

# diamond news

News update from Diamond Light Source



## Storage ring takes shape

Technical director, Richard Walker, pictured as the first girder is positioned in the storage ring

**After an intense period of work on the synchrotron building itself, the emphasis at Diamond is now changing and the machine installation team are very busy moving, positioning, connecting and aligning a vast number of components, all of which have a key role to play in the operation of the synchrotron machine.**

Much excitement surrounded the installation of the very first girder inside its doughnut-shaped storage ring. Each girder, and there will be 72 in total, is used to carry a selection of powerful magnets and vacuum vessels. These magnets and vacuum vessels will protect and guide the electron beams around the storage ring, which is contained in a tunnel with a circumference of 561.6 metres

The weight of each girder varies depending on the exact function of the equipment on it. Girder number one weighed in at around 9 tonnes. Quite light when you consider that the heaviest will weigh 19 tonnes. It was lifted into position



by one of Diamond's permanent cranes, which can lift up to 20 tonnes, and gently lowered into its exact position in the storage ring. All went according to plan and the installation team now has a production line of girders going across to the storage ring. This work will continue throughout 2005.

Richard Walker, Diamond's Technical Director, comments, "We have now completed the installation of the linear accelerator, and we are

*Pictured above: The installation team complete their testing prior to the girder going across to the storage ring. Pictured are (front row, l-r) David Alexander, Robert Greening, Paul Wightman and Peter Harlow, (back row) Willie Spensley, Alan Jones and Brian Mennie.*

### In this issue

#### Latest News

Storage ring takes shape

Diamond's Detectors

Diamond team grows to 200

A PhD with a difference

Healthy meals at Chilton School



#### Science & Synchrotron news

The Queen visits Canadian Light Source

Third generation synchrotron for China

Celebrating 25 years of the SRS

New-look website for Diamond



#### Dates for the diary

A round-up of up and coming events



continued over

Summer 2005 **diamond news**

looking forward to the start of commissioning. Installation is also progressing well in the booster synchrotron, and in the Radio Frequency hall, where the amplifiers are located that will provide the vital boost of energy to keep the beam of electrons circulating in the storage ring." Elsewhere in the synchrotron building there is a wide range of activity taking place. Colin Norris, Diamond's Physical Science Director, reports, "Last October when Lord Sainsbury visited us, the experimental hall was an empty shell. This area is being transformed as our first 7 experimental stations are being built rapidly".



The electron beam is generated here in the linear accelerator

Dr Walker adds, "A project of this scale requires a highly skilled and dedicated team and that is exactly what we have here at Diamond. When we start doing experiments in 2007 it will be thanks to the hard work of a large number of people, all of whom should be extremely proud of the part they have played during the construction phase."

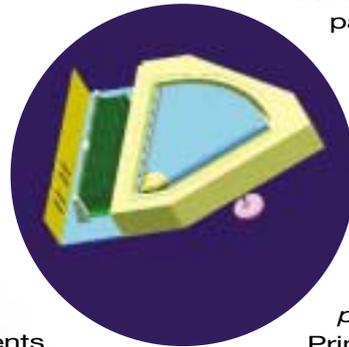
# Diamond's

While many of Diamond's teams are working hard to build the machine that will shine brilliantly intense light into the experimental stations, the Detector Group is developing equipment to collect that light once it has reached its destination. Each station, or beamline, may need several detectors to gather the output from thousands of experiments and turn it into data that scientists can interpret.

"Detector development represents a great opportunity and challenge for Diamond," comments Gareth Derbyshire, Head of the Detector Group. "Although there are some common factors between the detectors, each beamline has its own special requirements. Many of the current commercial detector systems used at synchrotrons around the world are limited, so there is an active development programme at Diamond to make better detector systems in order to enable new science."

