

# **NEW ZEALAND SYNCHROTRON GROUP LIMITED**



**ANNUAL REPORT 2013**



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## CHAIRMAN'S REPORT

The New Zealand Synchrotron Group Ltd (NZSG) has now completed its seventh year of operation. It marks an important milestone in the evolution of New Zealand's involvement with the Australian Synchrotron with the recent signing of the new agreements that secure the funding and future access rights so that New Zealand researchers can continue to use the facility on the best possible basis. During this period of intense negotiation to obtain the best possible outcome for New Zealand, a full support programme has been maintained.



Access as of right to the state of the art synchrotron in Melbourne is important to New Zealand's leading scientists dealing with materials of all types. Most of New Zealand's physical exports are agricultural products or materials of one sort or another. There is no alternative technique which provides the same resolution or power to analyse the structure of such materials. Equally synchrotron radiation provides the world's leading scientists in forensics, drug discovery and protein analysis with new opportunities to extend frontier knowledge. The growing number of New Zealand researchers using the facility is testament to its power to create new knowledge at the frontier and the science excellence being achieved across a broadening front of investigation by New Zealand based researchers.

As New Zealand researchers have been routinely receiving over 10-12% of the beamtime under the previous merit and preferred access regimes, the transition to receiving a 5% level will have to be carefully managed. One way in which this will be achieved is through a special feature of the New Zealand access agreement in which the company has the ability to negotiate variable access levels for each beamline (so that more access can be obtained on beamlines more sought after by New Zealand researchers).

With the securing of access rights until 2016, the focus for the board will now shift to how New Zealand can participate in any further capital development of the Synchrotron. Discussions in Australia on expanding the facility by adding new beamlines had been deferred during the re-financing period, but are now being revived. The board would like to ensure that New Zealand researchers can gain similar advantages from access to any new capability.

Full access arrangements for New Zealand researchers to the Australian Synchrotron are now in place for all beamlines, except the imaging and medical beamline where there has only been restricted Preferred Access available. New Zealand researchers have been awarded beamtime through both the Merit and the Preferred Access routes in increasing numbers up until the middle of 2013 when the impact of the new *juste retour* arrangement that will ultimately limit New Zealand's access to 5% of the beamtime began to have an effect. The ongoing support for New Zealand researchers

includes considerable financial support for the costs incurred by researchers in travelling to Melbourne or in shipping samples when using the remote access option.

The company had budgeted for a loss for the year of \$1,206,450 comprising of an expected loss of \$63,700 from trading operations and of \$1,142,750 through the amortisation of the investment in the Australian Synchrotron. The trading result for the year was a loss of \$74,047, a result that was influenced by foreign exchange losses of \$9,870 and costs of \$23,845 for preparing a case to the New Zealand government for future investment in the Australian Synchrotron and negotiating the funding and access rights. After providing for the amortisation costs, the overall result was a loss of \$1,216,795. The value of the shares held in the Australian Synchrotron Holding Company (ASHCo) has now been fully amortised. This is consistent with the imminent cessation of access rights to the original Foundation Investors in the Australian Synchrotron.

The company has no significant sources of revenue, other than funds received from the Australian Synchrotron which provides funding for travel and from interest on funds the company holds. It does, however, have cash reserves in excess of \$200,000. As the company has a more modest balance sheet than in the past, it is not possible to operate at loss, i.e. to utilise shareholders funds to operate the company. Those shareholders that are participating in the new funding and access arrangements have agreed to make an increased level of contribution towards the company's operating costs and it is expected that this will be supplemented by funds from external sources so that an increased level of support can be provided to researchers who are using synchrotrons elsewhere in situations where the Australian Synchrotron does not have the required capability.

The board has been very well supported by the Royal Society of New Zealand who provide secretariat services to NZSG. In particular, I would like to acknowledge the contribution made by Dr Don Smith in assisting the board, administering the New Zealand Synchrotron Support Programme and negotiating the funding and access agreements. I would also like to acknowledge the contribution from the Chair of the Access Committee, Professor Geoff Jameson and especially its retiring members Dr Graeme Gainsford, Associate Professor Mike Reid and Associate Professor Metcalf who have evaluated all requests for preferred access and for funding support for training.

Finally, I would like to thank my fellow directors, Dr Desmond Darby and Professors Geoff Jameson, Jim Metson and Ian Shaw.



GA Carnaby  
Chair

## **BUSINESS REVIEW**

### **Investment in the Australian Synchrotron and Ongoing Access Rights**

Through the original investment in the Australian Synchrotron in October 2007, NZSG has been a member of the Australian Synchrotron Company (ASC) and a shareholder in the Australian Synchrotron Holding Company (ASHCo). As part of the restructuring of the Australian Synchrotron operations and funding, the responsibility for operating the Synchrotron was transferred from ASCo to a new entity, the Synchrotron Light Source Australian Pty Ltd (SLSA) on 1 January 2013. As a consequence, ASCo was deregistered in June 2013. NZSG remains a shareholder in ASHCo which has leased the facility and equipment to SLSA to operate. The 5 million A\$1 shares in ASHCo held by NZSG are fully paid, however their value has been progressively written down to zero as at 30 June 2013 to reflect the cessation of access rights to all foundation investors in the Australian Synchrotron after August 2013.

