

NEWSLETTER

August 2009

The deadline for your contributions to the December 2009 issue of this newsletter is 23 October

E-mail your material to emma.sokell@ucd.ie

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Workshop is a real blast

The Institute organised and sponsored a rocket workshop at the Irish Science Teachers Association annual conference, which was held at the University of Limerick on 20–22 March.

The workshop was fully booked and every spectator space was taken. Participants worked under serious time pressure as they strove to build and launch their rockets in time to watch Ireland's bid to win its first 6 Nations Rugby Grand Slam at 5.00 p.m.

Stuart Farmer flew in from Aberdeen to head up the project. He was supported by Paul Nugent and David Keenahan (Teacher Network coordinators, IOP Ireland).

The Institute describes this rocket workshop as a “make & take”. Participants are shown a presentation of how to make a rocket and the launch pad. Then they make one for themselves and take it back to their schools.

Stuart pointed out that what we were about to make were not strictly speaking rockets, but projectiles (because they had no fuel on board). Nevertheless, we were happy to call them rockets. Stuart outlined the two phases of the workshop:

- make a compressed air rocket from card and sellotape; and
- make a rocket launcher from plumbing parts.

Award-winner goes up to Oxford

The winner of the Institute of Physics in Ireland award for the best physics A-level performance 2008 was Matthew R Nicholl of Foyle and Londonderry College (www.foyle-lderry.org.uk). Matthew is now reading physics at the University of Oxford.



Some of the participants as they prepared to launch their rockets.

Participants had plenty of opportunities to exercise their own judgement on matters, such as the shape and the weight of the nose-cone, the position of the fins and the number and shape of fins.

Then came the real test as the launch pads were positioned side by side on the terrace. Participants debated issues of how much pressure and which angle of firing to use. Rockets were then launched in pairs – some soared spectacularly across the Thomond sky, some shimmied awkwardly above the campus and a few spluttered embarrassingly close to the feet of their designers. Ian McCullough was heard halfway across the campus “whispering” that the launch-pad designer

had let him down only to see a colleague launch from the same pad with a spectacular trajectory.

Wounded pride soon healed as participants collected 2 m of ¾ inch copper piping, compression joints, release valves, tyre valves (with a value of approximately €35), and also a DVD of resources and instructions on how to assemble the launcher and rockets.

If you would like to try this workshop yourself, then keep an eye out for rocket launching events being run by the Institute this autumn. Contact Paul (e-mail paulnugent@eircom.net) or David (e-mail dkeenahan@gmail.com) for further details. **David Keenahan** and **Paul Nugent**, Teacher Network coordinators



From left to right: Sue McGrath (teacher coordinator for N. Ireland), Robert Bowman (Ireland branch chair), Matthew Nicholl, and SMO'Connell (head of physics at Foyle and Londonderry College).

Spring Weekend meeting concentrates on ‘physics for life’

Early in April the annual Spring Weekend meeting of the Institute of Physics in Ireland was held at White’s Hotel, Wexford. J Blogger was at the event and wrote a post about it at <http://coraifeartaigh.wordpress.com/2009/04/>.

I always enjoy these weekends – they’re more relaxing than a technical conference and they provide a great opportunity to keep in touch with physicists from across Ireland. As ever, there were good seminars, a physics pub quiz and discussions about science and philosophy over breakfast, lunch and dinner (not to mention a 32-strong Wexford choir who provided superb after-dinner entertainment). At the same time, there was a serious side to the weekend with committee meetings, the annual general meeting and a highly competitive poster competition for postgraduates.

The theme of the seminars on Saturday was “physics for life” and it mainly concerned advances in medicine and biology that have resulted from research in fundamental areas of physics, such as atomic and molecular physics (Bob McCullough of Queen’s University Belfast), solar physics (Louise Harra of University College London), nanophotonics (Brian MacCraith of Dublin City University) and molecule manipulation using optical tweezers (Martin Hegner of Trinity College Dublin).

My favourite was a general talk on causality in complex systems, entitled “Top-down action in the hierarchy of complexity”, given by world-famous cosmologist George Ellis. This was a fascinating overview of the subject of causation, focusing on the influence of feedback from top-down processes on bottom-up causes. There were lots of great examples and the speaker was fully convincing in his conclusion that “no complex system can have a single cause”.

