

PHYSICS DEPARTMENT NEWSLETTER

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Dates for your diary:

- Summer Graduation, 26th July

Farewell Finalists

Its that time of year again when we say goodbye and good luck to our finalists when they graduate in July.

Whatever path they choose to take they will always be remembered with the finalists group photos that will take



They are all moving on to pastures new which include staying here at Loughborough to do an MSc or PhD or moving on to other universities, graduate jobs or simply taking a year out to relax.

pride of place on the walls of the department along with all previous years photos.

We hope you have enjoyed your time here and we wish you well for your future.

Summer Graduation

The summer graduation ceremony for Physics students is due to take place on Tuesday 26th July. You can join in with the celebrations by watching the ceremony live on the web cam in the department coffee room.



Annual Finalists BBO

Wednesday 25th May saw the Physics Department Finalists BBO. This is an annual event and is the departments chance to say farewell and good luck to the finalists.

We had lovely weather this year and even managed to avoid the rain. There was over 50 finalists, staff and postgraduates at the BBO and plenty of food to go round.



Rambling On

If you have any enquiries or any news or events you would like covering in a future newsletter please contact

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Thank you and we hope you enjoyed this issue.

Gerry and John led the traditional post-exam Departmental Ramble on 23 June. Despite dire forecasts, the sun shone on them as they made their way through the Outwoods and over Buck hill to the Beacon, from where a few finalists had almost their last view of the Department.

Having worked up an appetite, most of the walkers made good use of the Toby Carvery and much Pepsi was consumed!



Congratulations



Congratulations to Sergey Slizovskiy who has received a Postdoctoral EPSRC Fellowship.

The project is devoted to the theory of high-temperature superconductivity, which is still under development. In the framework of his project Dr Slizovskiy suggests to apply modern holographic methods originated initially in the string theory.

Well done Sergey.

Invitation

This is an invitation to all finalists and your guests. The department is holding a strawberries and cream reception in the department on the morning of graduation (Tuesday 26th July) from 10.00am onwards. If you would like to attend this event please inform Maureen McKenzie as soon as possible so catering can be arranged.

We hope you can make it.



Is there a Doctor In The House?



Congratulations to Doug Green and Steven Jackson both have had their PhD thesis accepted after being successful with their oral examination. They will both graduate this summer.

We wish you all the luck for the future and hope you have a happy working career.



Say Cheese



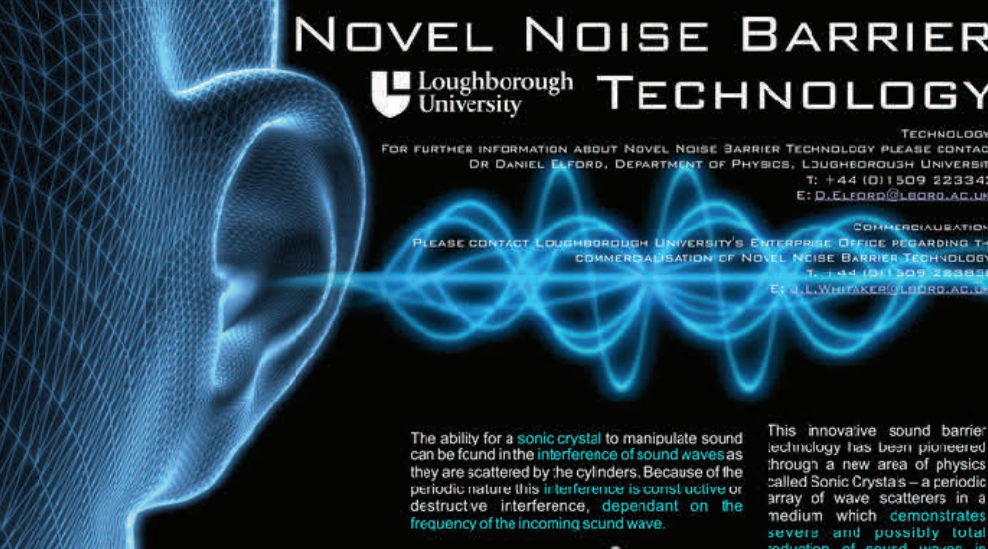
Our annual staff and postgraduate group photo. By this time next year this picture will look very different due to many of our current postgraduates nearing the end of their PhD studies. Its always sad to see them go but also a happy occasion as they are moving on to bigger and better things and we welcome new postgraduate students to the department.