During 2012 discussions were held between the Victorian State government and the Commonwealth government regarding the future funding of the operating costs for the Synchrotron. NZSG and the other foundation investors were involved in those discussions. The outcome was that the Commonwealth government would take an increased role in providing operating funding for the facility and a structure was established under which the facility was leased to SLSA, a subsidiary of the Australian Nuclear Science and Technology Organisation, which became the new operator with effect from 1 January 2013. An operating funding package of A\$100 million over four years from 1 July 2012 to 30 June 2016 was negotiated with most of the funding being provided by both the Australian research sector and the Victorian State and Commonwealth governments. New Zealand was invited to participate in this arrangement and NZSG has agreed to provide 5% of the operating funds in return for 5% of the future access.

In parallel with the discussions in Australia, the existing NZSG shareholders were offered the opportunity to continue providing operating funds and secure future access for their research personnel. In January 2013 an investment case was submitted to the New Zealand government for complementary funding. Eight shareholding institutions agreed to provide funding and the agreements establishing the future funding and access arrangements for New Zealand until 30 June 2016 were signed in July 2013. The research sector will provide A\$1.96 million and the government A\$2.21 million funding towards the Synchrotron's operating costs over the next three years.

A payment of A\$839,458, being the final payment of the New Zealand contribution towards the operating costs of the Synchrotron under the original Subscription Agreement was made on 28 February 2013.

Although the Synchrotron is now operated by an entity independent of the original foundation investors, its operations are governed by an Operating Services Agreement

with ASHCo under which a Funders Committee was established to advise the board of SLSA and to have oversight of the Synchrotron's operations, budget and development. The NZSG board has appointed Dr Don Smith to be the company's representative on the Funders Committee. He is also the company's representative at meetings of the shareholders of ASHCo. He attended the annual general meetings of ASCo and ASHCo in October 2012 and has participated in the discussions with Australian governmental agencies and other funding parties on the future funding and access arrangements for the Synchrotron. Dr Smith is also the contact person for day-to-day matters associated with access arrangements and user liaison with SLSA.

## **Decisions on Access and Funding Support**

In 2007 the Board established an Access Committee to make the decisions on applications for preferred time access, funding for synchrotron science or funding support for the costs of travel to synchrotrons. The members of the Committee were:

Professor Geoff Jameson, Massey University (Chair)  
Dr Graeme Gainsford, Industrial Research Ltd  
Associate Professor Peter Metcalf, University of Auckland  
Associate Professor Mike Reid, University of Canterbury

The Committee did not meet during the year formally as a group but the individual members have communicated throughout the year on proposals they have been asked to assess. The criteria for selecting proposals were developed and approved by shareholders and is published on the NZSG web site along with other information on accessing support.

With the cessation of the preferred access scheme for Foundation Investors from September 2013 onwards, the committee's focus has changed to providing an input into the ranking of merit proposals by New Zealand researchers. Three of the members retired in June 2013 and three new members were appointed.

The new committee consists of:

Professor Geoff Jameson, Massey University (Chair)  
Professor Vic Arcus, University of Waikato  
Dr Vladimir Golovko, University of Canterbury  
Dr Geoff Waterhouse, University of Auckland

The table at the end of this section lists the New Zealand researchers who have gained beamline access to the Australian Synchrotron from July 2012 onwards, and where applicable, the funding support provided to them.

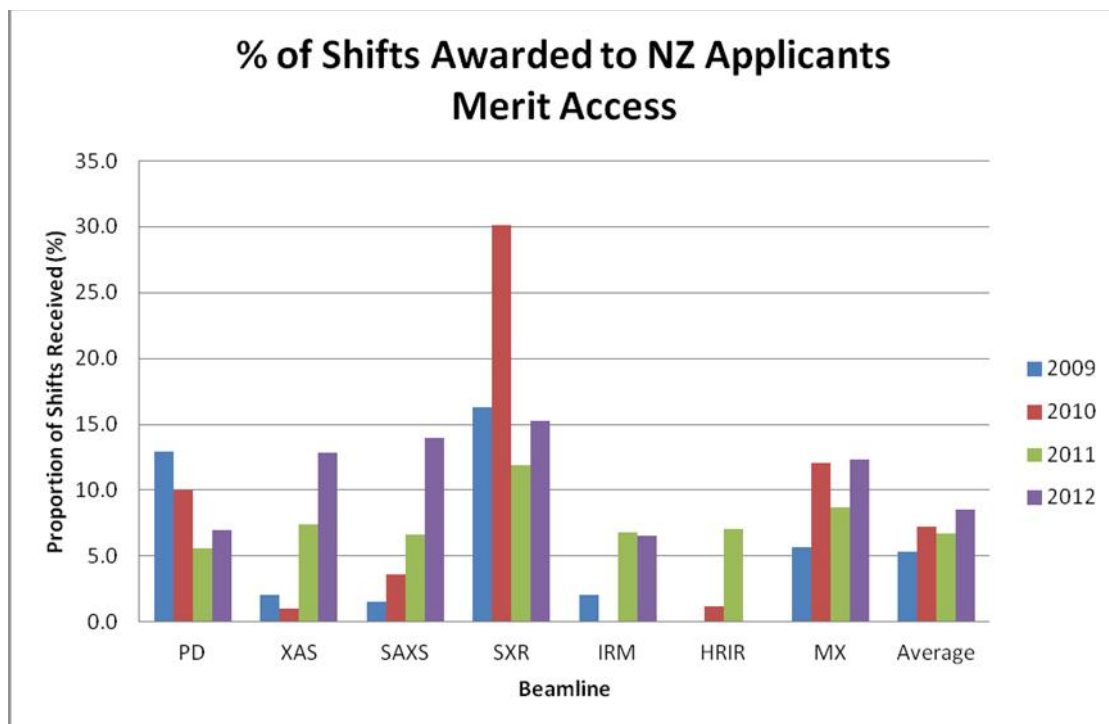
## **Use of the Australian Synchrotron by New Zealand Researchers**