I couldn’t help thinking how true this is of climate change. Some media pundits describe

global-warming phenomena in terms that are too simple; by citing man-made CO₂ as the only factor in climate change they give great ammunition to climate sceptics who point to other factors. (The point is that, while the CO₂ level is not the only factor affecting global climate, it is now clear that the man-made increase in CO₂ is a significant driver of warming.)

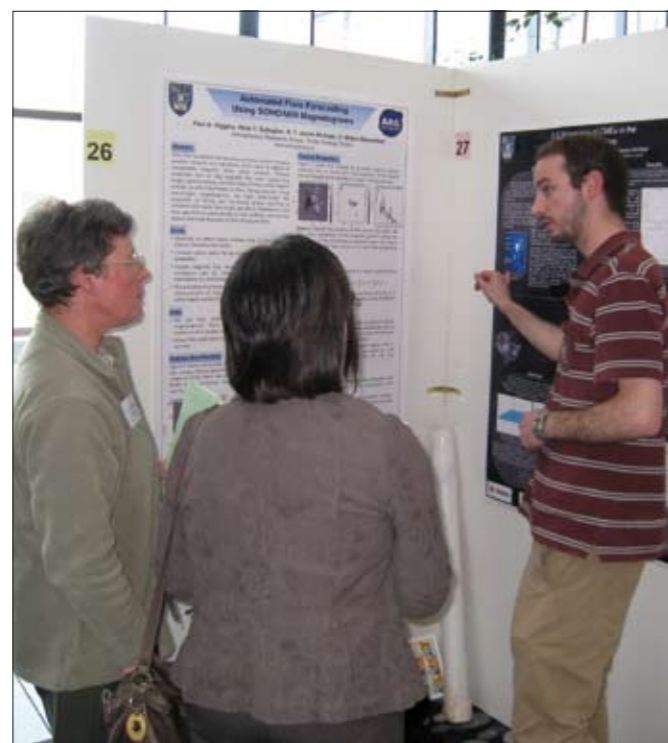
Sunday saw a new branch initiative – instead of more seminars, four well-known physicists were given the *This is Your Life* treatment in sequence. It was a great success, with the legendary Tony Scott of University College Dublin interviewing Ronan McNulty (on the LHCb experiment), Sile Nic Chormaic (on her path to the world of cold atoms) and Ray Bates (renowned Irish climatologist who was one of the first in the area of climate modelling). Best of all, the very first interviewee was Dame Prof. Jocelyn Bell Burnell, the Belfast-born astrophysicist famed for her discovery of radio pulsars (she is also president of the Institute of Physics).

Prof. Bell Burnell gave a fascinating overview of her life in physics, from failing the 11-plus exam to Cambridge. Of particular interest was her description of the postgraduate work leading up to the famous discovery – the long build of the radio-telescope from raw materials, persevering to the end as team members drifted off, the discovery of an unknown source, convincing her supervisor that she was on to something, the disappearance of the source and the stress of a possible mistake and lost thesis, the reappearance of the source, the classification of the first pulsar – a terrific account. All of the interviews are available online to Institute members at www.iopireland.org/activity/weekend/page_32164.html.

As always, the most humbling part of the weekend was the postgraduate posters. The level of research made one feel seriously inadequate. There were 39 posters and the final



Delegates take a break from the conference on Curracloe beach.



Left to right: Dame Prof. Bell Burnell, Sheila Porter and Shane Maloney at the Rosse medal poster competition.

round was judged by Eamonn Cunningham, Sheila Porter and Prof. Bell Burnell.

The 2009 Rosse medal was awarded to Joey Enfield of the University of Limerick for his poster entitled “*In vivo* investigation of microneedles penetration depth and closure rate in human skin”.

Second place went to Shane Maloney of Trinity College Dublin for his work entitled “3D kinematics in

the inner heliosphere”. Kieran Deasy (“Optical nanofibres as probes for cold atom characteristics”) of Cork Institute of Technology was third and Dermot Moran (“Luminosity measurement at LHCb using di-muons produced via di-photon fusion”) of University College Dublin was fourth.

