



# **NuPECC Survey 2006**

## **on Resources in**

### **Nuclear Physics Research**

#### **in NuPECC Member Countries**

## **1.) Introduction**

In 1997 NuPECC carried out a survey of Nuclear Physics activities and resources in NuPECC member states for the first time. The report on the survey was published on the NuPECC website and can be found under <http://www.nupecc.org/pub>.

In 2005 NuPECC decided to start a new survey in order to be able to identify trends within the subject. The collection of data mainly took place in 2006. In the following we describe the method of data collection, the analysis of the resources 2006 and the comparison with the data from 1997. In the end we present some observations and concluding remarks.

## **2.) Method of data collection**

Similar to the 1997 survey NuPECC formulated a questionnaire to be sent to and filled in by all institutions and university institutes active in nuclear physics research in the NuPECC member countries.

For France and Italy, the numbers were provided centrally by IN2P3 and CEA as well as INFN, respectively. For Austria, Croatia, the Czech Republic, Greece and Romania the questionnaires were distributed by the corresponding NuPECC members. For all other countries the list of institutions given in the NuPECC Handbook on international access to nuclear physics facilities was updated by the NuPECC members and the questionnaires sent out accordingly. The completed questionnaires were then collected and analysed by NuPECC. A copy of the questionnaire with its accompanying letter is given as an annex. An estimate of the uncertainty in the numbers presented in the report is about 10 %.

## **3.) Data for 2006**

The numbers for theoretical physicists in the different countries are given in Table 1 and Chart 1, for experimental physicists the corresponding numbers are given in Table 2 and Chart 2. Tenured here means a permanent position which can be occupied by a person until retirement, fixed term means positions where the

employment of a scientist is for a fixed period. Also the length of PhD training varies between different countries, but no account of that is taken. Contrary to the 1997 survey numbers for diploma or masters students have not been collected.

Table 3 and Chart 3 show the numbers for engineers, technicians and administrative staff in support of nuclear physics research. Here the boundaries between engineers and technicians might be blurred, therefore total numbers might be less uncertain. These are shown in Chart 4 giving the number of physicists (theoretical plus experimental) and the number of total support staff.

The questionnaire also requested information on the distribution of resources over the various research areas identified in the NuPECC Long Range Plan 2004. Table 4 shows these numbers for all NuPECC member countries; in Chart 5 the total distribution is shown.

Looking at these data and comparing different countries should only be done with a great amount of caution. Funding schemes differ in the various countries, and the boundaries between Nuclear Physics and its neighbouring fields such as Elementary Particle Physics, Neutrino Physics and Astrophysics may be defined differently.

#### **4.) Comparison 2006 – 1997**

Between 1997 and 2006 NuPECC increased its membership by 5 more countries. Therefore in order to compare the new data to the previous ones, the numbers for Croatia, the Czech Republic, Greece, Hungary and Romania have to be subtracted.

Now these numbers for 2006 and 1997 are given in Table 5 for theoretical physicists, in Table 6 for experimental physicists and in Table 7 for support staff. The differences are visualised in Charts 6, 7, and 8, respectively.

In Table 8 total numbers for (theoretical and experimental) physicists and support staff for all the relevant countries are given; chart 9 shows the difference in these total numbers of physicists and support staff

Since the definition of subfields changed from the 1997 to the 2006 survey, it is difficult to identify trends in the distribution. Therefore the data for 1997 are shown in

Chart 10; Chart 11 shows the 2006 data for the same countries, i.e. those who were member in NuPECC in 1997.

## **5.) Observations**

Looking at the numbers with the necessary amount of caution one can deduce that

- the number of physicists has slightly decreased, but this decrease of about 7% remains within the error. The decrease in France and Germany is nearly compensated by an increase in Finland, Italy, Spain and the UK

- a decrease within the error can also be seen in the numbers of PhD students

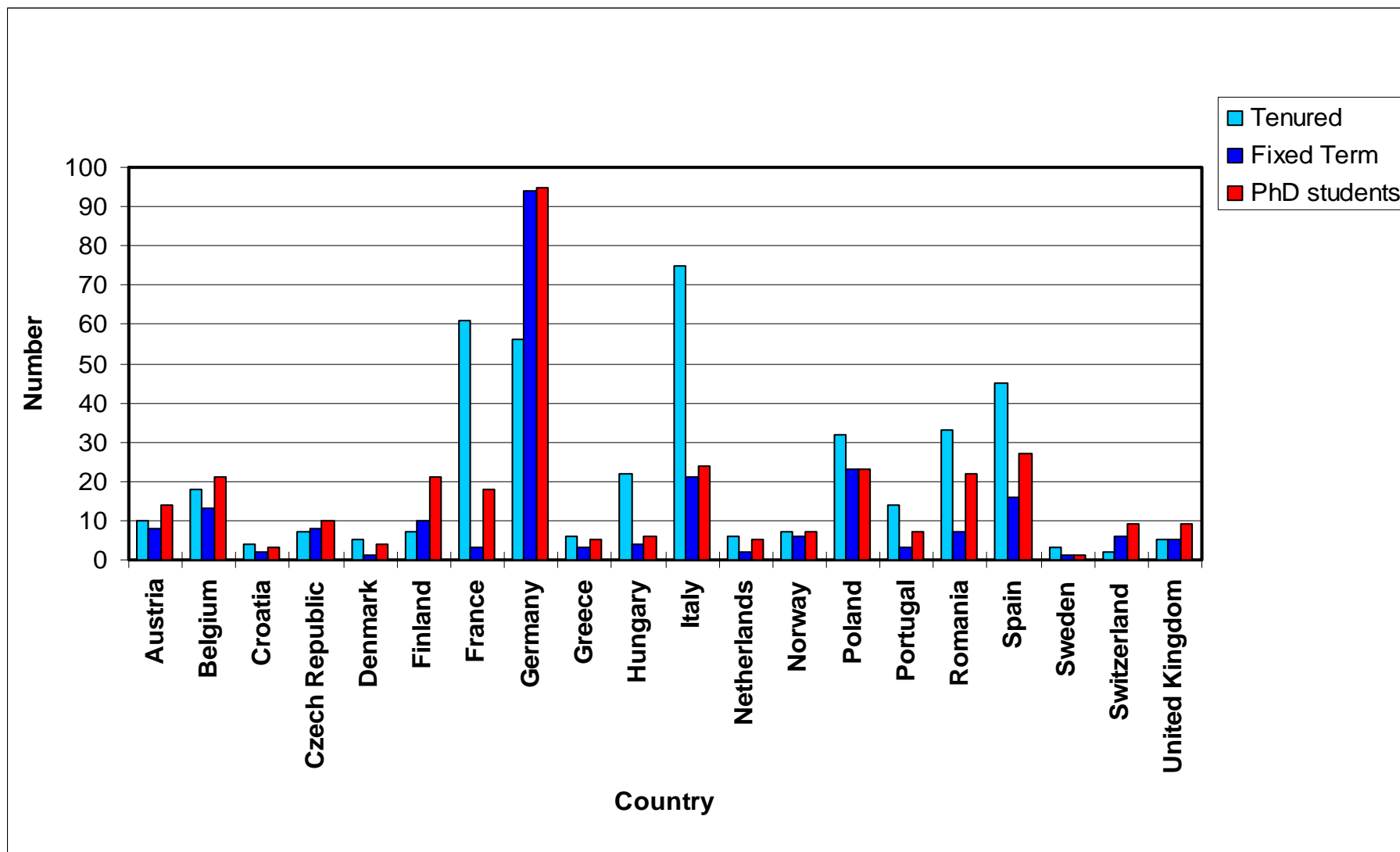
- NuPECC has for some time been advocating additional support for the development of nuclear theory and so we are disappointed to note that the number of theoretical physicists have not increased as we would have wished