The first of the beamlines was successfully commissioned in mid 2007 and since then all of the originally planned beamlines have become operational. The last of them, the Imaging and Medical Beamline, has only been available for merit access and for limited preferred access supporting commissioning this past year. Approximately 50% of the available beamline time is assigned to "merit" access and competitive

applications are sought from researchers worldwide, including from New Zealand. The Australian Synchrotron makes calls every four months for merit access to the beamlines. Applications are made directly to the Australian Synchrotron with no direct involvement from NZSG apart from promoting the opportunity to apply via our website.

Since late 2008, in recognition of the contribution New Zealand makes to operating costs, the Australian Synchrotron began contributing towards the travel costs for New Zealand researchers who obtained beamtime at the Australian Synchrotron on an equal basis with Australian researchers. These funds are administered through NZSG.

New Zealand researchers have applied for time on all the available beamlines with success as shown in the following graph. Although success rates fluctuate from round to round, applications from New Zealand research groups match well with those from elsewhere. The original target established with the view that the New Zealand research community were on the whole not established synchrotron users was to reach 5% of the merit time. The graph shows that this has been surpassed. For all of 2012 the proportion achieved was 8.5%. In the first cycle of 2013 (not shown on the graph, the figure was 12.5%, however this means of comparison will not be useful from now on as New Zealand’s share of the merit time will be governed by the 5% cap.

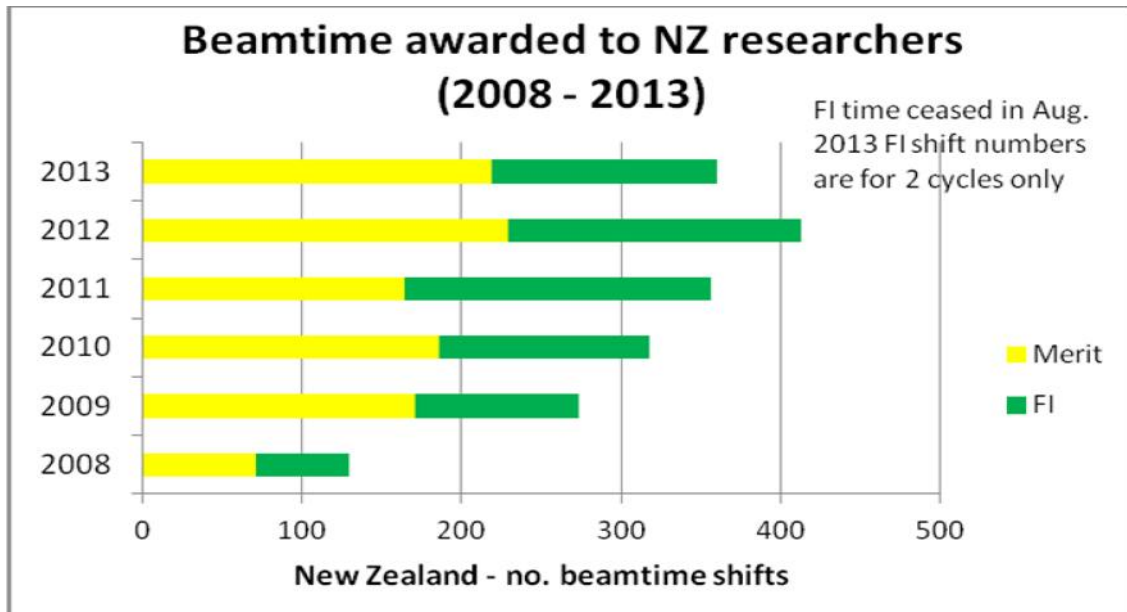


In addition to the awards of merit time, approximately 4.5% of the beamtime has been available for allocation by NZSG as “Preferred Access” (or Foundation Investor Access). Approximately 30% of the available beamline time is set aside explicitly for researchers from the ten Foundation Investors. This arrangement bypasses the “merit” process and ensures that researchers who did not obtain or apply for merit access can gain access directly as a result of their institution being a Foundation Investor. The provision of Foundation Investor time will cease in August 2013 when the obligation to make payments towards the Australian Synchrotron’s operating costs expires. Researchers from the company’s shareholding institutions apply through NZSG for



access to New Zealand’s Foundation Investor time and their proposals are evaluated by an Assessment Committee.

One of NZSG’s goals has been to ensure that full use is made of the Foundation Investor time. This is very important as the competition for merit time becomes more intense. The following graph demonstrates the growth in the number of beamline shifts that have been awarded to New Zealand researchers since 2008. In the past year, 95% of all the beamline time available to New Zealand as Foundation Investor time was utilised.