All in all it was a great event. **Cormac O’Raifeartaigh**, Waterford Institute of Technology



George Ellis speaking on causation.



Delegates at the Saturday morning poster session.



The winners of the pub quiz were from Dublin City University. Left to right: Vincent Richardson, Eamonn Cunningham, Thomas Kelly, Pdraig Hough and JP Mosnier.



Sile Nic Chormaic was one of four physicists “in the chair” interviewed during the Sunday morning session by Tony Scott.



Joey Enfield of the University of Limerick receives the Rosse medal for best postgraduate research poster from Prof. Bell Burnell.

WEEKEND WENT WELL FOR ALL

Spring Weekend attendees made it clear that the social side of the event was a prime motivator in their decision to come to Wexford this year, with almost half of the respondents in a recent evaluation citing this. Events like the physics pub quiz, trips to Ferrycarrig Heritage Park and the gala dinner all helped to create a good atmosphere between friends, family and colleagues.

Despite the desire to have a good time socialising, people were still keen enough on physics to fully participate in the lectures and their response to the talks was highly positive, with 85% of respondents finding the programme either good or excellent.

The introduction this year of the “Physicist in the chair” session, with Tony Scott teasing out fascinating stories from participants as diverse as Jocelyn Bell Burnell, Ronan McNulty, Sile Nic Chormaic and Ray Bates proved exceptionally popular. More than 70% said that they would like to see more of this, while a huge 93% were keen to keep talks on general areas of physics with a number commenting that: “The Spring Weekend is a rare chance to get excited about areas of physics beyond my field.”

Given that more than 40% of the participants were postgraduate students, all of whom received a bursary from the Institute to assist with travel costs, it was not surprising to find that the Rosse medal for the best poster competition was a large draw. While 75% of the respondents found the competition format and judging to be good or excellent, a number made useful suggestions that will be implemented next year.

Most gratifying, though, was that 97% said that their overall response to the event was good or excellent and asked that “we keep it going”. Many thanks to you all.

Sheila Gilheany, policy officer

Teachers look forward to Frontiers of Physics

The Annual Conference for post-primary teachers of physics will be held on Saturday 26 September 2009 from 9.30 a.m. to 4.00 p.m. at the Department of Computing, Mathematics and Physics, Waterford Institute of Technology (WIT), Waterford.

The aims of the meeting are to inform teachers of the exciting and innovative work at the frontier of physics in Ireland, to provide them with examples of simple, inexpensive demonstrations, and to inform teachers of the latest developments and resources available.

Presenters will include Prof. David W Hughes

(University of Sheffield), Eoin Gill (CALMAST, WIT), Jonathan Sanderson (SciCast), Dr Cormac O’Raifeartaigh (WIT) and Robert Hill (Northern Ireland Space Office). The meeting is sponsored by the IOPI Education Group and the Department of Computing, Mathematics and Physics WIT. The assistance of the Second Level Support Service is greatly appreciated.

Details will be sent to all post-primary schools before the event. Visit www.wit.ie/frontiers09, contact me (e-mail paul.nugent@eircom.net) or e-mail frontiers09@wit.ie. **Paul Nugent**, Teacher Network coordinator

Medal recognises bright student



Maynooth student Eoin Carley (front row, second from left) and his physics with astrophysics classmates in front of the 1.93m telescope at the Observatoire de Haute-Provence. (The first extra-solar planet, 51 Peg B, was discovered in 1995 using this telescope.)

Each year the Institute of Physics in Ireland awards the Earnshaw medal to the undergraduate student with the best final-year project. The 2008 Earnshaw prize went to Eoin Carley from NUI Maynooth for his project on the expansion of the galactic supernova remnant Cassiopeia A.

Cassiopeia A (Cas A) is the remnant material left over from the supernova explosion of a massive star at the end of its life. It is believed to have occurred in around 1671 AD, making it one of the youngest

known supernova remnants in our galaxy. Although it is the brightest extra-solar radio source, it is very faint optically and can only be seen on long-exposure photographs. Eoin compared his images of the Cas A with earlier published images to estimate the velocity of the expanding shell of material remaining from the original supernova explosion.

Eoin recorded his data during a week-long observation trip to the Observatoire de Haute-Provence in south-eastern France.