- the numbers for support staff have gone down considerably, again especially in France and Germany; a part of this may be due to the efficiency gains of replacing a number of smaller facilities with a few large-scale, multi-user facilities

- a number of tenured positions have been moved to fixed term positions

Country	Tenured	Fixed Term	PhD students
Austria	10	8	14
Belgium	18	13	21
Croatia	4	2	3
Czech Republic	7	8	10
Denmark	5	1	4
Finland	7	10	21
France	61	3	18
Germany	56	94	95
Greece	6	3	5
Hungary	22	4	6
Italy	75	21	24
Netherlands	6	2	5
Norway	7	6	7
Poland	32	23	23
Portugal	14	3	7
Romania	33	7	22
Spain	45	16	27
Sweden	3	1	1
Switzerland	2	6	9
United Kingdom	5	5	9
Total	418	236	331

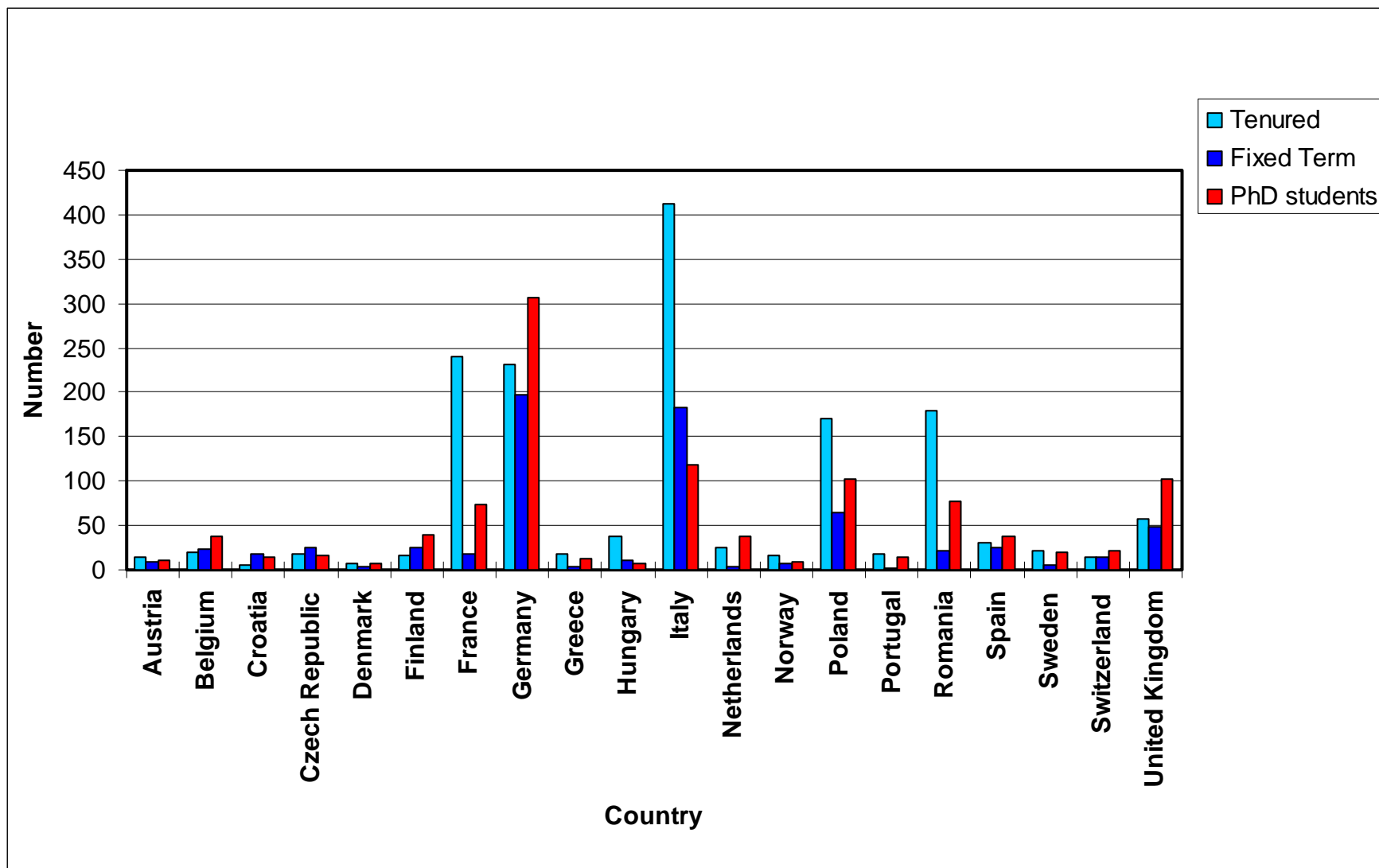
*Table 1: Theoretical Physicists 2006*



*Chart 1: Theoretical Physicists 2006*

Country	Tenured	Fixed Term	PhD students
Austria	14	9	11
Belgium	20	24	37
Croatia	5	18	14
Czech Republic	18	25	17
Denmark	7	3	7
Finland	17	25	39
France	240	18	74
Germany	231	198	306
Greece	18	4	13
Hungary	37	10	8
Italy	413	183	119
Netherlands	25	3	37
Norway	16	7	9
Poland	171	65	103
Portugal	18	2	14
Romania	180	21	77
Spain	31	25	37
Sweden	22	6	20
Switzerland	14	14	22
United Kingdom	58	48	103
Total	1555	708	1067