There has been a corresponding growth in the number of New Zealand research groups using the Australian Synchrotron up until 2013 as shown in the following table. The figures for 2013 are lower as the number of merit awards was constrained to reflect the fact that New Zealand researchers would be getting 5% of the beamtime from 2013 onwards and the awarding of FI time ceased after the 2013/2 cycle.

**Number of NZ groups with scheduled time (merit and preferred) at the AS**

Beamline \ Period	2008	2009	2010	2011	2012	2013
Imaging and Medical						5
Protein Crystallography (MX1 and MX2)	3	7	19	29	41	36
Infrared Microscopy and High Resolution IR	3	2	3	4	7	7
Powder Diffraction	8	10	11	10	6	4
Soft X-ray Spectroscopy	1	7	9	7	10	4
Small & Wide Angle X-ray Scattering		4	7	9	20	12
X-ray Fluorescence Microscopy		2	1	3	3	1
X-ray Absorption Spectroscopy		3	3	3	8	6
<b>Total</b>	<b>15</b>	<b>35</b>	<b>53</b>	<b>65</b>	<b>95</b>	<b>75</b>

## Support for Synchrotron Scientists

Until 30 June 2009, the company operated the New Zealand Synchrotron Support Programme (NZSSP) with funds originating from the Tertiary Education Commission. With the cessation of that funding, the formal NZSSP has scaled down, but in a large part has been replaced by travel funding available from the Australian Synchrotron which most groups which are granted merit or Foundation Investor access are entitled. The NZSG administers these funds.

Some opportunities still exist for the company to support the development of synchrotron science capability in students and postdoctoral researchers. In addition to funding a number of them to travel to Melbourne to use the Australian Synchrotron, through the associate membership of the Asia Oceania Forum for Synchrotron Radiation Research (AOFSTR), two places are made available each year for students to attend the Cheiron School at the SPring-8 Synchrotron in Japan. The offer of places includes full funding for travel and accommodation. In addition, extra places for self-funded students are also available.

The table below provides details of the students who attended in September/October 2012.

Name	Institution	Details	Comment
Hanan Kayed	Massey University	PhD student	Fully funded
Vedran Jovic	University of Auckland	PhD student	Fully funded
Richard Souness	University of Otago	PhD student	Self-funded
Nellie Olsen	Victoria University of Wellington	PhD student	Self-funded
Daniil Ovoshchnikov	University of Canterbury	PhD student	Self-funded
Seong Joo Nam	University of Auckland	PhD student	Self-funded



D K W Smith  
Executive Officer  
Secretariat

## New Zealand Research Groups Awarded Beamtime (July 2012 – June 2013)

The following New Zealand research groups were awarded time (merit and preferred) at the Australian Synchrotron between July 2012 and June 2013.

Researchers	Institution	Cycle	Beamline	Access
<b>A/P Emily Parker</b> Dr Grant Pearce Dr Renwick Dobson Ali Reza Nazmi Sebastian Reichau Dr Jo Hobbs Emma Andrews	Canterbury Canterbury Canterbury Canterbury Canterbury Waikato Waikato	2012-2	Macromolecular Crystallography (MX1) “Biomolecular Interaction Centre, University of Canterbury”  (Note: Canterbury did not need the time on 28-29 July so arranged for it to be used by their collaborators at Waikato)	Merit Access 2 days 4-5 July, and 28-29 July
<b>Dr Renwick Dobson</b> Michael Griffin Elena Sugrue Rachel North Hironori Suzuki	Canterbury Melb. Univ. Canterbury Canterbury	2012-2	Micro Crystallography (MX2) “Melbourne University, Bio21 Institute Time, MX Beam-lines”	Melb. Univ time 2 days 27-28 July 26-27 Aug
<b>Dr Shaun Lott</b> Prof Ted Baker Dr Christian Link Dr Genevieve Evans Dr Paul Young Jason Busby	Auckland Auckland Auckland Auckland Auckland Auckland	2012-2	Macromolecular Crystallography (MX1) “Mycobacterium tuberculosis: Structural biology and drug discovery.”	Preferred Access 1 day 1-2 August
<b>Dr Chris Daughney</b> Dr Bernt Johannessen Dr Peter Swedlund Dr Sarah Harmer Dr Chris Weisener	GNS Science Aust. Synch Auckland Flinders U Windsor U, Canada	2012-2	X-ray Absorption Spectroscopy (XAS) “Redox interactions between co-adsorbed copper and iron on bacterial surfaces I: Cu K-edge EXAFS”	Merit Access 2 days 4-6 August
<b>Prof Kurt Krause</b> Dr Sigurd Wilbanks Dr Sylvia Luckner Dr Karen Knapp	Otago Otago Otago Otago	2012-2	Micro Crystallography (MX2) “University of Otago Structural Biology Group”	Preferred Access 2 days 10-11 August 22-23 August
<b>A/P Emily Parker</b> Dr Celine Valery Prof Geoff Jameson Prof Juliet Gerard Dr Grant Pearce Dr Renwick Dobson Ali Reza Nazmi Sebastian Reichau Dmitri Joseph	Canterbury Canterbury Massey Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury	2012-2	Micro Crystallography (MX2) “Biomolecular Interaction Centre, University of Canterbury”	Preferred Access 1 day 11-12 August