Tyndall Lecture is online

The Tyndall Lecture by Dr Kevin McGuigan – “The human body is the ultimate physics laboratory” – toured Ireland from 20 January to 12 February. A recording is now available on YouTube in six segments

(just type in Tyndall Lecture). Alternatively, it can be found on the IOP in Ireland website at http://www.iopireland.org/activity/education/Tyndall_Lecture_for_Schools/page_34562.html.

Policy round-up reflects climate

Welcome news has just been received from the Department of Education in Northern Ireland. It has agreed to provide £40,000 towards a proposal from the Institute of Physics to expand the Teacher Network coordinator scheme from one to three coordinators operating in Northern Ireland over the next four years.

The long-awaited report on the Science, Technology, Engineering and Maths (STEM) review has been completed and in June it was with the Ministers for Education and Employment & Learning awaiting publication. While the exact details are not yet known, it is likely that the review will have highlighted the need for extended teacher support in science. Meanwhile, the Institute in Ireland has been participating in a Northern Ireland Department of Employment & Learning consultation on the possibilities of an undergraduate bursary or scholarship scheme to encourage uptake in science.

The good news from the north comes just as in-service teacher training is being curtailed in the Republic due to government budget cutbacks. Indeed, the Institute has made strong protests to government over the proposed curtailment of the Second Level Support Service. Currently there are six national coordinators who are providing individual support

in physics, chemistry, biology, maths, junior science and home economics. There is no coordinator in place for applied maths or agricultural science. The teacher education section of the Department of Education and Science is now proposing that from the academic year 2009/2010 all of the above subjects will be amalgamated, and just one coordinator will be appointed to be responsible for all continuing professional development.

This follows the earlier announcement withdrawing the grant to schools for the teaching of physics and chemistry. Coupled with the recent decision by Discover Science and Engineering to suspend indefinitely its sponsorship scheme in the wake of severe budget cutbacks, science education and outreach are not looking healthy in Ireland.

A new minister for science, Conor Lenihan, has been appointed and representation has been made to him about the funding of physics at all levels and drawing attention to Ireland’s non-membership of the ESO and CERN. Although the current economic climate makes it a difficult time to invest in science, given the potential for industrial returns with both of these facilities, the case for Irish membership is stronger than ever.

Sheila Gilheany, Institute policy officer

Higher Options: IOPI makes a stand

The Institute of Physics stand at *The Irish Times* Higher Options Conference (16–18 September 2009 at the Royal Dublin Society) is the only dedicated physics stand at this exhibition, which can have up to 15,000 people attending over the three days.

The Institute’s stand has an abundance of general physics information and handouts on physics, including the Day

in the Life profiles, posters, physics courses in Ireland and much more. Most importantly there are postgraduate physicists at the stand to talk to prospective students and encourage them to study physics at third level, and to discuss the benefits of choosing it as a subject at Leaving Certificate/A-level. **Alison Hackett**, Institute of Physics representative

Meeting scrutinises funding

The Institute of Physics in Ireland held its annual Heads of Physics meeting on 20 May at the Royal College of Surgeons in Ireland. The heads of all of the physics departments in colleges that provide physics degrees either attended or were represented. The guest speaker was Prof. Fionn Murtagh, the Science Foundation Ireland (SFI) director for information, communications and emergent technologies. Prof. Murtagh has a background in astrophysics – he was senior scientist for 12 years at the European Southern Observatory – and also in computer science – having held chairs at the University of Ulster and Queen’s University Belfast.

He presented a status report on SFI’s support for physics in Ireland. Using the 2008 Institute report *Research*

Fields in Physics as a template to define physics research, he examined which areas of physics in Ireland are covered by SFI funding and which are not. Looking across the identified 93 physics groups in eight Irish institutions, he noted that 60 of the physics groups have SFI funding.

Given the SFI’s remit to drive excellence in Irish science in the key economic areas of biotechnology and ICT, unsurprisingly it was noted that in 2008 the largest area of physics funding (€47.5 m) was in imaging, nanotechnology and telecoms. Other areas funded by the SFI included optics, plasmas, quantum computing and what he termed “foundations” – i.e. cosmology, theoretical, particle and solar physics. These additional areas received around €14.1 m. The areas that were not funded

by the SFI included topics such as radiation physics, environmental physics and general relativity.