*Table 2: Experimental Physicists 2006*

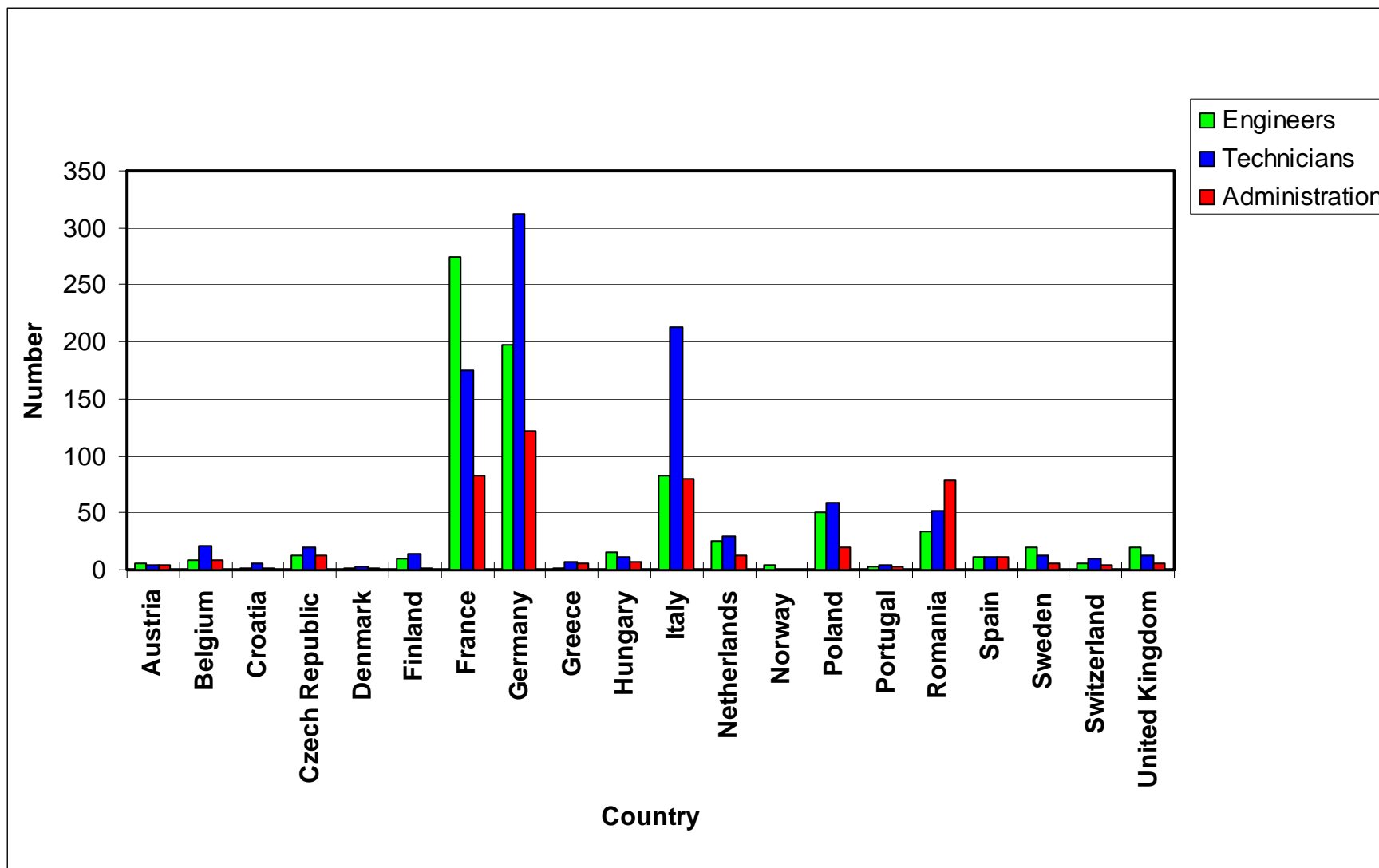


*Chart 2: Experimental Physicists 2006*

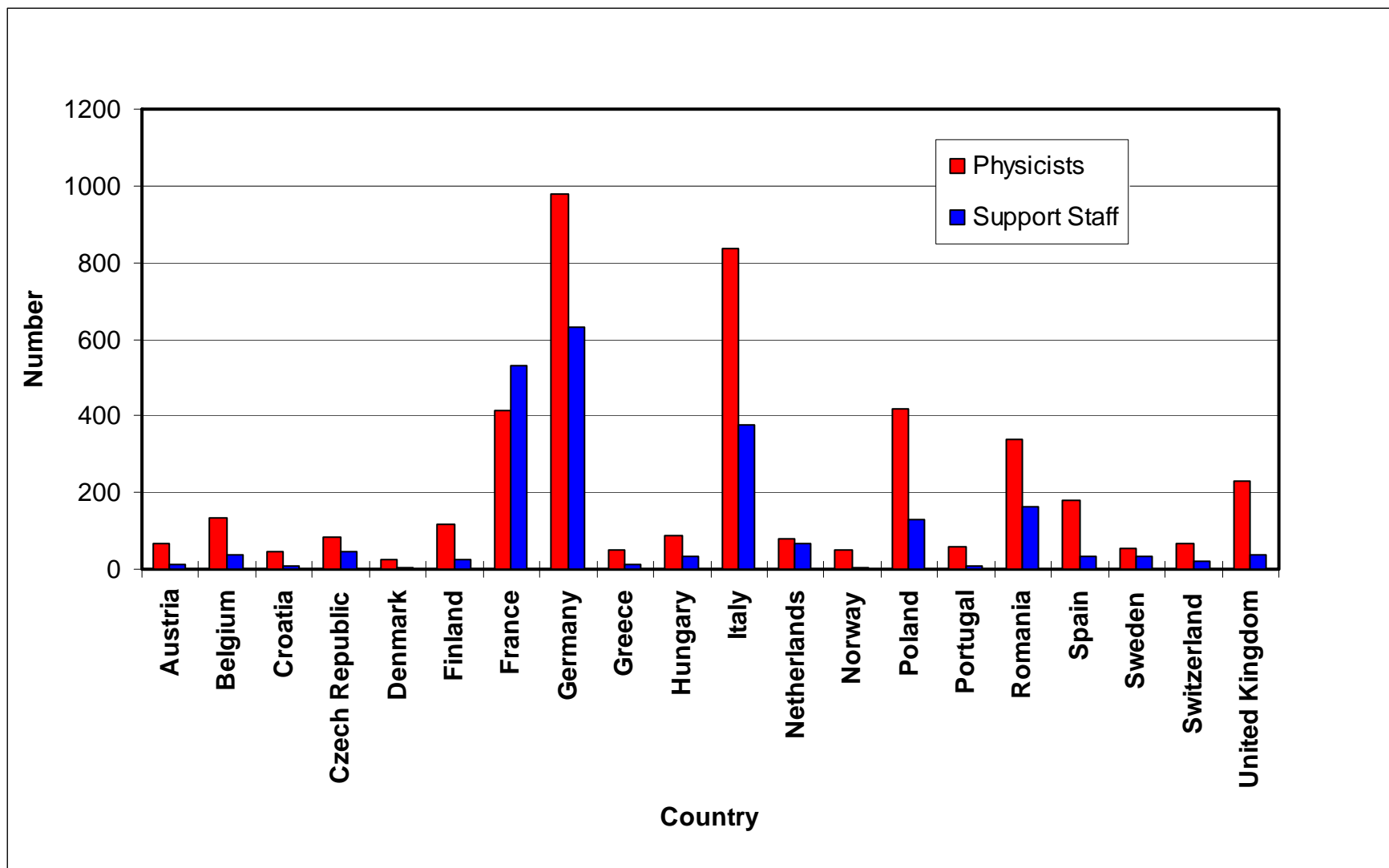


Country	Engineers	Technicians	Administration
Austria	6	4	4
Belgium	8	21	8
Croatia	2	5	2
Czech Republic	13	19	13
Denmark	2	3	1
Finland	10	14	2
France	274	175	83
Germany	197	312	122
Greece	1	7	5
Hungary	15	11	7
Italy	82	213	80
Netherlands	25	30	12
Norway	4	0	0
Poland	50	59	20
Portugal	3	4	3
Romania	33	52	79
Spain	11	11	11
Sweden	18	12	5
Switzerland	6	10	4
United Kingdom	19	12	6
Total	779	974	467