To produce truly cutting-edge detectors, Diamond is collaborating closely with other partners such as the Centre for Instrumentation of CCLRC, working with staff at both the Rutherford Appleton and Daresbury Laboratories

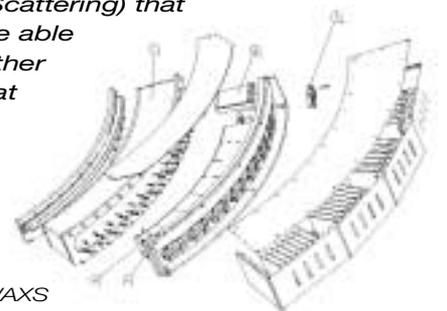
and is building relationships with other SR sources such as the European Synchrotron Radiation Facility (ESRF), the Swiss Light Source (SLS) and the Stanford Synchrotron Radiation Laboratory (SSRL). Diamond's Non-Crystalline Diffraction (NCD) beamline, I22, is the target of one of these innovative detector development partnerships.



HOTSAXS

"I22 will help us to understand the structure and function of large molecular assemblies, such as living organisms and polymers," explains Principal Beamline Scientist, Dr Nick Terrill.

"These large assemblies scatter X-rays at both very small and very wide angles. Diamond and CCLRC are working together to produce a matched suite of gas microstrip detectors called HOTWAXS (High Overall Throughput Wide Angle X-Ray Scattering) and HOTSAXS (High Overall Throughput Small Angle X-Ray Scattering) that will be able to gather data at these two



HOTWAXS

*extremes, whilst structural changes are happening. The detector pair will simultaneously give I22 unprecedented access to processes that take place on the millisecond timescale with dynamic ranges that are unattainable with currently available technologies."*

Diamond will also be developing an energy resolving hybrid pixel detector for the Powder Diffraction Beamline, I11, with CCLRC playing a major role. This detector will compliment a novel scintillator-based detector system specified by Dr Nicola Tartoni, the third



HOTSAXS

# Detectors



X-SPRESS

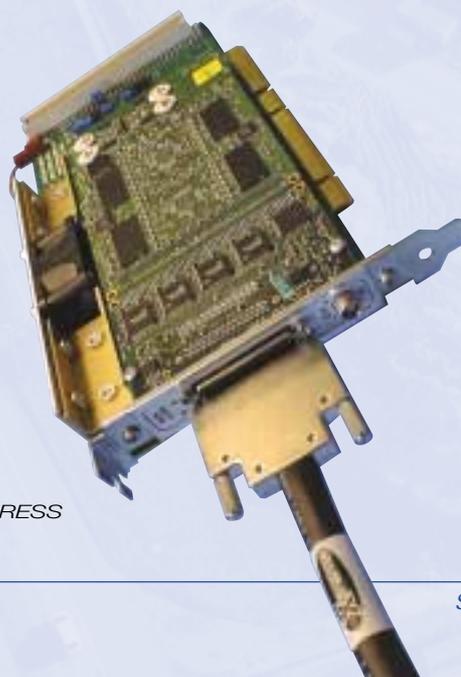
Another "hot" development area for the Detector Group is in silicon hybrid pixel detectors. Commonly used in high energy physics, these detectors have excellent spatial resolution, fast read-out and can be tiled together to cover large areas. Diamond hosted a Pixel Detector Co-ordination Meeting in April, organised jointly with the ESRF, bringing together experts from synchrotrons across Europe.

*"The meeting was a great success and has already led to some interactions in key technology areas,"* confirms Dr Victoria Wright, Detector Scientist. *"Swiss Light Source will host another collaboration meeting in September, which will continue to build a closer community of SR detector groups, leading to more interaction between different institutions, not only for pixel detectors, but other detectors too."*

member of the detector team, in collaboration with an industrial project partner.

Crucial to the success of the pixel detector project will be the infrastructure providing interconnects between the detector pixel and the associated microelectronics. Diamond and CCLRC recently bought a key piece of this equipment, a bump bonder.

