Communication and outreach activities within the CLF

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Introduction

Public engagement encompasses outreach activities that inspire the next generation and raise the profile of our world-class research, as well as communication activities that offer a platform on which to demonstrate the high-impact and inspiring science that the Central Laser Facility (CLF) delivers. Opportunities for communication and engagement in the reporting period 2016-2017 have been diverse, reaching across the UK and around the world. Here we highlight a selection of those activities.

CLF in government

Part of the *Incredible Power of Light* roadshow (shown in full above at the Big Bang Fair) was installed in the foyer of government offices to engage with staff and policy makers. The objective of the UK government's Business Innovation and Skills (BIS) 'Hands on Science' programme, led by Professor Tim Dafforn, Chief Scientific Adviser, is to demonstrate how BIS science partner organisations spend over £7 billion a year of investment in UK universities and research institutes on beneficial applications. The events tap into a real desire for BIS staff to find out more about new applications for UK science research. Colleagues from BIS, UK Trade and Investment, the Department of Energy and Climate Change (DECC), and the Ministry of Defence (MoD) took part in an interactive exhibition focused on the CLF, which demonstrated how laser technology is applied in day-to-day life. The visitors had the opportunity to hear from CLF staff about the science, technology and engineering of the CLF, as well as the impact and innovation of the work that we do. They saw a demonstration of the technology behind award-winning Cobalt Light Systems, a spinout company of the CLF. Their leading product, the Insight100, was on display; this uses laser spectroscopy to detect hidden liquid explosives and identify the contents within opaque bottles. BIS staff enjoyed testing sample liquids in sealed shampoo bottles, to determine whether the contents were safe or dangerous - the same technology that is currently deployed in eight of the top 10 airport hubs in Europe, and in 65 airports across Europe. The exhibition attracted a real mix of BIS staff from various policy and other teams, plus people from GO Science, UK Trade and Investment, Digital, BIS Local, BIS Sheffield, MoD and DECC, all of whom were very positive about the event. Visitor comments included:

"Very interesting and informative session. We should bring the Rutherford Appleton Lab to 1VS for a seminar"

"Thank you to the team who put the exhibition together, fascinating stuff!"

"I was impressed by the Hands on Science event, I've persuaded the Engineering and Innovation team here to do an energy version for DECC staff."

Martin Donnelly (Permanent Secretary to BIS) also stopped by en route to an evidence session with the Public Accounts Committee on the National Audit Office's report on BIS's capital investment in science projects. As a result, Martin mentioned what an important contribution lasers are making and that STFC was running a laser demonstration at BIS:

"It is clear that looking at a lot of these projects just one year after they are in place is far too early. We have to move that back, and we will do that. The other question is how we go on checking years later. In classic areas like lasers - we had some work on that being shown off in the Department today - they are still producing new medical research innovations from research that took place 20-odd years ago and has come through. We need to make sure that we do not stop at an arbitrary point. What we must not do is do it too quickly. We must also make sure we are picking up the full range of social, health and other related benefits - not just narrowly economic, if I can put it that way."

Laserlab and ELI Training Weeks held at CLF

The Training Weeks event, jointly organised by the CLF and Laserlab Networking, provided a unique opportunity for the participants to learn the key skills required to run experiments on HPL facilities, such as Vulcan or Gemini.

The broad range of topics covered in the course included laser and plasma diagnostics, optics characterisation, laser safety, vacuum and cryogenic systems, targetry, and overall project management of a typical experiment. In addition the participants had the opportunity to put their skills to the test by setting up and performing their own experiment in the Vulcan Petawatt target area. With many new to the field, this was an extremely useful exercise in working collaboratively with experimenters from other laboratories and universities.

12 scientists from eight different European institutions (including ELI-NP) attended the course, which also featured guest talks and tutorials from leading academics in the field of laser-plasma interactions from the UK and Europe. As well as hands-on and classroom learning provided by the CLF, the Training Weeks also provided an excellent opportunity for the participants to network with other members of the EU HPL community.

International collaboration with Newton funding

The first Newton-Bhabha workshop was jointly organised by the CLF and the Tata Institute of Fundamental Research, and was held in India.

The Newton Fund is part of the UK's official development assistance programme. It supports the UK to use its strengths in scientific research to promote economic development and social welfare in emerging science nations, while building long-term collaborations. Teams from UK universities and Indian institutes are exploring laser-based plasma-accelerators for cancer therapies, and training a new generation of Indian researchers, in a joint collaboration supported by the Newton Fund. Professor G. Ravindra Kumar, based at the Tata Institute of Fundamental Research in Mumbai, India, is one of the collaborators in this programme. *"Personally, it has been very fruitful as we can now hope to strengthen existing links, improve research infrastructure in India with the participation of the UK teams, and innovate together with them right here,"* he says.

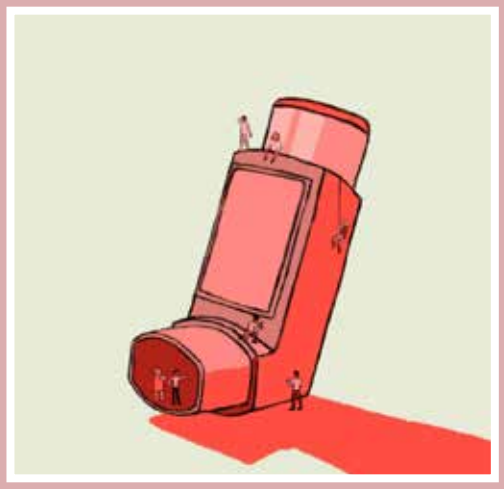
Illustrator joins as CLF outreach officer

Helen Towrie has taken up a three-month placement as the CLF's Illustration and Outreach Officer. Illustration is a powerful form of visual communication – it is an all-inclusive tool which, by its very design, tells a story for any and all to enjoy. An example of one of her pieces is shown opposite in the doodle created to summarise the main messages of a symposium and workshop on correlative light, electron and x-ray microscopy held in STFC's Pickavance Lecture Theatre. The event aimed to discuss the developments of these complex fields, and how scientists have been using them to get accurate results in their experiments.

The monster under each moat symbolises the hidden, difficult to analyse sample, and the people atop the castles are scientists trying to identify the monster.

The CLF hopes to use images like this, aimed at older children, to strengthen the general awareness of analytical processes such as spectroscopy, and to portray them in a dynamic, exciting and, most importantly, understandable way.

Other examples of Helen's work include her 'engineers are like bees' project, which engages people with the wide-ranging impact of engineers, and her coverage of science highlights, such as the work carried out on Ultra about condensation in asthma inhalers.




Light Microscopy
• Produces a very clear image
- Only a magnified version of what the eye can see.
All clear!
CLEM:
- Combo of light and electron.
+ Gives a very clear image
- Very destructive
- Very slow
Electron.
+ Great detail
- But only on very small target areas.
FIB
+ Can pick up certain substances
- Lots of the same substance can ruin the image.
STEM:
+ Gives very accurate image
- Very destructive.
Raman:
+ Can see what things are made of
- Only gives 2D image
Combined, the many different types of spectroscopy can create a clear, reliable image.
We know what it is now!
X-Ray CT:
+ Gives a full, 3D picture.
+ Non destructive
- Low resolution.