*Table 3: Support Staff 2006*



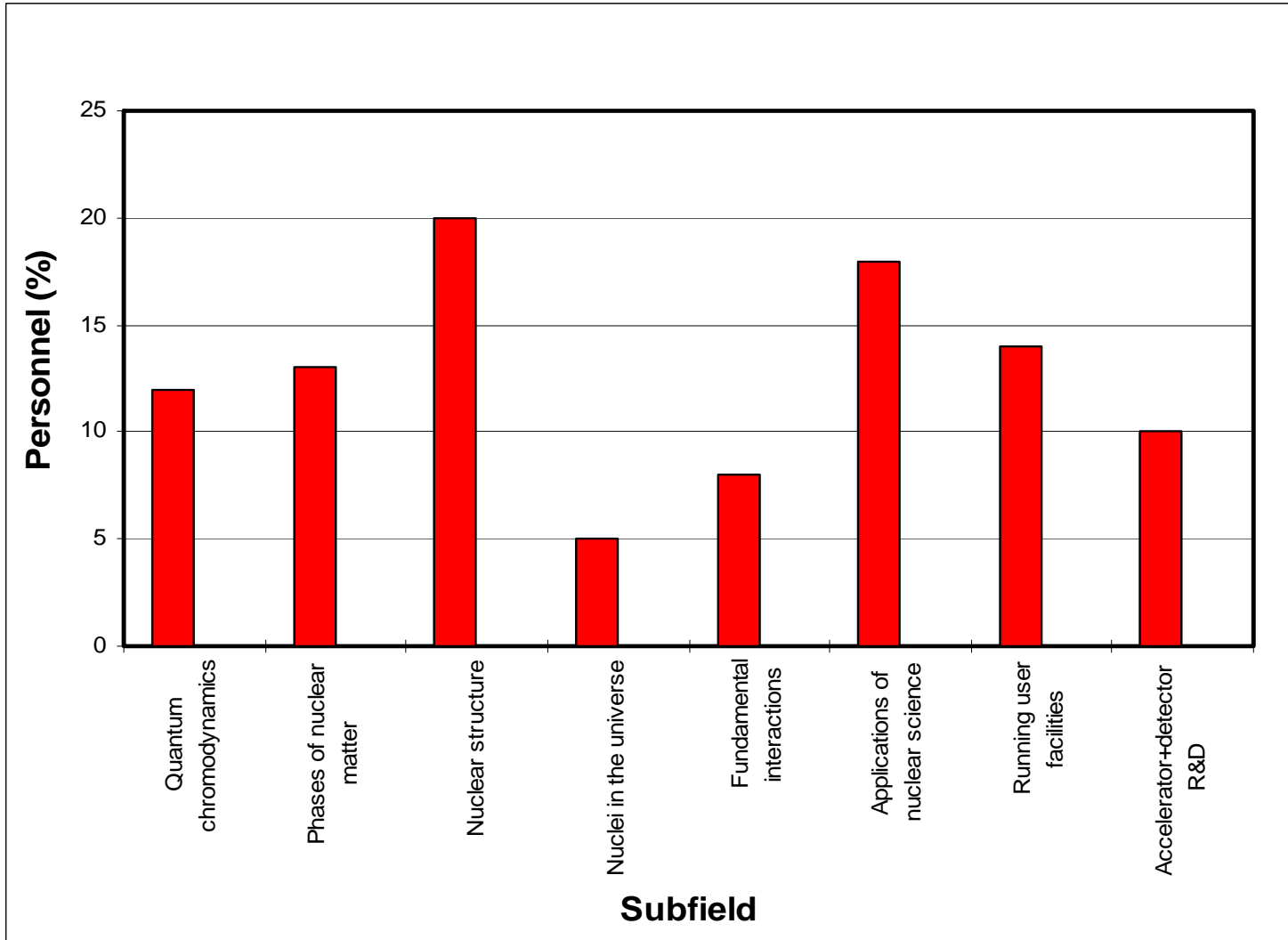
*Chart 3: Support Staff 2006*



*Chart 4: Physicists and Support Staff 2006*

Country	Quantum Chromodynamics	Phases of nuclear matter	Nuclear structure	Nuclei in the universe	Fundamental interactions	Applications of nuclear science	Running user facilities	Accelerator and detector R&D
Austria	32	0	3	5	10	17	6	7
Belgium	30	1	55	12	12	43	10	7
Croatia	7	8	9	2	4	13	5	7
Czech Republic	14	21	17	7	18	24	18	11
Denmark	1	16	13	1	0	2	0	0
Finland	8	15	44	0	11	27	19	21
France	76	145	262	14	58	139	155	97
Germany	254	175	182	95	218	109	306	272
Greece	0	0	16	9	0	20	6	11
Hungary	12	13	31	9	3	28	16	8
Italy	225	226	185	42	22	242	246	22
Netherlands	28	28	17	10	23	6	24	9
Norway	0	32	12	3	3	2	3	1
Poland	20	53	135	36	36	150	37	79
Portugal	4	5	16	7	1	31	3	1
Romania	20	49	57	18	61	215	59	25
Spain	10	17	72	12	15	72	1	15
Sweden	4	9	17	2	13	7	30	6
Switzerland	14	1	6	8	40	0	0	18
United Kingdom	33	12	144	17	2	27	0	30
TOTAL	792	826	1293	309	550	1174	944	647

*Table 4: Distribution in Subfields 2006*



*Chart 5: Total Distribution in Subfields 2006*

2006				1997		
Country	Tenured	Fixed Term	PhD students	Tenured	Fixed Term	PhD students
Austria	10	8	14	7	0	9
Belgium	18	13	21	24	22	29
Denmark	5	1	4	8	1	5
Finland	7	10	21	5	5	7
France	61	3	18	68	11	30
Germany	56	94	95	81	112	161
Italy	75	21	24	85	3	18
Netherlands	6	2	5	9	2	5
Norway	7	6	7	6	0	8
Poland	32	23	23	53	14	19
Portugal	14	3	7	28	4	8
Spain	45	16	27	51	8	32
Sweden	3	1	1	9	1	6
Switzerland	2	6	9	5	5	10
United Kingdom	5	5	9	12	11	10
Total	346	212	285	451	199	357