*"This is an exciting new facility for us, that's only possible because it can be hosted by the infrastructure already available on the campus,"* says Gareth. *"With access to the correct infrastructure, targeted funding and through collaboration with other groups in the field, we can build some detectors that will not only benefit Diamond but also, in the longer term, all SR based science."*



X-SPRESS

## Diamond team grows to 200

**Bringing together the multi-skilled team that will develop and run Diamond requires a sustained recruitment campaign. In the past 15 months, employee numbers have increased dramatically from 100 to 200.**

The honourable title of "200th employee" goes to Dr Rohanah Hussain, who has just joined Diamond's Science Division as Beamline Scientist for the Circular dichroism beamline (B24), which is headed by Dr Giuliano Siligardi.

Diamond News met up with Rohanah to learn about her background and her thoughts on the scientific facilities that are being created here at Diamond.

*"I began my career as a pharmacist in Singapore and worked both in hospitals and in the community before coming to the UK to further my studies in pharmaceutical chemistry and drug delivery synthesis", explains Rohanah. "After 2 years lecturing and researching at the Institute of Pasteur in France, I returned to London where I focused on structural analysis work in both academic and commercial settings. Prior to joining Diamond I was a Research Fellow at King's College where I was responsible for the chiroptical spectroscopy facilities, which attracted users from across the country, and the optical spectroscopy facilities for the colleges within the University of London."*

*On joining Diamond Rohanah says, "I feel it is a real privilege to be part of such a dynamic and diverse team of experts. As a young company, Diamond offers a very exciting environment to work in. The Circular dichroism beamline and its support laboratory is*

*going to provide a fantastic, leading edge facility for life and chemical scientists from both academic and commercial organisations. We will demonstrate the potential of the beamline by conducting our own in-house research".*

*"In addition, the variety of techniques that Diamond's other beamlines will offer opens up a wealth of opportunity for those looking at drug discovery and development, as well as improving the techniques for effective drug delivery. Diamond will help speed up the time it takes to bring new drugs to market, which will in turn*

*ago and I think it is a wonderful achievement to have built up our team of 200 dedicated staff in this time. When Diamond becomes operational in early 2007, around 320 people will work here so there are still opportunities for scientists, technicians and administrators with an ambition to be part of one of the UK's largest scientific projects."*

To view current vacancies, please visit [www.diamond.ac.uk](http://www.diamond.ac.uk)



*bring cost benefits to the organisations involved".*

*Gerd Materlik, Diamond's Chief Executive, adds, "Diamond Light Source Ltd was set up just over 3 years*

*Gerd Materlik welcomes Dr Rohanah Hussain to Diamond*

# A PhD with a difference!

**One of the most exciting things about synchrotron light is the techniques it offers are currently untapped by certain areas of science. This means that the scope of synchrotron light as a research tool will probably far exceed the expectations of even its most avid supporters.**

One of the most exciting things about synchrotron light is the techniques it offers are currently untapped by certain areas of science. This means that the scope of synchrotron light as a research tool will probably far exceed the expectations of even its most avid supporters.

Environmental Science is a good example of a field where the use of synchrotron light is currently in its infancy in the UK. Diamond is extremely keen to spread the word about the potential of research techniques such as Non-crystalline diffraction in the area of Environmental Science, where issues such as pollution require our urgent attention.

In a strategic move to built up interest among the environmental science community prior to Diamond becoming operational in 2007, our first PhD student, Lois Davidson, is from Leeds University Earth Science Department.

Dr Nick Terrill, Principal Beamline Scientist for Diamond's Non-crystalline diffraction beamline, comments, *"Before we applied to The Natural Environment Research Council (NERC) for funding for Lois, I had worked with Dr Liane Benning from Leeds and Dr Sam Shaw from Oxford to prove the value of the technique in looking at the early stages of nucleation, growth and aggregation of iron-based nanoparticle colloid systems. Knowing that Diamond is going to be able to make a major contribution to this field motivated us to develop a proactive strategy for Lois, Diamond's first PhD student."*

"There are three areas that Lois has been focusing on since joining us in October 2003. These are promoting the potential of the Non-crystalline diffraction beamline to environmental scientists so that we have an educated user base come 2007; contributing to the design and development of the experimental equipment and protocols in relation to Diamond's Environmental Sciences programme; and undertaking knowledge transfer so that other beamlines at Diamond can benefit from the technologies and protocols developed during her studentship."