<b>Researchers</b>	<b>Institution</b>	<b>Cycle</b>	<b>Beamline</b>	<b>Access</b>
<b>Dr Grant Pearce</b> Amy Phillips Jeremy Keown Akshita Wason Dr Celine Valery Dr Penel Cross Francesca Manea	Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury Macquarie U.	2012-2	Small/Wide Angle X-ray Scattering (SAXS) “Solution Structure Studies of Dihydrodipicolinate Reductase”	Merit Access 1 day 16-17 August
<b>Felix von Aulock</b> Dr Ben Kennedy Prof Shane Cronin Dr Christopher Oze Paul Ashwell	Canterbury Canterbury Massey Canterbury Canterbury	2012-2	Infrared Microscopy (IRM) “Water distribution in collapsing foams of magma”	Merit Access 4 days 16-20 August
<b>Dr Shaun Lott</b> Prof Ted Baker Dr Christian Link Dr Genevieve Evans Jason Busby	Auckland Auckland Auckland Auckland Auckland	2012-2	Macromolecular Crystallography (MX1) “Mycobacterium tuberculosis: Structural biology and drug discovery.”	Merit Access 1 day 17-18 August
<b>Dr Grant Pearce</b> Amy Phillips Jeremy Keown Akshita Wason Dr Celine Valery Dr Penel Cross Francesca Manea	Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury Macquarie U.	2012-2	Small/Wide Angle X-ray Scattering (SAXS) “Solution Structure Studies of Rubisco and Rubisco Activase”	Merit Access 1 day 17-18 August
<b>Dr Renwick Dobson</b> Dr Michael Griffin Dr James Murphy Hironori Suzuki Katerine Donovan	Canterbury Melbourne U. WEHI. Canterbury Canterbury	2012-2	Small/Wide Angle X-ray Scattering (SAXS)	WEHI Merit Access 18 August
<b>Dr Grant Pearce</b> A/PEmily Parker Prof Juliet Gerrard Dr Renwick Dobson Moritz Lasse	Canterbury Canterbury Canterbury Canterbury Canterbury	2012-2	Small/Wide Angle X-ray Scattering (SAXS) “Biomolecular Interaction Centre, University of Canterbury”	Preferred Access 1 day 19-20 August
<b>Prof Richard Haverkamp</b> Anne Anderson Christian Dimkpa David Britt Joan Mclean Katie Sizeland	Massey Utah S Utah S Utah S Utah S Massey	2012-2	X-ray Absorption Spectroscopy (XAS) “Bioaccumulated silver in wheat shoots (AS)”	Merit Access 2 days 22-24 August
<b>Dr Chris Squire</b> Prof Ted Baker Dr Liam O’Ryan Michael Herbert Hanna Kwon	Auckland Auckland Auckland Auckland Auckland	2012-2	Small/Wide Angle X-ray Scattering (SAXS) “Unbiquitination, OV008/Skp1, and an insect cytotoxin complex”	Merit Access 1 day 24-25 August
<b>Dr Shaun Lott</b> Prof Ted Baker Dr Chris Squire Jason Busby James Jung Hanna Kwon Neil Paterson	Auckland Auckland Auckland Auckland Auckland Auckland Auckland	2012-3	Macromolecular Crystallography (MX1) “Structure-based inhibitor design”	Merit Access 2 days 14-15 September 17-18 October

<b>Researchers</b>	<b>Institution</b>	<b>Cycle</b>	<b>Beamline</b>	<b>Access</b>
<b>Assoc Prof Emily Parker</b> Dr Ali Reza Nazmi Sebastian Reichau Prof Geoff Jameson Dr Renwick Dobson Dmitri Josef Dr Wanting Jiao	Canterbury Canterbury Canterbury Massey Canterbury Canterbury Canterbury	2012-3	Macromolecular Crystallography (MX1) “Inhibition and allostery of essential bacterial metabolism”	Merit Access 1 day 26-27 September
<b>Assoc Prof Emily Parker</b> Prof Juliet Gerard Dr Ali Reza Nazmi Dr Grant Pearce Dr Renwick Dobson Penelope Cross Sebastian Reichau Sarah Wilson-Coutts Jeremy Keown	Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury	2013-3	Small/Wide Angle X-ray Scattering (SAXS) “Allosteric control of aromatic amino acid biosynthesis: Complex formation and conformational changes”	Merit Access 1 day 28-29 September
<b>Assoc Prof Vic Arcus</b> Emma Summers Dr Jo Hobbs Dr Judith Burrows Tifany Oulavallickal	Waikato Waikato Waikato Waikato Waikato	2012-3	Macromolecular Crystallography (MX1) “Proteins from Mycobacteria and Bacillus”	Merit Access 1 day 28-29 September
<b>Assoc Prof Emily Parker</b> Prof Juliet Gerard Sebastian Reichau Gerd Mittelstaedt Dr Grant Pearce Dr Renwick Dobson Dr Ali Reza Nazmi Penelope Cross	Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury	2012-3	Small/Wide Angle X-ray Scattering (SAXS) “Regulation and solution structure changes in enzymes of histidine and leucine biosynthesis”	Preferred Access 1 day 29-30 September
<b>Professor Ted Baker</b> Dr Chris Squire Dr Neil Paterson Dr Shaun Lott Dr Paul Young Yuliana Yosaatmadja	Auckland Auckland Auckland Auckland Auckland Auckland	2012-3	Micro Crystallography (MX2) “Molecular basis of microbial pathogenesis”	Merit Access 2 days 29-30 September 3-11 November
<b>Dr Grant Pearce</b> Assoc Prof Emily Parker Prof Juliet Gerard Dr Renwick Dobson Amy Phillips Penel Cross	Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury	2012-3	Small/Wide Angle X-ray Scattering (SAXS) “Biomolecular Interaction Centre, University of Canterbury”	Preferred Access 1 day 4-5 October
<b>Dr Renwick Dobson</b> Dr James Murphy Dr Michael Griffin Arvind Ravichandran Rachel North	Canterbury WEHI Melbourne U. Canterbury Canterbury	2012-3	Small/Wide Angle X-ray Scattering (SAXS)	WEHI Merit Access 1 day 5-6 October

