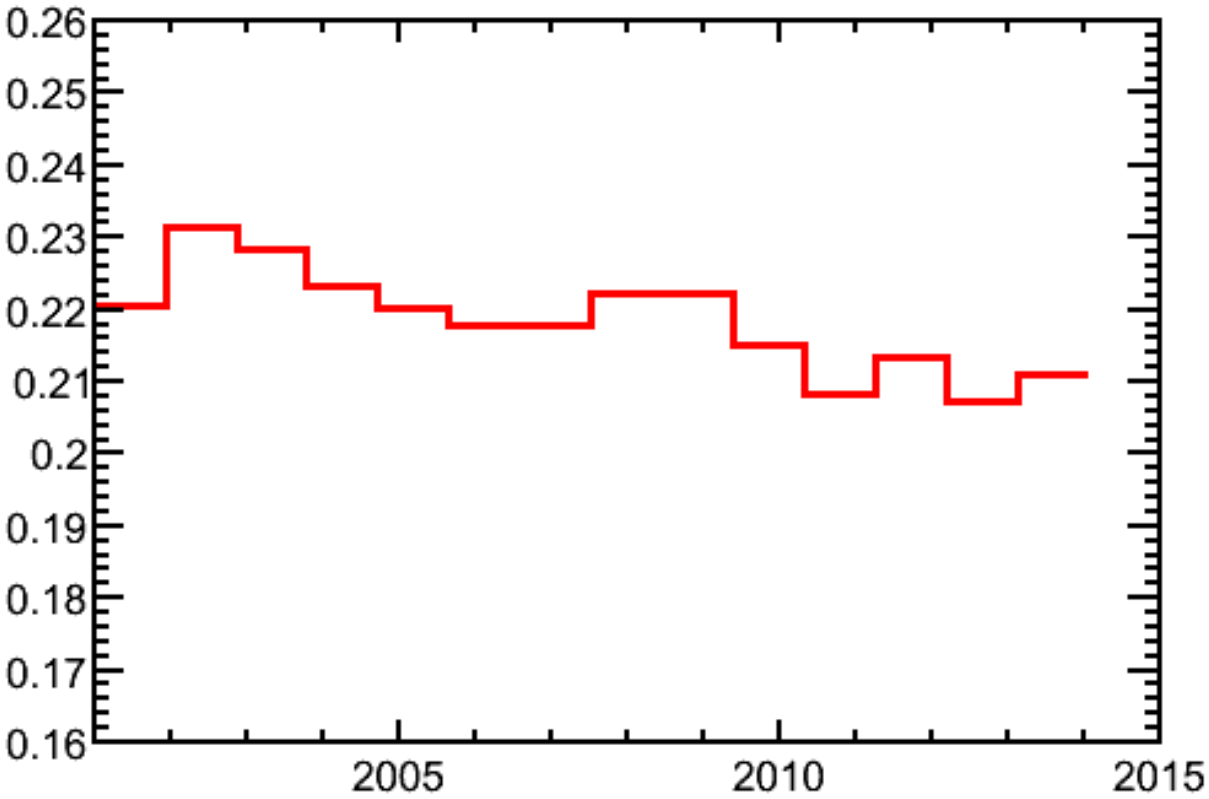
Physics accounts for ~4% of all A levels taken.
(Most popular subjects are Maths, English - ~11% each)



Data: Joint Council Qualifications

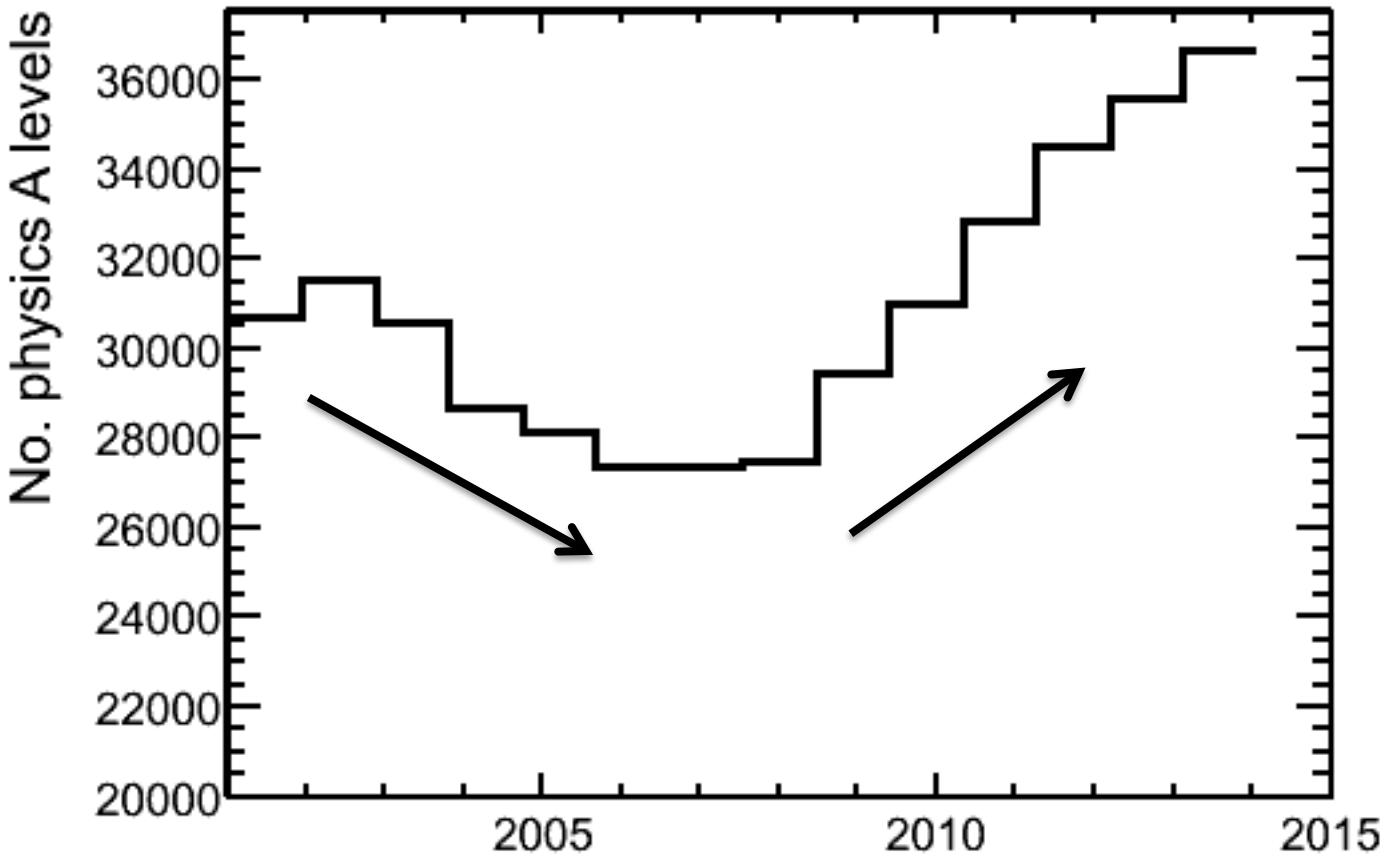
Women form 20-22% of A level physics entrants.