*Table 5: Theoretical Physicists in 2006 und 1997*

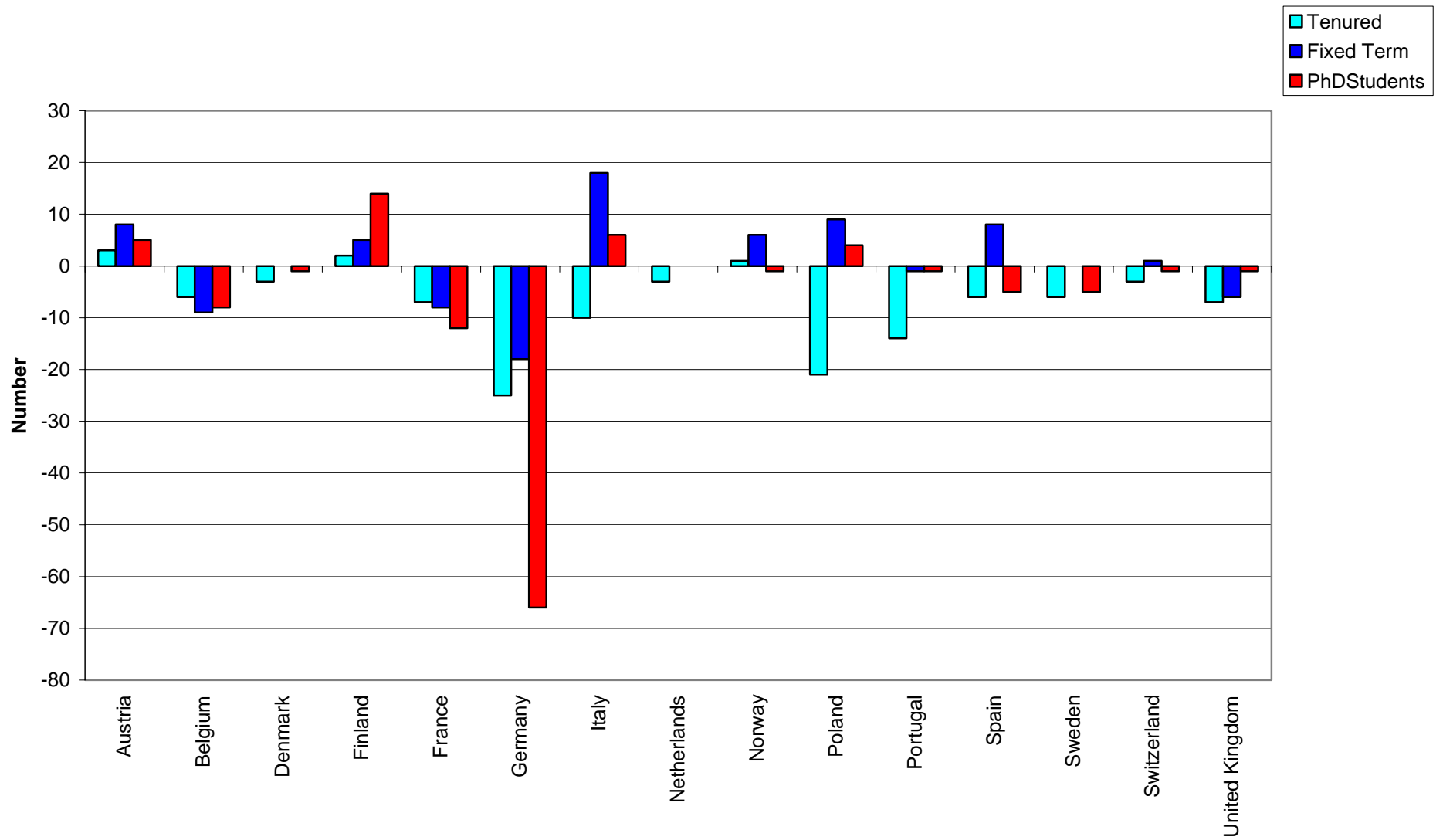
2006				1997		
Country	Tenured	Fixed Term	PhD students	Tenured	Fixed Term	PhD students
Austria	14	9	11	18	3	16
Belgium	20	24	37	26	15	40
Denmark	7	3	7	11	3	5
Finland	17	25	39	6	16	23
France	240	18	74	361	30	122
Germany	231	198	306	362	240	489
Italy	413	183	119	276	32	100
Netherlands	25	3	37	27	10	38
Norway	16	7	9	10	1	7
Poland	171	65	103	220	50	59
Portugal	18	2	14	18	5	6
Spain	31	25	37	24	6	14
Sweden	22	6	20	35	13	40
Switzerland	14	14	22	13	12	26
United Kingdom	58	48	103	48	40	64
Total	1297	630	938	1455	476	1049

*Table 6: Experimental Physicists in 2006 und 1997*

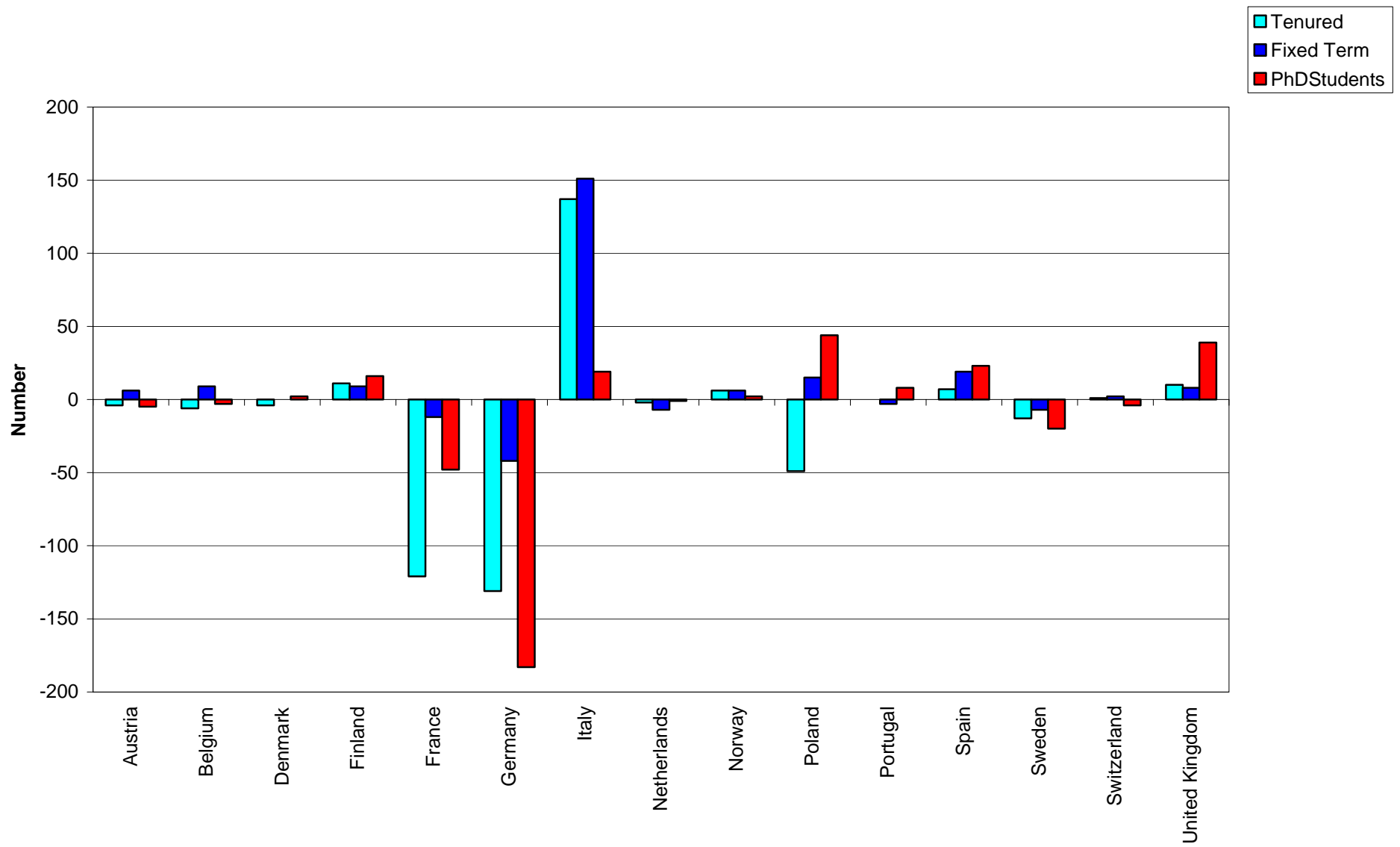
2006				1997		
Country	Engineers	Technicians	Administration	Engineers	Technicians	Administration
Austria	6	4	4	3	8	4
Belgium	8	21	8	11	50	12
Denmark	2	3	1	2	11	3
Finland	10	14	2	7	13	1
France	274	175	83	338	570	158
Germany	197	312	122	421	465	167
Italy	82	213	80	330	52	221
Netherlands	25	30	12	26	59	11
Norway	4	0	0	4	0	2
Poland	50	59	20	72	96	40
Portugal	3	4	3	1	2	2
Spain	11	11	11	2	4	6
Sweden	19	12	6	30	13	6
Switzerland	6	10	4	7	16	3
United Kingdom	19	12	6	13	30	6
Total	716	880	362	1267	1389	642