*"We have been really impressed with Lois's enthusiasm and dedication to the work. Her contribution will have long term benefits to the*

*Environmental Sciences programme here at Diamond and we are delighted that she chose synchrotron light as the focus for her PhD".*



*Dr Nick Terrill with Lois Davidson in the experimental hall*

Lois adds, *"Prior to starting my PhD I knew very little about synchrotron light and what it can do for environmental science researchers. With the help of Dr Benning and Dr Shaw, my supervisors, and the Diamond team I have learnt a huge amount. Knowing that the work I am doing will go towards shaping the Environmental Sciences programme at Diamond is extremely rewarding. I also find the promotional work, presenting papers at national meetings and international conferences, very exciting. The community is really positive about the potential of synchrotron light and I'm confident that there will be a large number of researchers looking to Diamond to help them progress their work from 2007 onwards."*

# Healthy meals at Chilton School

When staff at Diamond learnt that their neighbouring school, Chilton Primary, was about to launch a Healthy School Dinners campaign they decided to lend a hand.

As highlighted recently by UK's Celebrity Chef, Jamie Oliver, what we eat affects everything. Mood, behaviour, growth, even our ability to concentrate. So as far as helping children to get a good start in life, you can't do much better than feed them healthy, nutritious meals.

As health will be an important aspect of the science work that will be done at Diamond, it was a fitting campaign for the company's staff to support.

Christine Dunsdon, Chilton School's Headteacher, says,

*"We wanted to change the way we catered for our children and this meant creating a new menu of delicious, freshly prepared, balanced lunchtime meals, revamping our kitchen so that we could cook everything on site, and encouraging our pupils to sample the new school dinners."*

*"Diamond staff held a 'Guess the Baby' competition and a Staff Talent Auction and raised £600 during their 3rd Birthday Party and this has been a brilliant boost to our campaign. We've used the money to give children a free sample of the new menu and carry out work in the kitchen so that our chef and kitchen staff have all the equipment they need to prepare fresh meals every day."*

# Science

# new

## The Queen visits Canadian Light Source

As part of the Royal Visit commemorating Saskatchewan's centennial, Her Majesty Queen Elizabeth II and His Royal Highness the Duke of Edinburgh visited the University of Saskatchewan's Canadian Light Source synchrotron on Thursday 19th May 2005.

## Third generation synchrotron for China

The Shanghai Synchrotron Radiation Facility (SSRF) is under construction in China. The facility, which has gone through 10 years' preparation, is the biggest science research and technology development project in China. It is due to open before 2010 with seven beamlines in its first phase.



From left to right: Ali Al-Zoubi, Diamond's IT Manager, Christine Dunsdon, Chilton School's Headteacher, Carl Jackman, Chilton School's Chef, Victoria Wright, Diamond Detector Scientist, and pupil, Carolyn Nutley

# & Synchrotron

## Celebrating 25 years of the SRS

The UK's Synchrotron Radiation Source (SRS) at the Daresbury Laboratory in Cheshire is 25 years old this year. To mark this occasion, a one day celebration meeting is being held on the 12th September 2005 at the

Palace Hotel in Manchester. The purpose is not only to highlight the achievements of the past 25 years, but also to mark the "*collaborative*" spirit which the SRS has helped to engender in the scientific community.

## SR User Meeting 2005

Diamond and Daresbury have joined forces to deliver the UK's SR users meeting, Last year this took place near Diamond and this year will be held at the Palace Hotel in Manchester immediately following the SRS-25 event on the 13th and 14th September.