Female fraction



Data: Joint Council Qualifications

Trends:

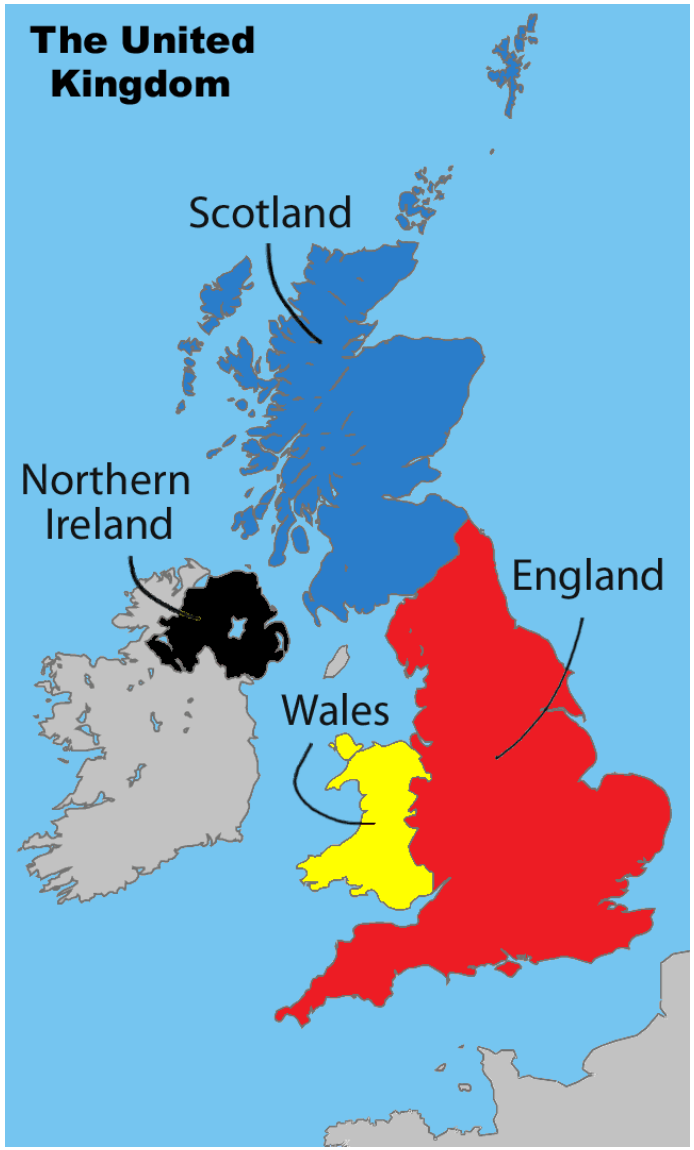

No. physics A levels
36000
34000
32000
30000
28000
26000
24000
22000
20000
2005
2010
2015

Trends downwards:

- **Introduction of "science" GCSE** in 1989 began long term decline for A level physics
  - 1985: 45,000 physics A level entrants
- Qualified Physics **teacher shortage** in England
  - IOP: 1000 new teachers needed /yr for 15 years.
  - Impact on school type (independents have higher physics rate, and more physics teachers)
  - 2011: almost half of English schools had no female A level physics entrants.
  - Regional differences; (eg) NI uptake higher.

Trends upwards:

- 2006: **update of GCSE science**
  - Gives physics more “identity”
- 2006-2009 **Stimulating Physics** pilot
  - IOP and SLC; improve student access, improve university-school links
  - Now support network for teachers and pupils
- 2008 onwards; **higher profile of science** in popular culture
  - “Brian Cox effect” /LHC /Higgs.
- 2011: government **target set for physics teacher recruitment**
  - 100 DfE/IOP Teacher Training scholarships (£20K)