NOVEL NOISE BARRIER TECHNOLOGY

Loughborough University

FOR FURTHER INFORMATION ABOUT NOVEL NOISE BARRIER TECHNOLOGY PLEASE CONTACT:
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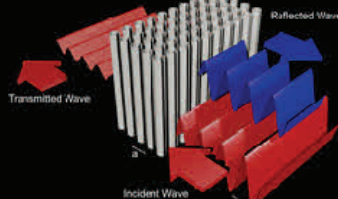
The ability for a **sonic crystal** to manipulate sound can be found in the interference of sound waves as they are scattered by the cylinders. Because of the periodic nature this interference is constructive or destructive interference, dependant on the frequency of the incoming sound wave.

This innovative sound barrier technology has been pioneered through a new area of physics called **Sonic Crystals** – a periodic array of wave scatterers in a medium which demonstrates severe and possibly total reduction of sound waves in specific frequency ranges.

Our technology mostly consists of **space**, offering the following advantages over conventional sound proofing:

- Relative optical transparency
- Permeability to wind, better wind loading properties
- Less reverberation time between parallel barriers
- Simple design, very low maintenance, unrestricted drainage
- More aesthetic, less confined
- Material independent

The immediate impact of the novel noise barrier technology is to enable, in a **cost effective** and **less intrusive** manner, sound attenuation systems to be deployed along **noisy transport links** and around **machinery**. This provides economic benefits in that **less material is required for barrier construction**. A **free flow of air** is available for cooling thus, avoiding the need for additional cooling as would be required in a system that fully enclosed noisy machinery.




Constructive interference occurs when the **spacing of the crystal, is comparable to the wavelength, λ** of the incoming sound.

The incoming sound **energy is reflected back** and the wave **cannot propagate** through the sonic crystal.

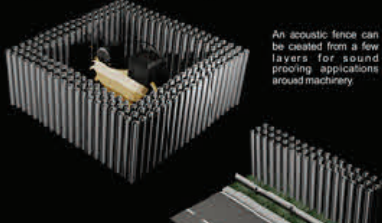
This means that our technology can be **tailored to attenuate noise in any frequency range** by adjusting the crystal's parameters.

To gain additional performance over conventional sonic crystals, the solid scattering objects are replaced by **broad band sound attenuating devices**, developed by Loughborough University physicists. This incorporates an **additional attenuation mechanism** of resonance to lock out an **increased range of frequencies** related to the dimensions of the resonators, not the spacing between them.

The applications of our technology is not restricted to that of sound proofing. An extension to the underlying physics behind the novel noise barrier technology could be utilised to **attenuate other forms of pressure waves** i.e. water or seismic, for protection against **tsunamis, freak waves and earthquakes**.



Eusebio Sempere's sculpture in Madrid has unique acoustic properties.

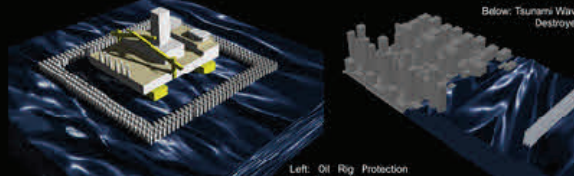


An acoustic fence can be created from a few layers for sound proofing applications around machinery.

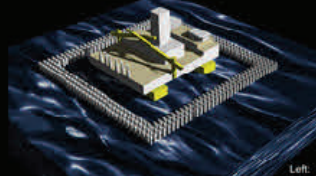
Noise barriers can be also be constructed along road, railway and airports.

The novel noise barrier system has been successfully developed in a **prototype form** and evaluated in laboratory testing **demonstrating proof of concept**. The work to date is protected by international patent application: "Attenuators arrangements of attenuators, acoustic barriers and methods for constructing acoustic barriers" PCT/EP2010/051370 (Feb 2010).

Ongoing work includes **field trials, market research and planning commercial exploitation** of the technology. A successful outcome will lead to sound attenuation systems with **wide applications throughout industry** which offer **major advantages** over conventional systems.



Below: Tsunami Wave Destroyer



Left: Oil Rig Protection from Storm Waves.

Is it a bird? Is it a plane? No, its Mike Pierpoint

For those of you who don't know, Mike Pierpoint (PhD student) is a keen pole-vaulter. He recently took part in the Staffordshire County Championships and came 1st with 3.60m.