Prof. Murtagh concluded by looking at undergraduate student recruitment in the US from 1971 to 2006, and postulating that in science areas, trends here can be used as a proxy for the economy. He particularly noted the two well-known major upswings in computer science recruitment – the first in the early 1980s corresponding with the PC revolution, and the second during the dotcom boom of the late 1990s. However, he also looked carefully at the physics degrees awarded and noted corresponding earlier upswings in physics in 1975–1980 and in 1990–1995. His point was that physics has an essential precursor role in an economic upswing and

speculated that physics, with its fundamental role in new technologies, may actually kickstart an upswing.

His talk was followed by a group discussion on topics such as the stability of government funding for science in the current economic climate, technical issues to do with timing of SFI grant awards, and possible distortions in departments because of funding mechanisms with fundamental physics being damaged due to the impact of full economic costing being introduced for research funding.

The meeting ended on a somewhat positive note with Prof. Murtagh emphasising that the SFI’s funding was part of the National Development Plan and so has definite commitments until 2013. **Sheila Gilheany**, policy officer

Survey uncovers why students choose physics

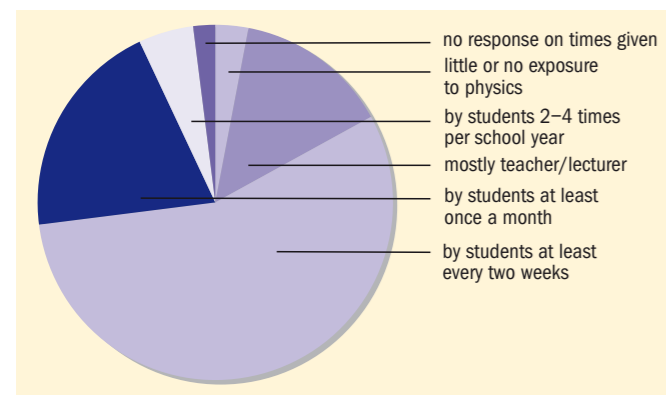


Fig. 1. Level of school practical experience.

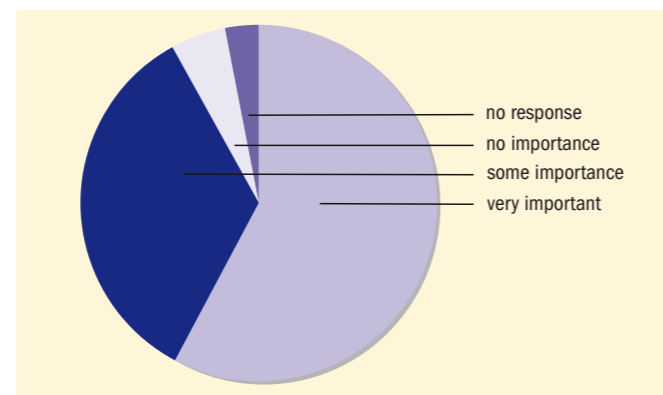


Fig. 2. Importance of prior experience regarding course choice.

Choose life. Choose a job. Choose a starter home. Choose dental insurance, leisurewear and matching luggage. Choose your future. Choose physics... but why would anyone want to do a thing like that?

The IOPI Education Group recently carried out a survey of first-year undergraduates on the key factors influencing their decision to study physics. The survey of 199 students across six Irish institutions specifically looked at areas such as previous practical experience,

prior engagement with colleges, national outreach activities, the influence of family, friends and teachers as well as the student’s interest in the subject.

While 96% of students had some practical physics experience prior to college, there was a wide variation in the level of this with only just over half getting experience at least every two weeks.

It was clear that previous experience with physics was a strong determining factor,

as was the influence of their physics teacher, in the decision to take physics at third level.

For those physicists who have put in considerable time and effort visiting schools, it may be gratifying to note that almost all of the respondents who had had such a talk found it very influential, and equally so a visit to the college’s physics department. Around 25% of all of the respondents had had such experiences.