16: Standard Grade

17: Highers

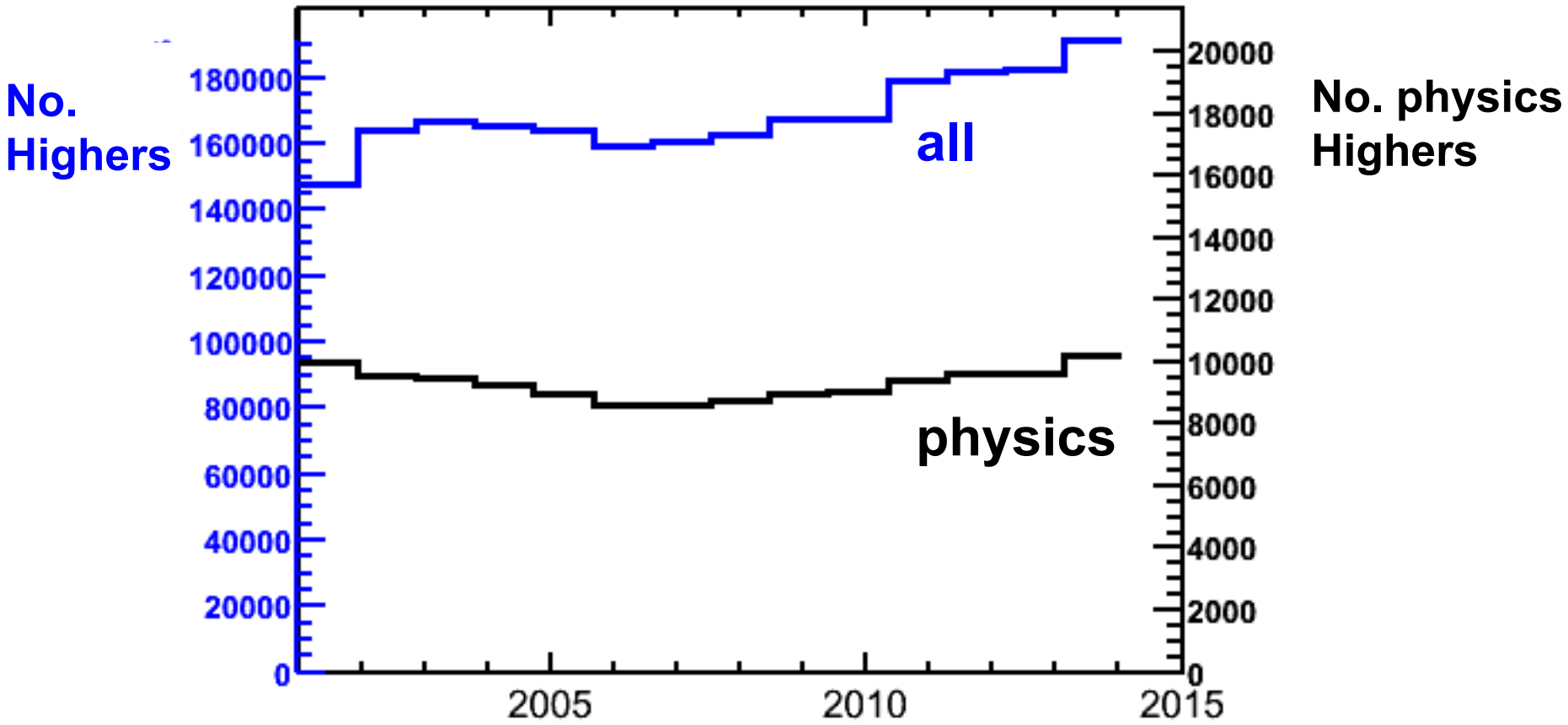
18: Advanced Highers

University

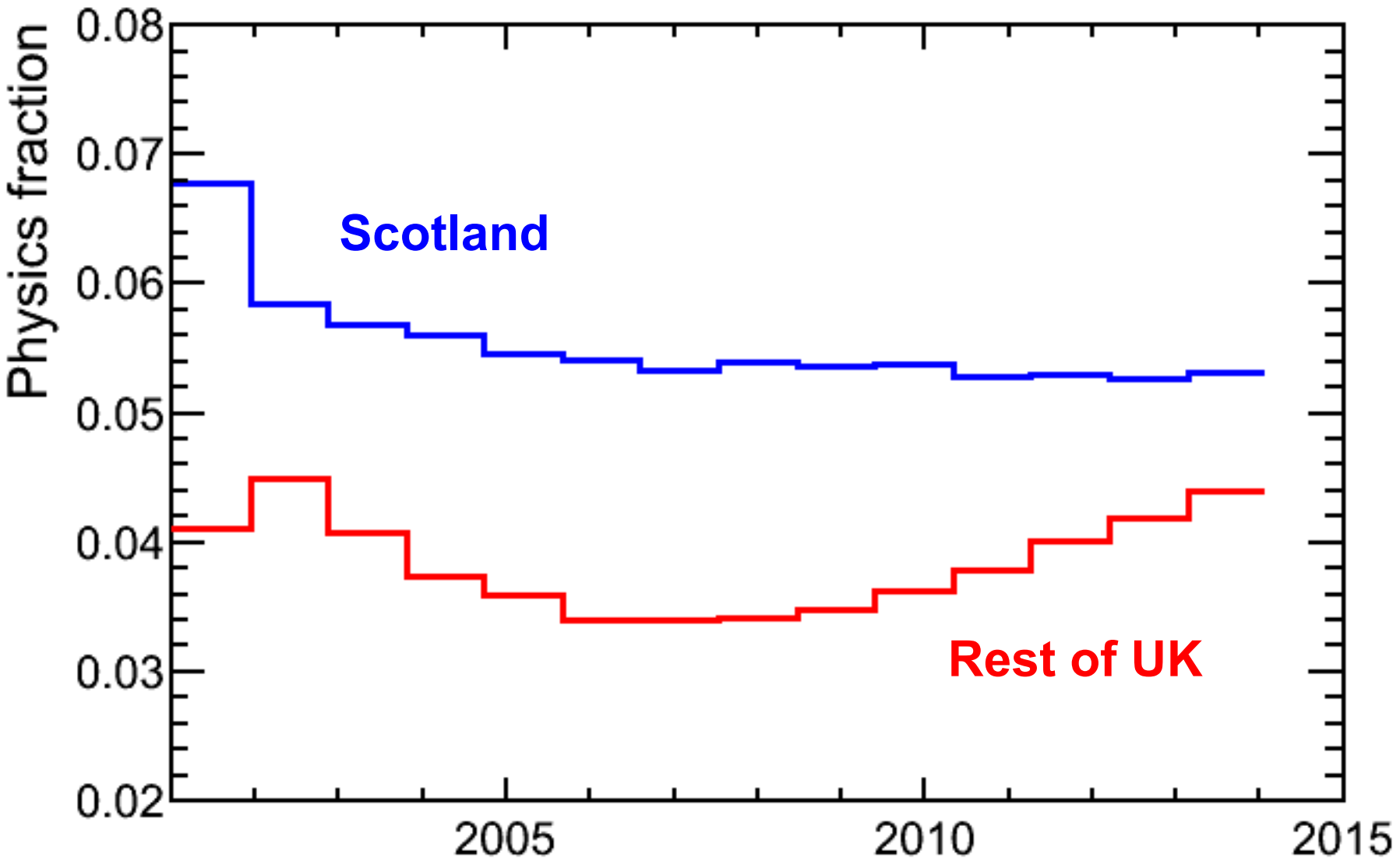
(Scotland)

Physics accounts for ~5-6% of all Higher exams

Proportion shows slow decrease.