<b>Researchers</b>	<b>Institution</b>	<b>Cycle</b>	<b>Beamline</b>	<b>Access</b>
<b>Dr Grant Pearce</b> Prof Juliet Gerrard Dr Renwick Dobson Bridget Mabbutt Francesca Manea	Canterbury Canterbury Canterbury Macquarie U. Macquarie U.	2012-3	Small/Wide Angle X-ray Scattering (SAXS) “Characterization of Ring Shaped Protein Complexes”	Merit Access 1 day 6-7 October
<b>Prof Geoff Jameson</b> Prof Richard Haverkamp Eric Ainscough Harjinder Singh Devastotra Poddar Dr Ashling Ellis Katie Sizeland	Massey Massey Massey Massey Massey Massey	2012-3	X-ray Absorption Spectroscopy (XAS) “Characterization of speciation of manganese in probiotic Lactobacillus paracasei”	Preferred Access 2 days 9-11 October
<b>Dr Renwick Dobson</b> Dr Michael Griffin Dr Sarah Kessans Dr Hironori Suzuki	Canterbury Melbourne U. Canterbury Canterbury	2012-3	Micro Crystallography (MX2)	Melbourne Univ Merit Time 1 day 11-12 October
<b>Prof Geoff Jameson</b> Prof Richard Haverkamp Eric Ainscough Harjinder Singh Devastotra Poddar Dr Ashling Ellis Katie Sizeland	Massey Massey Massey Massey Massey Massey	2012-3	X-ray Absorption Spectroscopy (XAS) “Characterization of speciation of manganese in probiotic Lactobacillus paracasei”	Merit Access 2 days 11-13 October
<b>Assoc Prof Emily Parker</b> Celine Valery Prof Geoff Jameson Prof Juliet Gerard Ali Reza Namzi Dr Grant Pearce Dr Renwick Dobson Sebastian Reichau	Canterbury  Massey Canterbury Canterbury Canterbury Canterbury	2012-3	Micro Crystallography (MX2) “Biomolecular Interaction Centre, University of Canterbury, Protein structure determination”	Preferred Access 1 day 20-21 October
<b>Dr Simon Hinkley</b> Dr Bridget Ingham Cameron Tristram	IRL	2012-3	Small/Wide Angle X-ray Scattering (SAXS) “Amorphous state changes of a novel series of polymeric materials”	Preferred Access 1 day 24-25 October
<b>Prof Kurt Krause</b> Sigurd Wilbanks Sylvia Luckner Karen Knapp	Otago	2012-3	Micro Crystallography (MX2) “University of Otago Structural Biology Group”	Preferred Access 1 day 26-27 October
<b>Andreas Auer</b> Dr Marco Billia A/P James White Dr Jan Scholz Prof Keith Gordon	Otago Otago Otago Otago	2012-3	Infrared Microscopy (IRM) “Determination of volatile contents in volcanic silicate rock samples”	Preferred Access 2 days 31 Oct - 2 Nov
<b>Dr Chris Squire</b> Michael Herbert Prof Ted Baker Dr Ghader Bashiri	Auckland Auckland Auckland Auckland	2012-3	Small/Wide Angle X-ray Scattering (SAXS) “How does the poxvirus orf hijack ubiquitination?”	Merit Access 1 day 7-8 November