However, probably the most important aspect was

the student’s own inherent interest in the subject with many citing areas such as the “big” questions in cosmology and particle physics as being strong drivers, together with new technologies that are emerging. It was noteworthy that many of the respondents were science-fiction fans and when asked the question:

“What would encourage other students to take physics?”, most suggested more outreach activities with practical and interesting experiments,

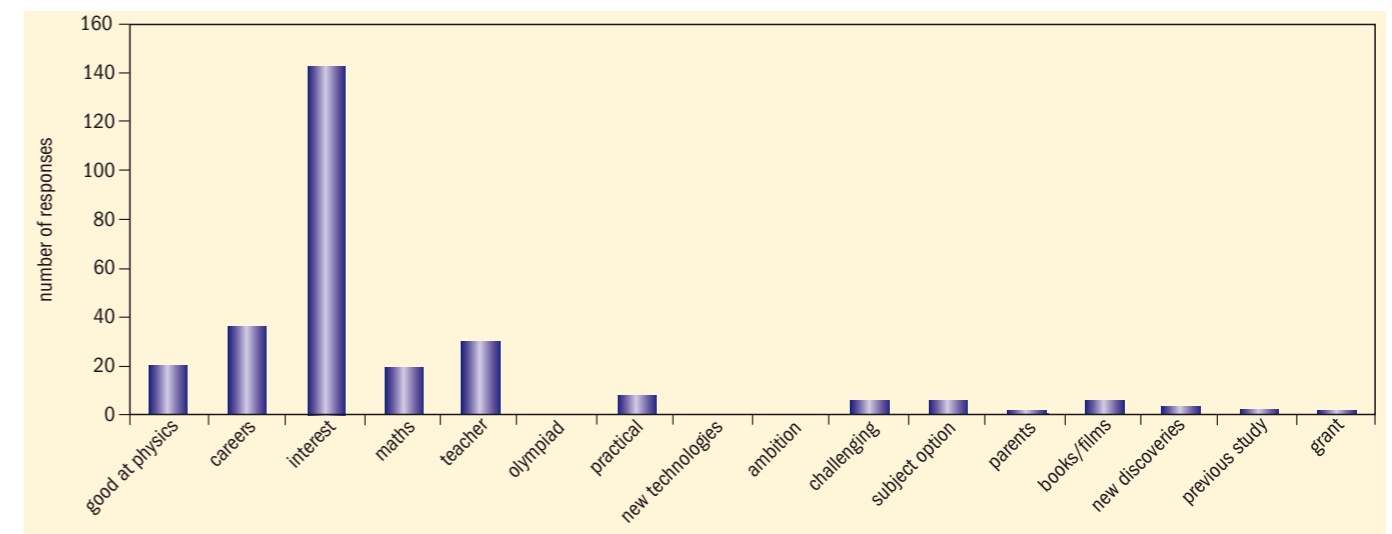