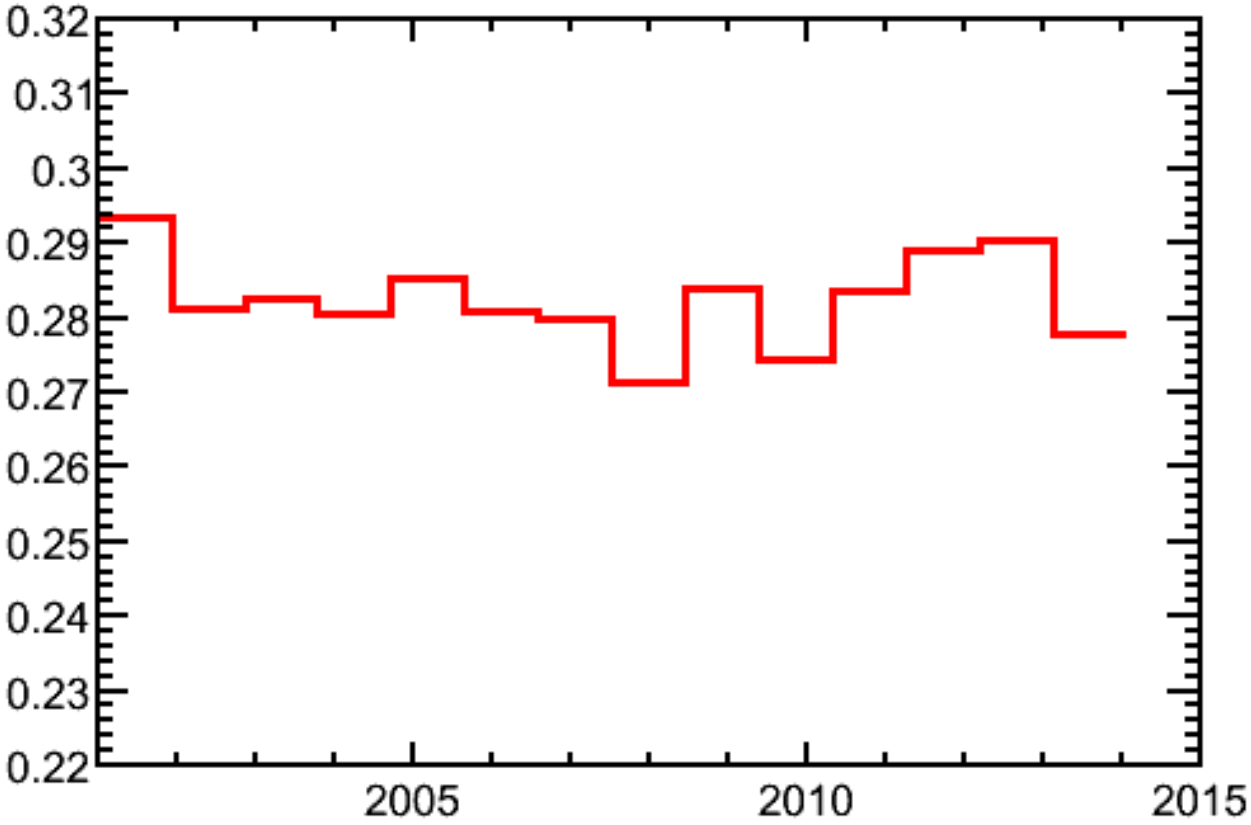


Data: Scottish Qualifications Authority


Physics fraction
0.08
0.07
0.06
0.05
0.04
0.03
0.02
2005
2010
2015
Scotland
Rest of UK

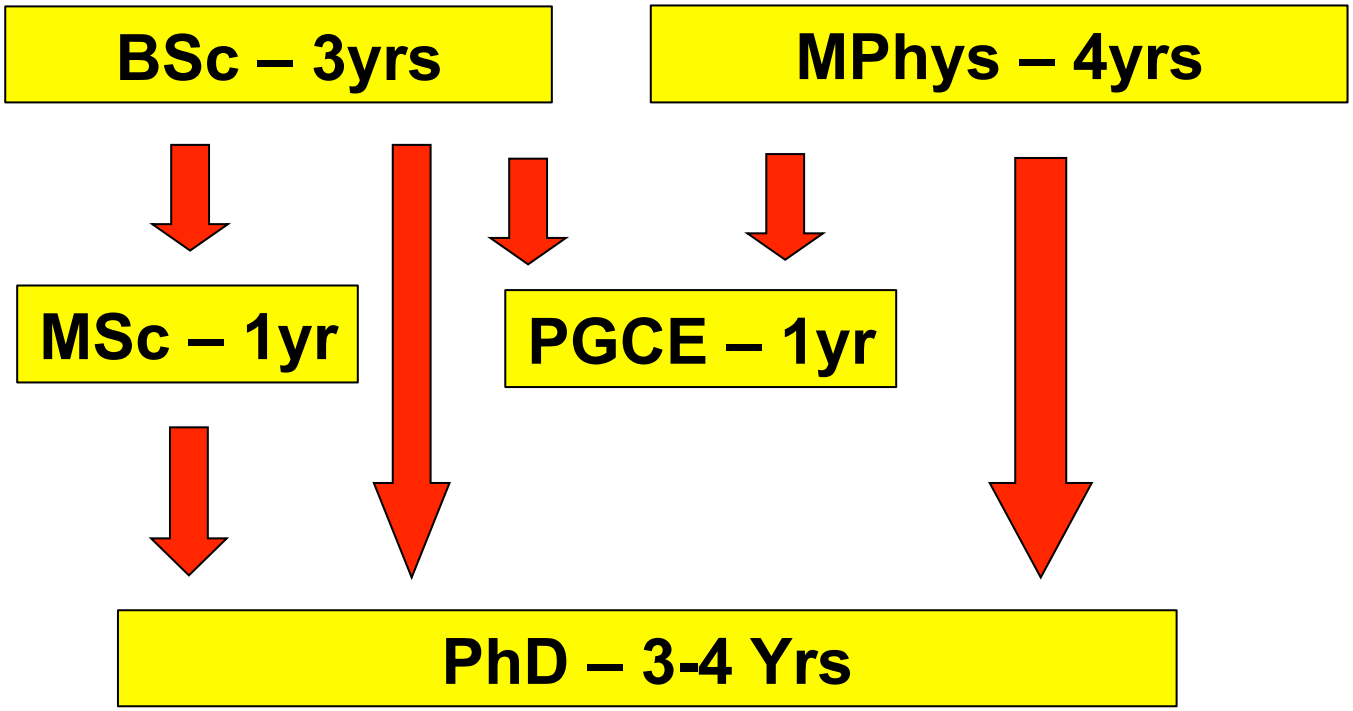
Women form 28-30% of physics Higher entrants.
Could be due to (greater) number of Higher subjects taken