<b>Researchers</b>	<b>Institution</b>	<b>Cycle</b>	<b>Beamline</b>	<b>Access</b>
<b>Prof Kurt Krause</b> Sigurd Wilbanks Sylvia Luckner Karen Knapp	Otago Otago Otago Otago	2012-3	Macromolecular Crystallography (MX1) “University of Otago Structural Biology Group”	Merit Access 1 day 16-17 November
<b>Assoc Prof Emily Parker</b> <b>Gerd Mittelstaedt</b>	Canterbury Canterbury	2012-3	Macromolecular Crystallography (MX1) Biomolecular Interaction Centre University of Canterbury - Inhibition and allostery of essential bacterial metabolism	Merit Access 1 day 21 November
<b>Assoc Prof Vic Arcus</b> Emma Summers Dr Jo Hobbs Dr Judith Burrows	Waikato Waikato Waikato Waikato	2012-3	Macromolecular Crystallography (MX1) “Proteins from Mycobacteria and Bacillus”	Preferred Access 1 day 23-24 November
<b>Dr Vince Carbone</b> Dr Ron Ronimus Dr Linley Schofield Dr Yanli Zhang Debjit Dey Carrie Sang	AgResearch AgResearch AgResearch AgResearch AgResearch AgResearch	2012-3	Micro Crystallography (MX2) “Structural characterisation of methanogen and archaeal- specific enzymes”	Preferred Access 1 day 25-26 November
<b>Professor Ted Baker</b> Dr Chris Squire Dr Neil Paterson Dr Shaun Lott	Auckland Auckland Auckland Auckland	2012-3	Macromolecular Crystallography (MX1) “Molecular basis of microbial pathogenesis”	Preferred Access 1 day 26-27 November
<b>Dr Qinfen Gu</b> Dr Yacine Hemar	Aust. Synch. Auckland	2012-3	Powder Diffraction (PD)	Aust Synch Time 26-27 November
<b>Assoc Prof Emily Parker</b> Dr Ali Reza Nazmi Sebastian Reichau Prof Geoff Jameson Dr Renwick Dobson	Canterbury Canterbury Canterbury Massey Canterbury	2012-3	Macromolecular Crystallography (MX1) “Inhibition and allostery of essential bacterial metabolism”	Merit Access 1 day 27-28 November
<b>Prof Geoff Jameson</b> Eric Anscough Prof Richard Haverkamp	Massey Massey Massey	2012-3	X-ray Fluorescence Microscopy (XFM) “Characterization of Cellular Distribution of Metals and Concentration Gradients of Manganese in Probiotic Lactobacillus paracasei 431”	Preferred Access 2 days 4-6 December
<b>Dr Peng Cao</b> Saifang Huang Prof Wei Gao Gang Chen Xin Ouyang	Auckland Auckland Auckland Auckland Auckland	2012-3	Powder Diffraction (PD) “High temperature in situ observation of nucleation and crystallization of lithium disilicate glasses”	Merit Access 1 day 5-6 December
<b>Dr Peng Cao</b> Saifang Huang Prof Wei Gao Gang Chen Xin Ouyang	Auckland Auckland Auckland Auckland Auckland	2012-3	Powder Diffraction (PD) “High temperature in situ observation of nucleation and crystallization of lithium disilicate glasses”	Preferred Access 3 days 6-9 December

<b>Researchers</b>	<b>Institution</b>	<b>Cycle</b>	<b>Beamline</b>	<b>Access</b>
<b>Michel Nieuwoudt</b> Dr Mark Simpson Dr Jeff Mauk James Conway Prof Robert Bodnar	Auckland Auckland Auckland Auckland Virginia Tech	2012-3	X-ray Fluorescence Microscopy (XFM) “Synchrotron FTIR microscopy of CO <sub>2</sub> in the gas and liquid phases in a set of synthetic H <sub>2</sub> O-CO <sub>2</sub> fluid inclusions having different but known CO <sub>2</sub> concentrations”	Merit Access 2 days 11-13 December
<b>Dr Renwick Dobson</b> Dr Michael Griffin Dr Sarah Kessans Dr Hironori Suzuki	Canterbury Melbourne U. Canterbury Canterbury	2012-3	Micro Crystallography (MX2)	Melbourne Univ Merit Time 1 day 12-13 December
<b>Dr Greg Giles</b> Emily Shearer Dr James Crowley	Otago Otago Otago	2013-3	X-ray Fluorescence Microscopy (XFM) “Metallosupramolecular Cages for Drug Delivery”	Preferred Access 2 days 12-14 December
<b>Michel Nieuwoudt</b> Dr Mark Simpson Dr Jeff Mauk James Conway Prof Robert Bodnar	Auckland Auckland Auckland Auckland Virginia Tech	2012-3	X-ray Fluorescence Microscopy (XFM) “Synchrotron FTIR microscopy of CO <sub>2</sub> in the gas and liquid phases in a set of synthetic H <sub>2</sub> O-CO <sub>2</sub> fluid inclusions having different but known CO <sub>2</sub> concentrations”	Preferred Access 1 day 13-14 December
<b>Dr Geoff Waterhouse</b> Zakiya Al-Azri Wan-Ting Chen Andrew Chan Harpreet Chahal Rayomand Shahlori	Auckland Auckland Auckland Auckland Auckland Auckland	2013-1	Soft X-ray Spectroscopy (SXR) “Electronic structure of CuO <sub>x</sub> /TiO <sub>2</sub> and Au-RuO <sub>x</sub> /TiO <sub>2</sub> photocatalysts for water splitting”	Merit Access 5 days 5-10 February
<b>Assoc Prof Emily Parker</b> Prof Geoff Jameson Dr Ali Reza Nazmi Sebastian Reichau Gerd Mittelstaedt Gerard Moggre Dr Penelope Cross	Canterbury Massey Canterbury Canterbury Canterbury Canterbury Canterbury	2013-1	Macromolecular Crystallography (MX1) “Inhibition and allostery of essential bacterial metabolism”	Merit Access 2 days 7-8 February 14-15 April
<b>Dr Chuong Nguyen</b> Prof Jim Metson Francis Goh Jerome Leveneur Yantao Song Lewis Hensman	Auckland Auckland Auckland GNS Science Auckland GNS Science	2013-1	Soft X-ray Spectroscopy (SXR) “Investigation of the extent of ion-induced reduction of metal oxides by energy resolved XPS and XANES”	Preferred Access 3 days 12-15 February
<b>Dr Chris Squire</b> Prof Ted Baker Dr Shaun Lott Dr Ghader Bashiri Hanna Kwon Dr Neil Paterson Dr Paul Young	Auckland Auckland Auckland Auckland Auckland Auckland Auckland	2013-1	Micro Crystallography (MX2) “Structural and molecular basis of microbial pathogenesis”	Merit Access 1 day 12-13 February