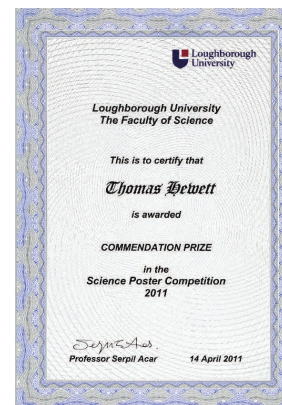
This however, is 40cm below his personal best but he was still pleased with the outcome as there was a strong crosswind on the day.



Mike in action

Perfect Poster

Congratulations goes to Tom Hewett (postgraduate student) who recently won a prize at the poster competition for research students with his poster "Extraordinary Magnetoresistance: Sensing The Future".



EPSRC Grant Success

Congratulations to Prof Kusmartsev, Dr Zagoskin and a group of researchers headed by Prof Vardaxoglou from the Department of Electronic and Electrical Engineering for receiving a EPSRC grant on the study of synthetic materials using metallic and non-metallic nanoparticles at microwaves frequencies.



Warden Award

Dr Binoy Sobnack, Head Warden of Harry French Halls of Residence has been awarded with the prestigious award of 'Warden of the Year' for all his hard work he does at Harry French.

We were notified about this by one of our students who resides at Harry French and who contacted us to tell us about Dr Sobnack's award as they were very pleased for him and thought well deserved.

Well done Binoy.





Novel Noise Barrier Technology

Following on from previous updates & news, we are proud to announce that two of our previous PhD students, Dr Daniel Elford & Dr Luke Chalmers are now well under way with their novel noise barrier technology with the help of Dr Gerry Swallowe & Prof Feo Kusmartsev.

They recently held a demonstration event day in which eight interested industrial partners attended. They were impressed with the benefit embedded in their technology and potential applications within each of the companies and they are continuing to follow up leads from this event. To date they have generated interest from companies including: Tarmac Building Products, IPSO Ventures plc, British Precast, British Gyp-

sum, Lindhurst Engineering Ltd, Alkane Energy plc, Collis Engineering Ltd, Culm Detuners, Porterbrook, Taudevin Engineering Ltd, A. V. Access, Stanton Bonna Concrete & East Midlands Airport.

They have just come to the end of their Innovation Fellowship Grant, (The Innovation Fellowship programme is a collaborative programme operating across all nine East Midlands HEIs: De Montfort University, University of Derby, University of Leicester, University of Lincoln, Loughborough University, University of Northampton, University of Nottingham, Nottingham Trent University & Bishop Grosseteste University College, Lincoln. It is currently jointly funded by the East Midlands Development Agency (*emda*) to-



Experimental set-up in the anechoic chamber facilities in the Department of Aeronautical and Automotive Engineering to ensure free field conditions, and that the results are reliable



gether with European support through ERDF.

The fellowship facilitated in supporting prototyping, enabling their novel noise barrier system to be successfully developed in a prototype form and evaluated in laboratory testing demonstrating proof of concept. This provides an invaluable demonstration tool to potential licensees of the technology. The performance of the technology is shown to be at least equal to that of conventional methods. Experimentally they have achieved a dB(A) reduction between 15-20dB(A) for a single layer of scatterers. The demonstration of the prototype has materialised into potential license negotiations with at least two companies. Further application areas have been highlighted from discussions with industrial partners from different sectors. Application areas that have arisen include, incorporating technology into prefabricated wall panels for timber frame housing, locomotive engine silencing, portable noise barriers for jet engine testing, coastal defence, dual-purpose jet blast shield & noise barrier.

They are hosting a similar event in the next few weeks in which they hope to invite many interested companies, some of which include: Alstom Power, Birmingham International Airport, Bombardier, Hanson Concrete, JCB, Jpen Engineering Ltd, Luxfer, Martec Conservation, Minelco, Network Rail, Robin Hood/Liverpool Airports, Valiant Industrial, Viaton, & Vortok.

On going work on the project includes field trials, market research & planning commercial exploitation of the technolo-

gy. A successful outcome will lead to sound attenuation systems with wide applications throughout industry, which offer major advantages over conventional noise mitigation systems.

Well done to you all.

Here is the website for Novel Noise Barrier Technology if you would like more information:

<http://www.lboro.ac.uk/business/noise/>



Dr Luke Chalmers,
Research associate,
former PhD
Student



Dr Daniel Elford,
Research Associate,
former PhD
Student



Prof Feo Kusmartsev,
Head of Department



Dr Gerry Swallowe,
Deputy Head