Female fraction

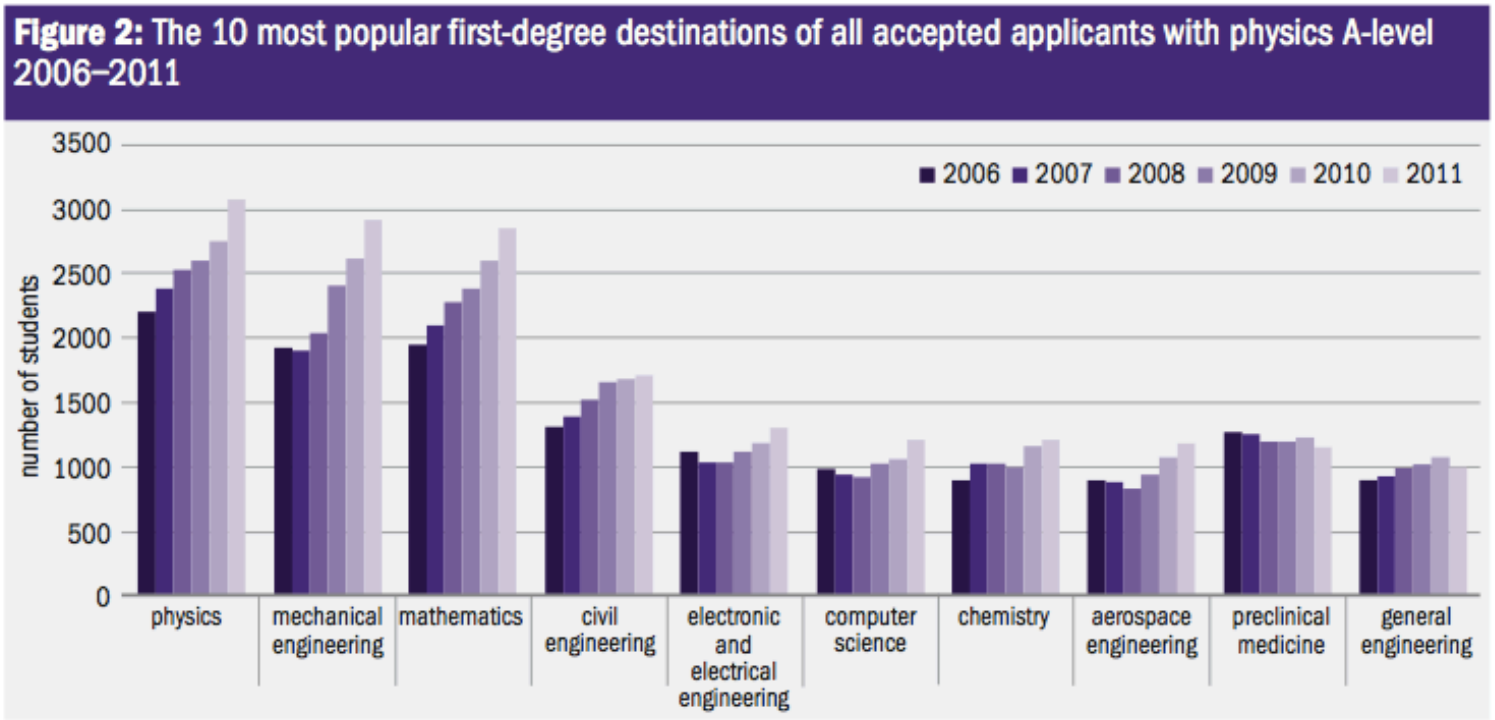


Data: Scottish Qualifications Authority

47 Universities offer IOP accredited physics degrees
Scottish courses take one extra year.



First destination with physics A-level is physics.
Engineering and maths next destinations.

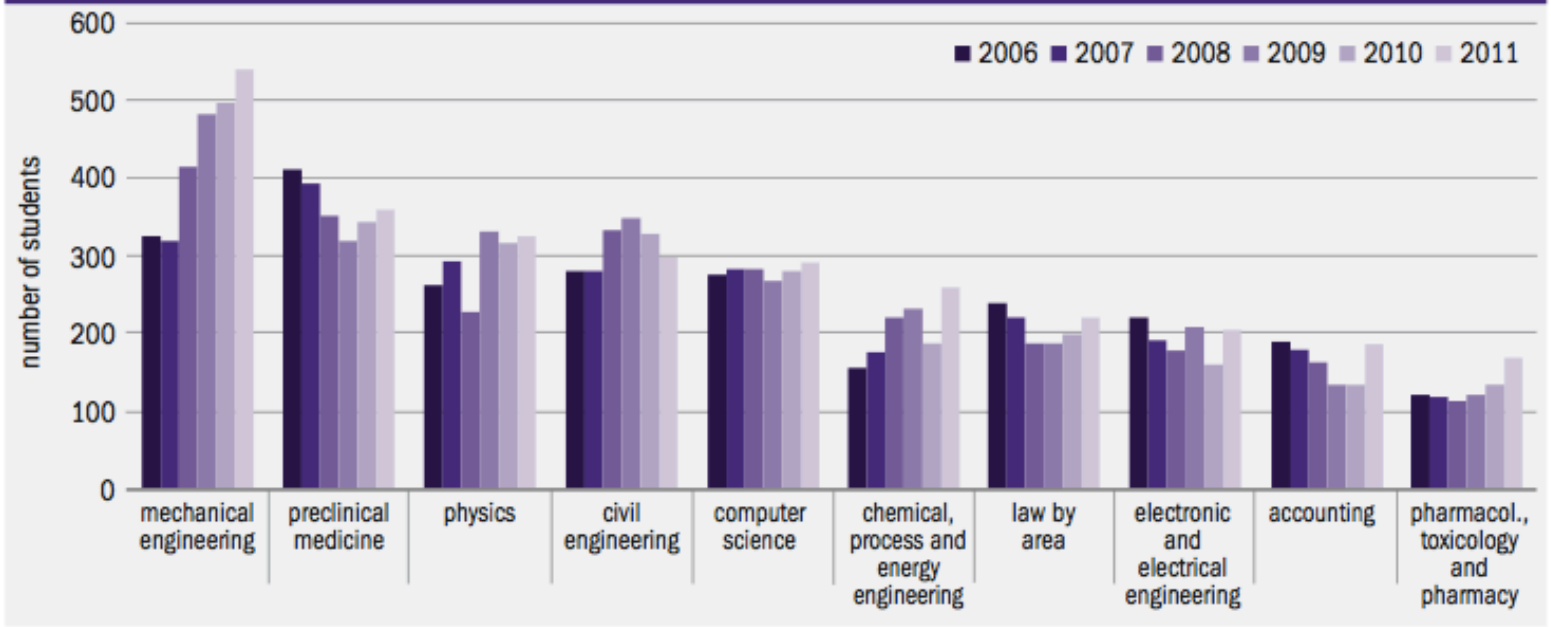


IOP report: Physics students in UK Higher Education Institutions (2012), data: UCAS.

First destination with physics Higher is engineering.
Medicine and physics next destinations.

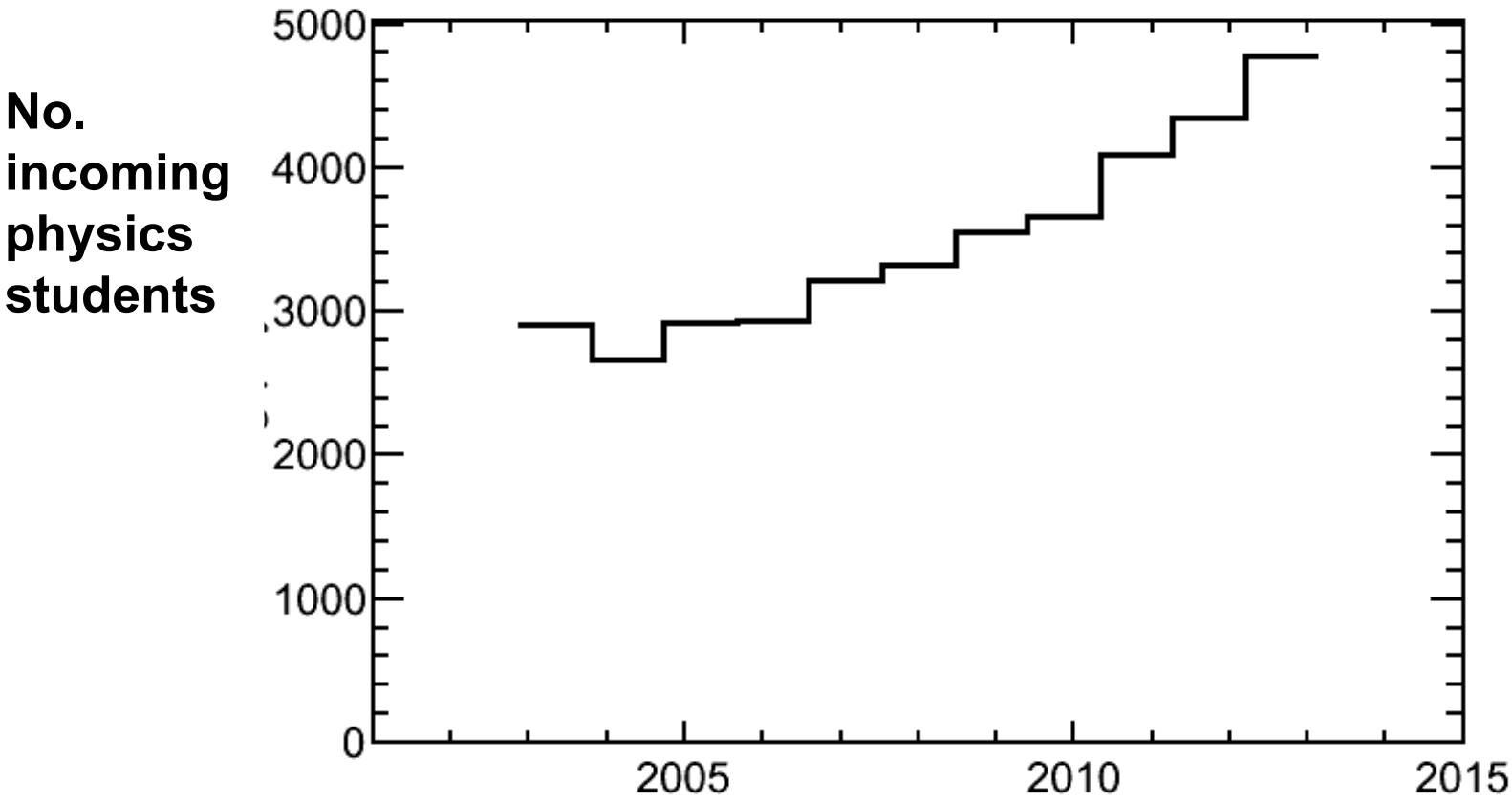
Figure 29: The 10 most popular first-degree destinations of all accepted applicants with physics Scottish Higher 2006–2011