Details on both meetings, including Registration Forms

and Programme, can be found by clicking the 'Meetings and Events' option on the website: [www.srs.ac.uk/srs](http://www.srs.ac.uk/srs)

The Organising Committee may be contacted via Alison Hannah on: Tel: +44 (0) 1925 603363 or e-mail [srmeeting@dl.ac.uk](mailto:srmeeting@dl.ac.uk)

## New-look website for Diamond

Regular visitors to the Diamond website will have noticed that it has a new look and feel. We have strived to improve the layout and introduce updated content in various sections including Science, Technology, For Users and News.

To encourage you to visit our site, we have a fabulous Electron Tree to give away to the first name out of the hat with the correct answer to this question:

### How many concrete piles does Diamond sit on?

Visit [www.diamond.ac.uk](http://www.diamond.ac.uk) to find out and e-mail your answer to [silvana.damerell@diamond.ac.uk](mailto:silvana.damerell@diamond.ac.uk) by Friday 26th August, including your full name and postal address.

NB This competition is not open to DLS staff or their families.

We would be delighted to receive your comments and ideas on the new website. Please contact Catherine Gater, Web Manager, at [catherine.gater@diamond.ac.uk](mailto:catherine.gater@diamond.ac.uk)



# DATES FOR THE DIARY

## General public interest

Contact

[talkingscience@rl.ac.uk](mailto:talkingscience@rl.ac.uk)

## Scientific & technical interest

A one day meeting to celebrate 25 years of the SRS

12th September 2005

The Palace Hotel, Manchester, UK

Contact [www.srs.ac.uk/srs](http://www.srs.ac.uk/srs) then click 'Meetings and Events' option

## UK Synchrotron Radiation User Meeting 2005

13th & 14th September 2005

The Palace Hotel, Manchester, UK

Contact [www.srs.ac.uk/srs](http://www.srs.ac.uk/srs) then click 'Meetings and Events' option

## XII International Summer-School Nicolàs Cabrera

Synchrotron Light as a

powerful tool for materials Madrid, Spain

19th – 23rd September 2005

Contact:

[www.uam.es/otroscentros/inc/](http://www.uam.es/otroscentros/inc/)

14th National Conference on Synchrotron Radiation

Instrumentation

20th – 23rd September 2005

Baton Rouge, Louisiana, USA

## XRMS 2005

X-ray Spectroscopy of Magnetic Solids

18th -20th October 2005

Paul Sherrer Institut, 5232

Villigen PSI, Switzerland

Contact

<http://xrms2005.web.psi.ch>

## User accommodation in planning

Plans are underway for overnight accommodation facilities to serve the Diamond user community. Situated a short walk from the synchrotron building, near the RAL/Diamond main security gate, the facility will have 180 bedrooms.

## Diamond Industry Day

As reported in the last issue of Diamond News, DISCo (Diamond Industrial Science Committee) is advising the company on best practice for industrial engagement. To help raise awareness of what Diamond will be able to offer industry in 2007, an Industry Day will be held at Diamond in Oxfordshire on 6th December 2005.

To register your interest in this event, please visit [www.diamond.ac.uk](http://www.diamond.ac.uk)



### Contact information

**Diamond Light Source Ltd**  
Diamond House, Chilton, Didcot,  
Oxfordshire OX11 0DE

**Head of Communications:**  
Isabelle Boscaro-Clarke  
Tel: +44 (0) 1235 778130  
E-mail: [isabelle.boscaro-clarke@diamond.ac.uk](mailto:isabelle.boscaro-clarke@diamond.ac.uk)

**Media Relations Officer:**  
Silvana Damerell  
Tel: +44 (0) 1235 778238  
E-mail: [silvana.damerell@diamond.ac.uk](mailto:silvana.damerell@diamond.ac.uk)

**Web Manager:**  
Catherine Gater  
Tel: +44 (0) 1235 778420  
E-mail: [catherine.gater@diamond.ac.uk](mailto:catherine.gater@diamond.ac.uk)



**diamond**  
[www.diamond.ac.uk](http://www.diamond.ac.uk)



CCLRC

**welcometrust**