*Table 7: Support Staff in 2006 und 1997*

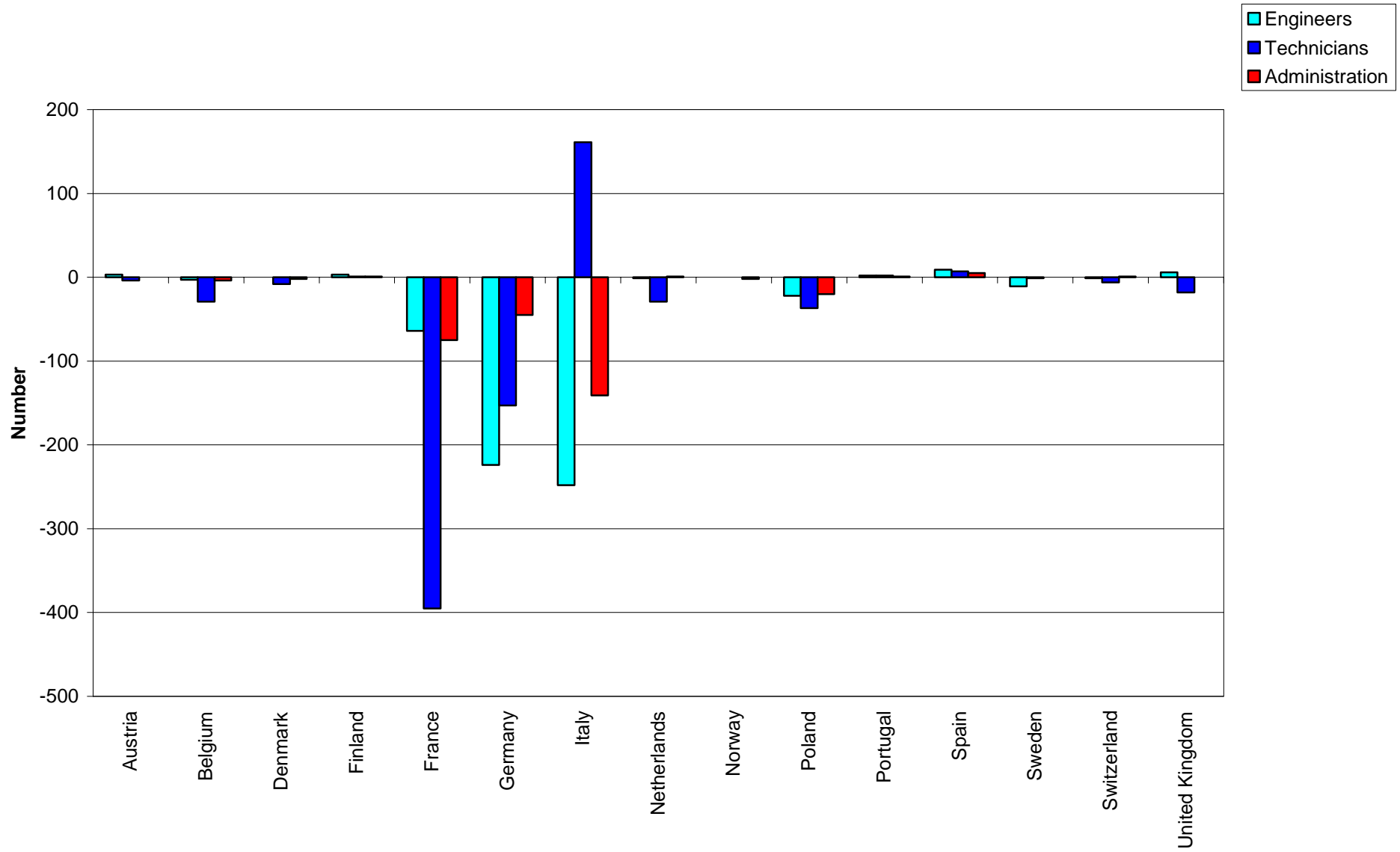




***Chart 6: Changes in Theoretical Physicists 1997-2006***



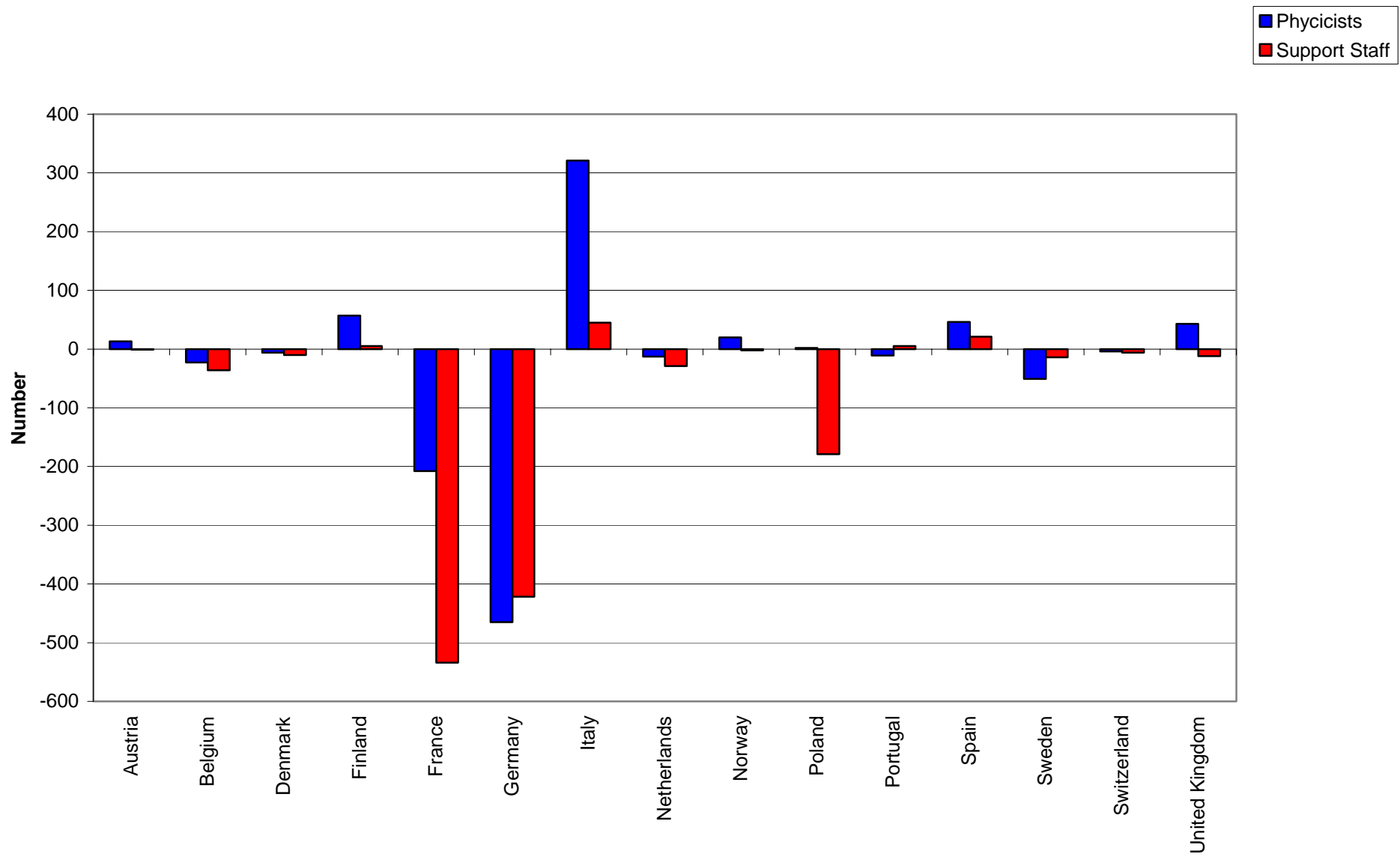
*Chart 7: Changes in Experimental Physicists 1997-2006*



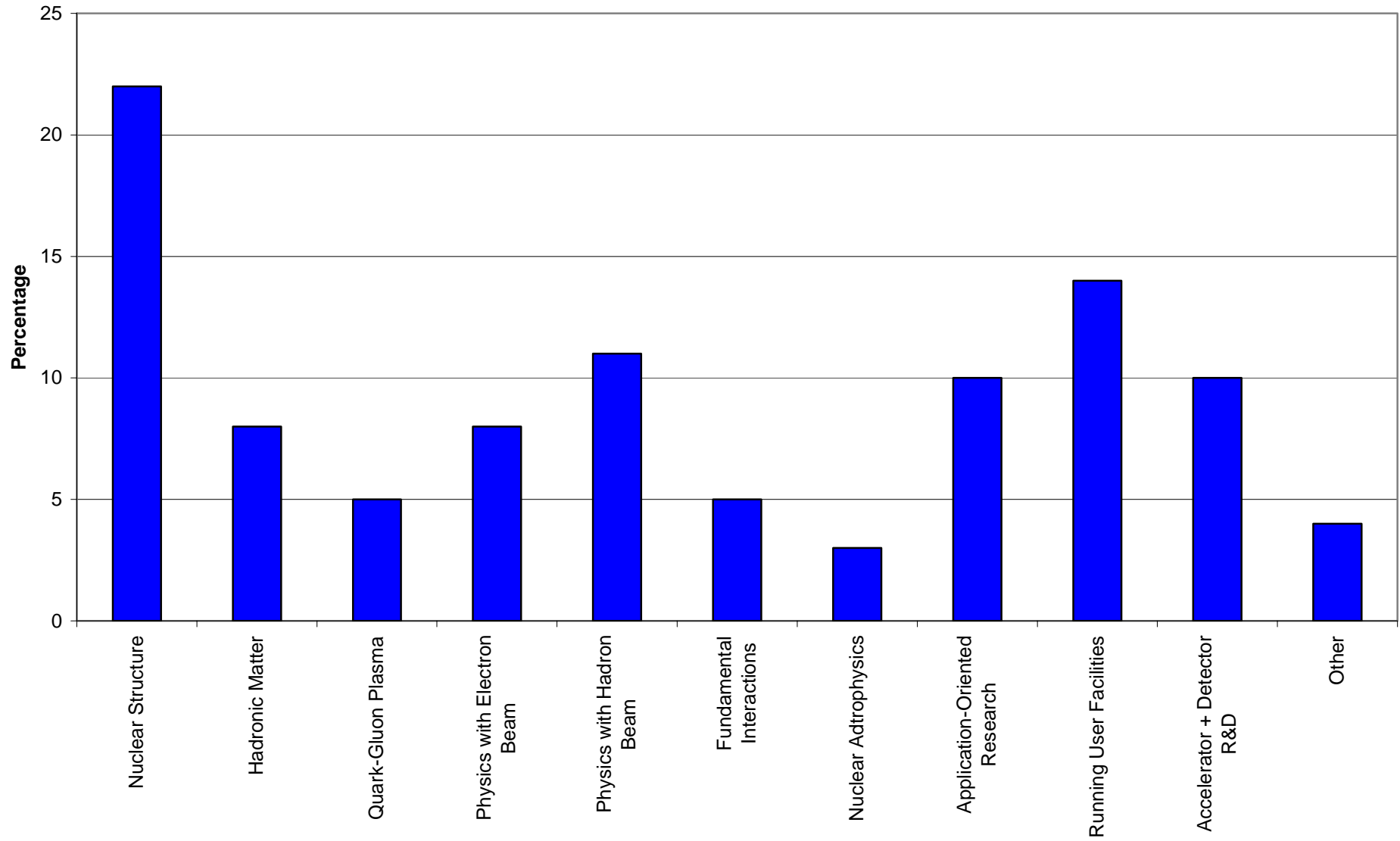
***Chart 8: Changes in Support Staff 1997-2006***

Country	2006				1997			
	Theoretical	Experimental	Physicists	Support Staff	Theoretical	Experimental	Physicists	Support Staff
Austria	32	34	66	14	16	37	53	15
Belgium	52	81	133	37	75	81	156	73
Denmark	10	17	27	6	14	19	33	16
Finland	38	81	119	26	17	45	62	21
France	82	332	414	532	109	513	622	1066
Germany	245	735	980	631	354	1091	1445	1053
Italy	120	715	835	375	106	408	514	330
Netherlands	13	65	78	67	16	75	91	96
Norway	20	32	52	4	14	18	32	6
Poland	78	339	417	129	86	329	415	308
Portugal	24	34	58	10	40	29	69	5
Spain	88	93	181	33	91	44	135	12
Sweden	5	48	53	35	16	88	104	49
Switzerland	17	50	67	20	20	51	71	26
United Kingdom	19	209	228	37	33	152	185	49
Total	843	2865	3708	1956	1007	2980	3987	3125