Source: UCAS



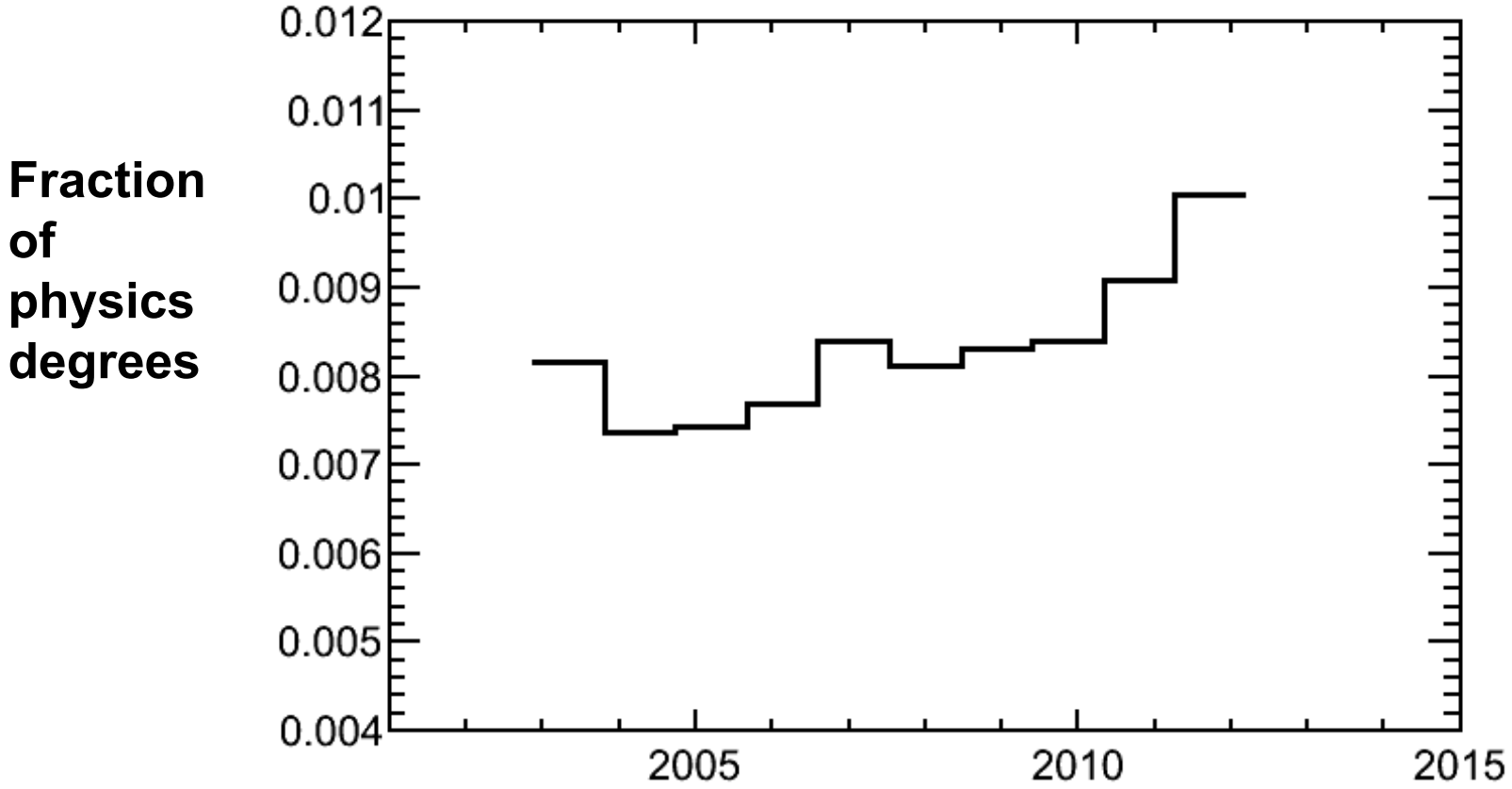
IOP report: Physics students in UK Higher Education Institutions (2012)

UK Physics undergraduate degree places are increasing.