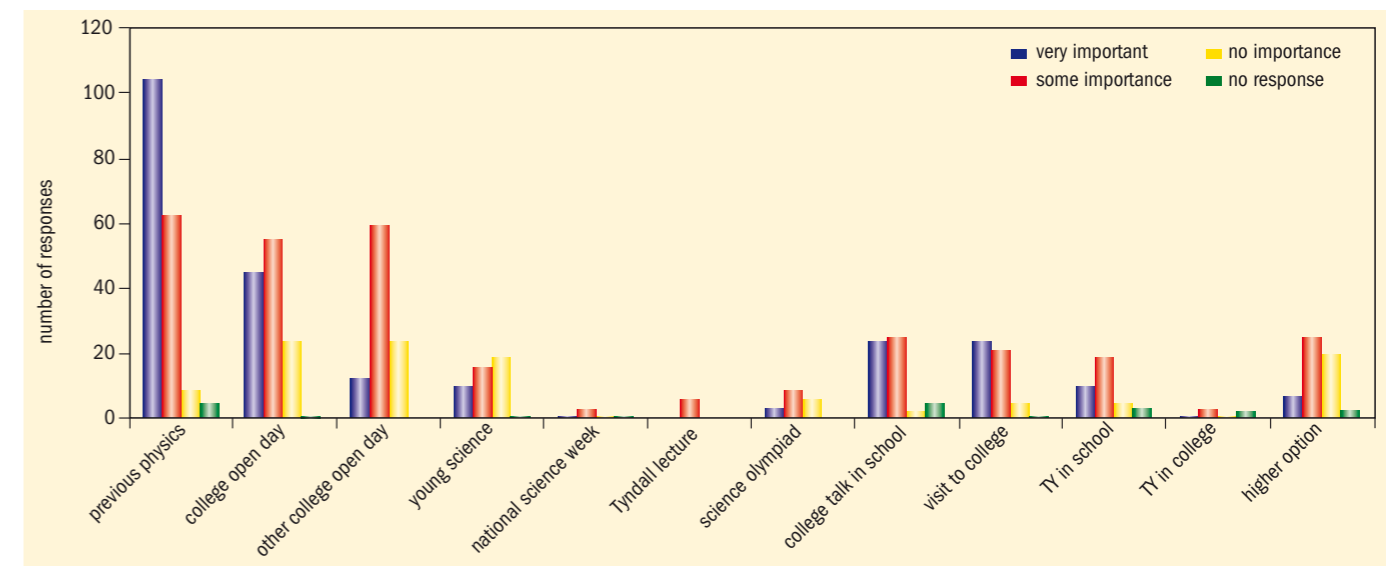
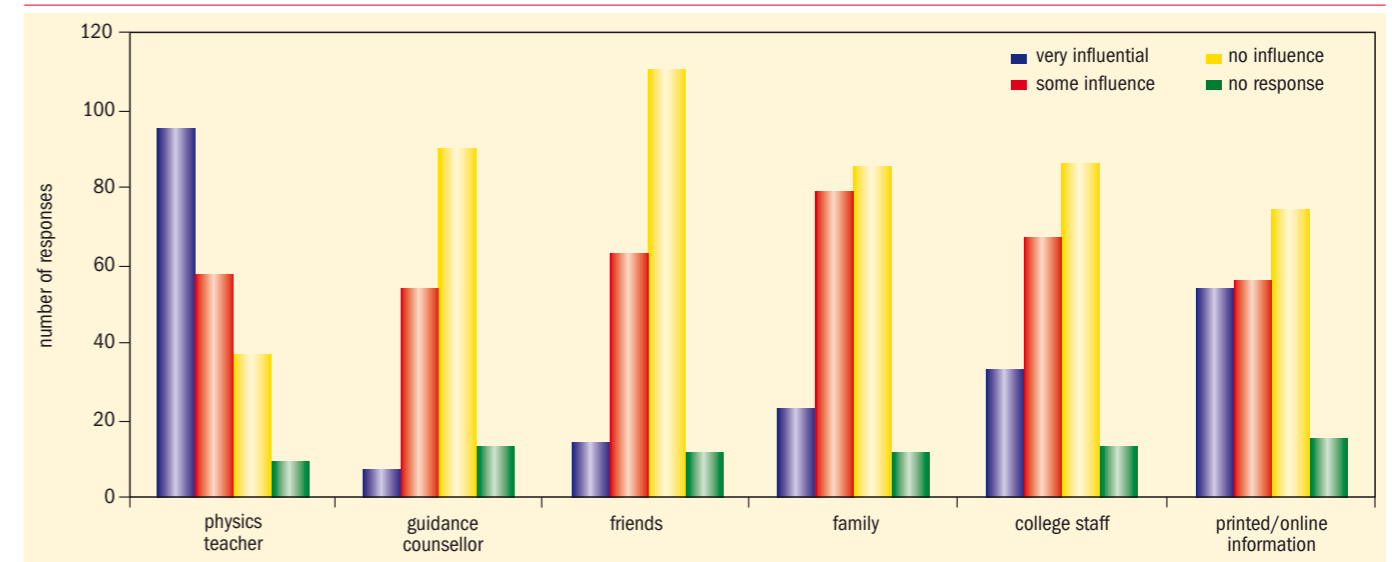


Fig. 3. Factors that influenced course choice. Fig. 4. Factors that influenced college choice. Fig. 5. Reasons given for choosing physics.

together with clear information on courses and careers.

The analysis of the survey is

not yet complete but it will be followed up with the individual colleges to assist with their

advertising programmes. In addition it is planned that an annual online survey will be

made available to students earlier in the academic year.

Sheila Gilheany, policy officer