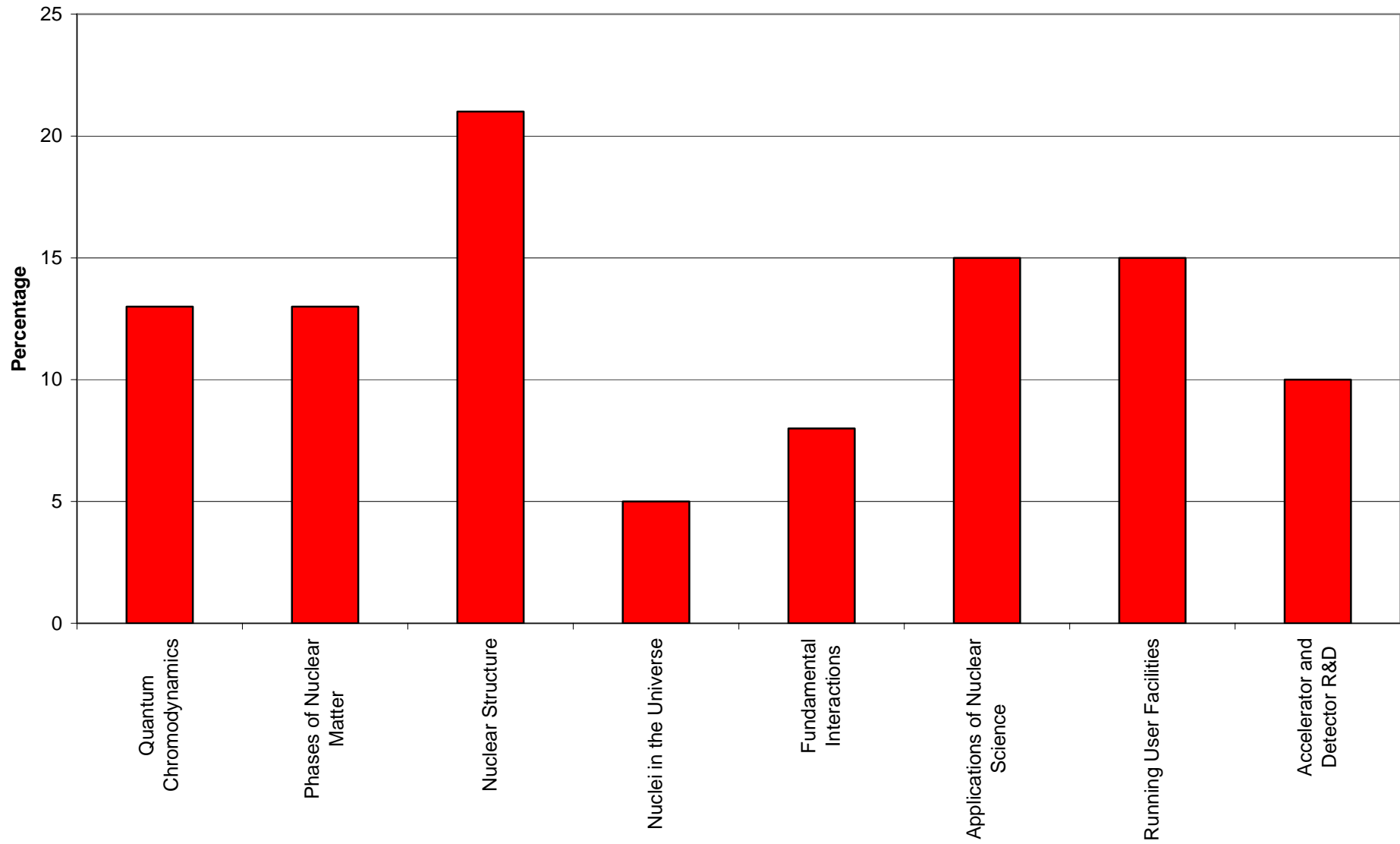
*Table 8: Physicists and Support Staff in 2006 und 1997*



***Chart 9: Changes in Physicist and Support Staff 1997-2006***



*Chart 10: Percentage Distribution in Subfields in NuPECC Member Countries in 1997*



*Chart 11: Percentage Distribution in Subfields in the Same Countries in 2006*



## **NuPECC Evaluation of Resources for Nuclear Physics in Europe**

In 1997 NuPECC published the results of a survey of the resources for nuclear physics in Europe. This summarised the staffing (broken down in various categories) and financial resources allocated to different areas of the subject. The report is available on the NuPECC website (<http://www.nupec.org/pub>).

It was the intention that this survey would be repeated at intervals, so that NuPECC can identify trends within the subject. Such information is important for NuPECC to have when we make representations to National and European Funding Agencies. In particular, hard evidence of the shift of personnel and resources into new areas is important to back up our claims that nuclear physics is a vibrant and developing subject. For this reason we are again surveying all relevant university groups and research institutions, to obtain up-to-date information. We hope that the attached form, which we would ask you to return as soon as possible, will only take a few minutes of your time to complete. The individual returns will only be seen by a small subgroup of NuPECC who will use them to compile the information in a similar format to last time. This means that no information on individual groups or institutions will appear – the summed resource will appear for each country and against each area of activity.

Please return forms by May 15, 2006, to:

Dr. Gabriele – Elisabeth Körner  
NuPECC  
c/o Physik-Department E12  
Technische Universität München  
85748 GARCHING  
Germany

Thank you in advance for helping in this important action.

A handwritten signature in blue ink that reads "Brian Fulton".

Brian Fulton  
Chair, NuPECC



## **Your institution/group**

Country

Type (e.g. National Laboratory, University, Institute)

Postal Address

Contact person

Telephone

Fax

Email

Below is a list of the other institutions/groups in your country to which we have sent this questionnaire. If you are aware of any that we have missed, please note a contact name and address below.

## Personnel

Please identify the full time equivalent posts currently employed in each category working in nuclear physics research. Use fractions of posts if appropriate.

Category	Number of posts
Theory: Tenured	
Fixed term	
PhD student	
Experimental: Tenured	
Fixed term	
PhD student	
Support staff: Engineers	
Tecnicians	
Administration	

Notes:

Tenured means a permanent position which can be occupied by a person until retirement.

Fixed term means positions where the employment is for a fixed period.

Where a person spends a part of their time on nuclear physics activities and part on other activities, include the relevant fractions.

Posts involving research management should also be included.

University positions (tenured and fixed term) associated with nuclear physics should be counted as full posts for the purposes of counting, even though the position may also involve teaching at undergraduate or postgraduate level.

## Sub-fields

Please give the approximate distribution of the personnel mentioned on the previous page between the different sub-fields. If a person works in different fields, then subdivide the post into fractions and allocate accordingly. Please also give an estimate of the fraction of your financial expenditure which goes to each sub-field, but when estimating this please do NOT include staff salaries.

The list of sub-fields follows the areas identified in the recent NuPECC Long Range Plan 2004. We appreciate that these may not match exactly the areas of your activity, if so please enter the data in the closest match rather than leaving out personnel or expenditure, as this would make the survey incomplete.

Subfield	% Personnel	% Expenditure
Quantum chromodynamics		
Phases of nuclear matter		
Nuclear structure		
Nuclei in the universe		
Fundamental interactions		
Applications of nuclear science		
Running user facilities		
Accelerator and detector R+D		
TOTAL	100%	100%

## Comments

Please use the space below to convey any comments on your return, or any suggestions about this survey.