Higher Education Statistics Agency reports
IOP report: Accepted Applicants to degree courses in UK Higher Education Institutions (2012)

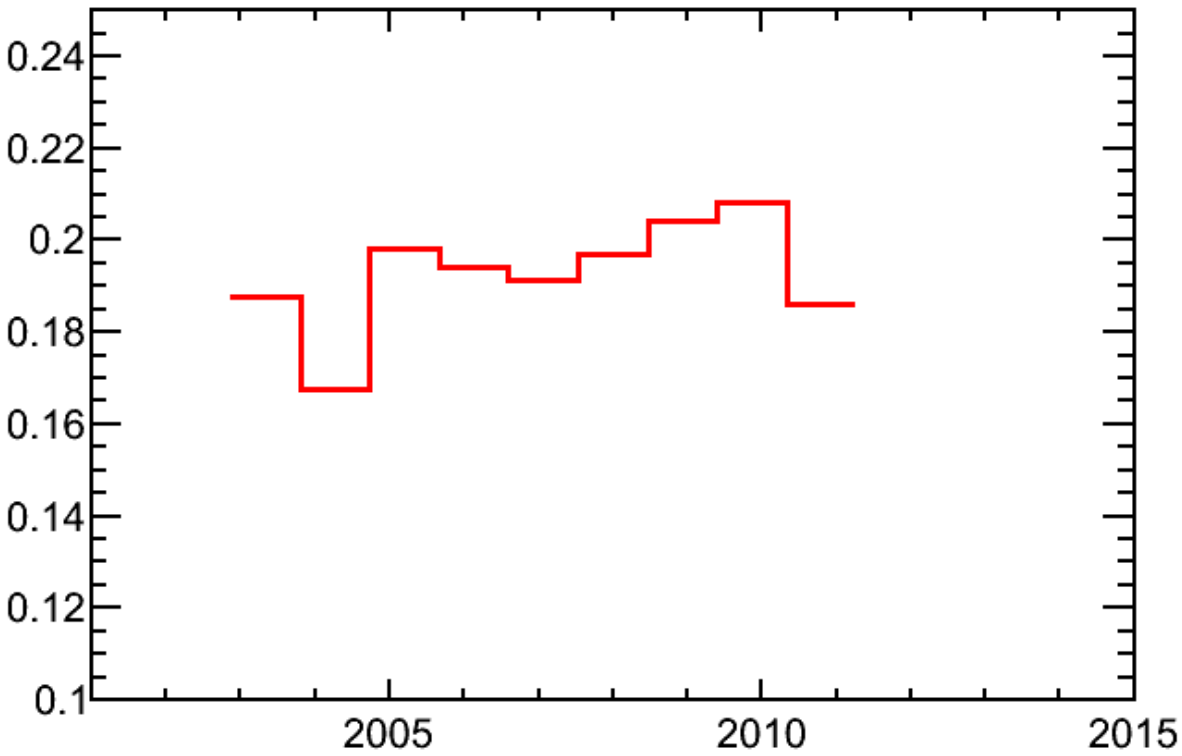
UK undergraduate degree numbers have also increased. Fraction of students sitting physics, out of all degrees, ~1%



Higher Education Statistics Agency reports
IOP report: Accepted Applicants to degree courses in UK Higher Education Institutions (2012)

Women form ~20% of physics students.

Female fraction

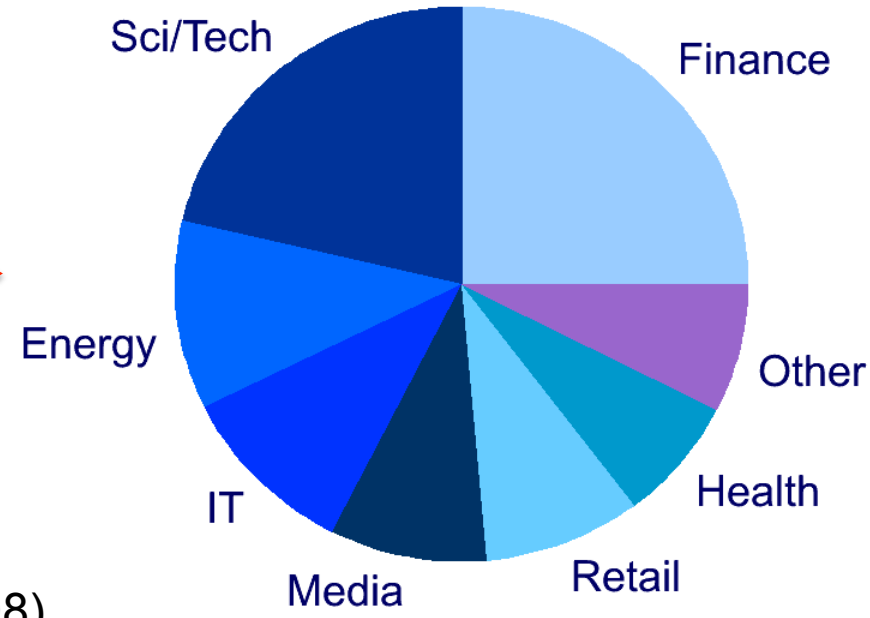


(data only available until 2011)

IOP report: Accepted Applicants to degree courses in UK Higher Education Institutions (2012)

Destinations:

One year after graduation (2006-2009 cohorts)
5.1 (3.4)% unemployed (other)
54.9% PhD / Masters
1.7% Teacher training
10.6% Public sector
24.2% Private sector



Median salary in employment £22 500 (2008)
Almost £3000 more than degree average.

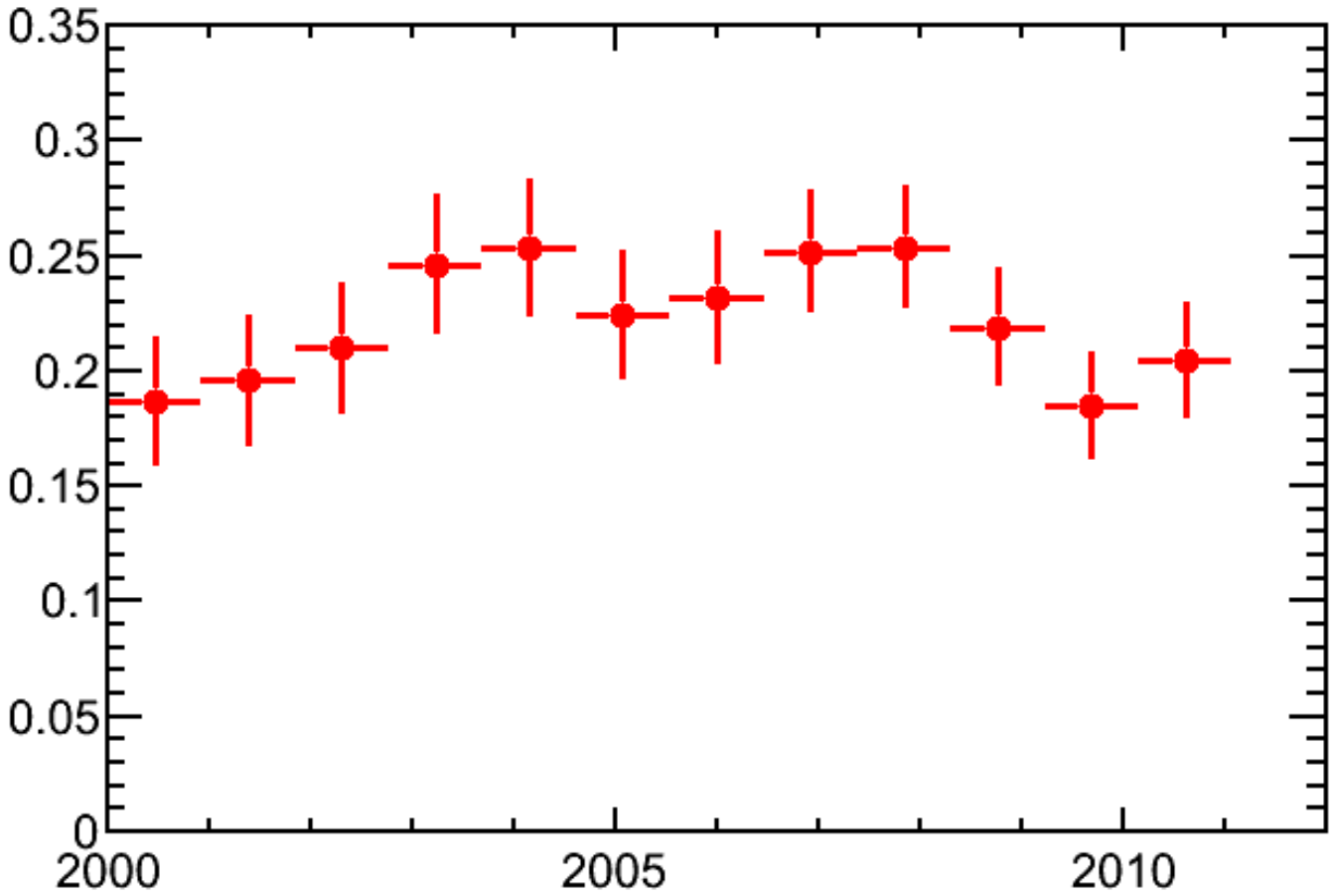
IOP report: The career paths of physics graduates (2006-2010)

Physics PhD:

- approximately 710 per year
  - (in 2009-2010, source: IOP Physics Students in UK Higher Education Institutions)
  - Breakdown: 435 UK, 110 EU, 135 overseas. 165 female
- Funded by research councils, ERC grants, university and other scholarships.
- Some involve partnerships with industry (CASE)
- Some are organised in doctoral training centres offering centralised schemes.
- STFC covers particle physics, astrophysics, nuclear physics

Women form ~20% of STFC PhD students.

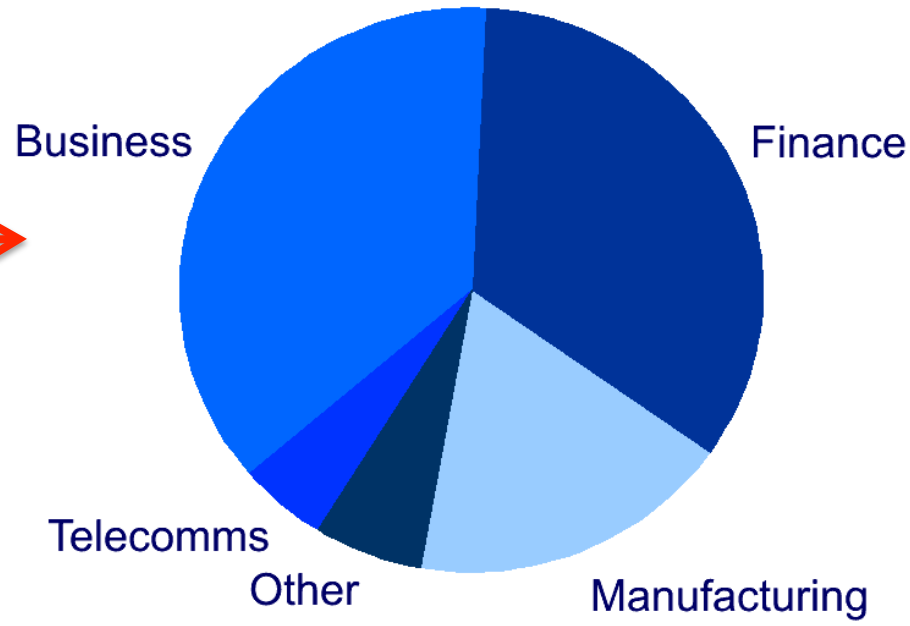
Female fraction



(source:STFC)

Destinations:

2004-2009 students, contacted in 2011.
3 (4)% unemployed (other)
44.6% higher education
20.5% public sector
27.9% private sector

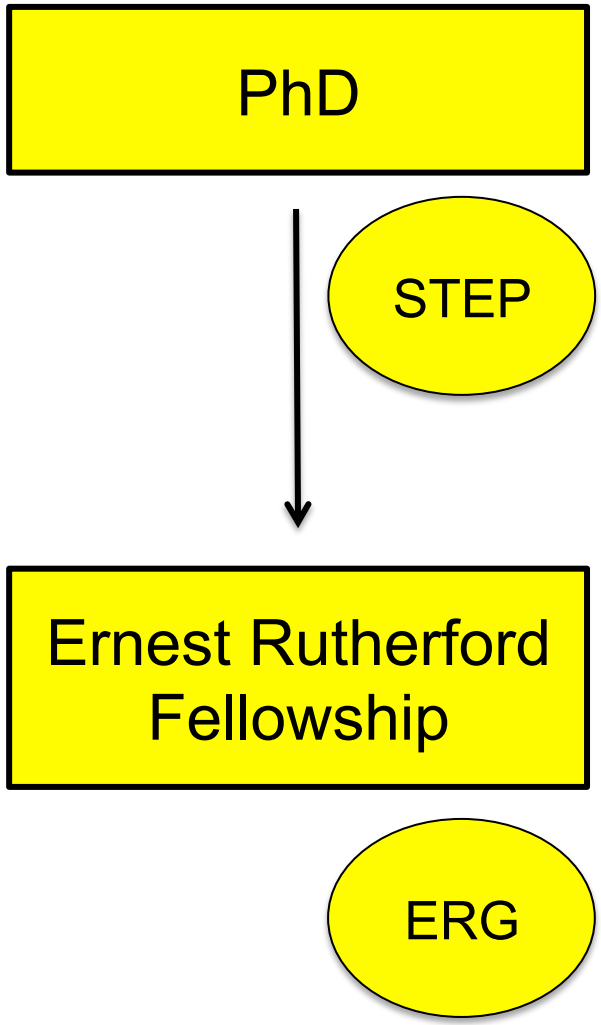


60% earn > £35 000 / year (2011)
33% earn > £35 000 / year

STFC report: Career destinations of STFC-funded PhD students (2011)

Particle physics PhD:

- Funded by STFC (3.5 years of funding, UK residents)
- Approx. 80/yr (experiment and theory), distributed to active particle physics groups algorithmically.
- Some coursework, mostly research;
  - Departmental training schemes and 1st year school,
  - Attendance at CERN/FNAL/JINR schools, CERN academic training lectures etc.
- Experimental students usually spend a year at experimental facilities.
- Approx. 20% will ultimately enter academia.



2012-2015: **STEP**
6-12 months funding post PhD submission

Future research leaders
At least 2 years postdoc experience
(5 from start of PhD)
12 awarded annually
100% employment, academia
Potential to apply for ER grant funds
(final round 2014).