<b>Researchers</b>	<b>Institution</b>	<b>Cycle</b>	<b>Beamline</b>	<b>Access</b>
<b>Dr Renwick Dobson</b> Dr Michael Griffin Dr James Murphy Katerine Donovan	Canterbury Melbourne U Melbourne U Canterbury	2013-1	Micro Crystallography (MX2)	Melbourne Uni. Merit Access 1 day 15-16 February
<b>Dr Liam O’Ryan</b> Assoc Prof Alok Mitra Dr Chris Squire Mike Herbert	Auckland Auckland Auckland Auckland	2013-1	Small/Wide Angle X-ray Scattering (SAXS) “Investigation of the structure of bacterial integral membrane mercury transport protein MerT in solution”	Preferred Access 1 day 16-17 February
<b>Prof Kurt Krause</b> Dr Sigurd Wilbanks Dr Sylvia Luckner Dr Karen Knapp Prof Catherine Day	Otago Otago Otago Otago Otago	2013-1	Macromolecular Crystallography (MX1) “University of Otago Structural Biology Group”	Merit Access 2 days 21-22 February 26-27 March
<b>Dr Michael Mucalo</b> Dr Bridget Ingham Kethsiri Lokuliyana	Waikato IRL Waikato	2013-1	X-ray Absorption Spectroscopy (XAS) “EXAFS of Ni(II)-, Cu(II)- and Au(I)-pseudohalide complexes in polar aprotic solvent (DMSO)”	Preferred Access 2 days 27 Feb-1 March
<b>Dr Renwick Dobson</b> Dr Michael Griffin Dr James Murphy	Canterbury Melbourne U Melbourne U	2013-1	Macromolecular Crystallography (MX1)	Melbourne Uni Preferred Access 2 days 1-2 March 23-24 April
<b>Dr Ben Ruck</b> James McNulty Prof Joe Trodahl Prof Walter Lambrecht Dr Eva-Maria Anton Harry Warring	Victoria Victoria Victoria Case Western Victoria Victoria	2013-1	Soft X-ray Spectroscopy (SXR) “Soft x-ray spectroscopy of in-situ grown SmN and EuN”	Merit Access 5 days 5-10 March
<b>Dr Ren Dobson</b> Dr Michael Griffin Dr James Murphy Dr Sarah Kessans Jeremy Keown	Canterbury WEHI WEHI Canterbury Canterbury	2013-1	Small/Wide Angle X-ray Scattering (SAXS)	WEHI Merit Access 1 day 6-7 March
<b>Dr Tilo Soehnel</b> Daniel Wilson Hyung-Been Kang	Auckland Auckland Auckland	2013-1	Powder Diffraction (PD) “Structural studies on transition metal doped copper antimony”	Preferred Access 2 days 8-10 March
<b>Prof Kurt Krause</b> Dr Sigurd Wilbanks Dr Sylvia Luckner Dr Karen Knapp Prof Catherine Day Dr Adam Heikal Dr Yoshio Nakatani Dr Adam Middleton	Otago Otago Otago Otago Otago Otago Otago Otago	2013-1	Micro Crystallography (MX2) “University of Otago Structural Biology Group”	Merit Access 1 day 8-9 March

<b>Researchers</b>	<b>Institution</b>	<b>Cycle</b>	<b>Beamline</b>	<b>Access</b>
<b>Assoc Prof Emily Parker</b> Dr Celine Valery Prof Geoff Jameson Prof Juliet Gerard Dr Ali Reza Nazmi Dr Grant Pearce Dr Renwick Dobson Sebastian Reichau Dmitri Joseph Nicola Blackmore	Canterbury Canterbury Massey Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury	2013-1	Micro Crystallography (MX2) “Biomolecular Interaction Centre, University of Canterbury, Protein structure determination”	Preferred Access 1 day 9-10 March
<b>Dr Renwick Dobson</b> Dr Michael Griffin Dr James Murphy Dr Hironori Suzuki Dr Muge Kasnamascheff Arvind Ravichandra Dr Sarah Kessans	Canterbury Melbourne U Melbourne U Canterbury Canterbury Canterbury Canterbury	2013-1	Micro Crystallography (MX2)	Melbourne Uni Preferred Access 3 days 15-16 March 10-11 April 3-4 May
<b>Dr Natalia Pardo</b> Prof Shane Cronin Dr Heather Wright Dr Ben Kennedy Dr Ian Smith Rafael Torres	Massey Massey USGS Canterbury Auckland Massey	2013-1	Imaging and Medical (IM) “Reconstructing magma degassing processes from 3D pumice textures”	Merit Access 2 days 19-21 March (transferred to 24-26 August)
<b>Dr Steve Wakelin</b> Prof Enzo Lombi Dr Erica Donner	AgResearch Univ Sth Aust Univ Sth Aust	2013-1	X-ray Absorption Spectroscopy (XAS) “Speciation and bio-availability of nanoparticulate copper in soil”	Preferred Access 1 day 19-20 March
<b>Dr Steve Wakelin</b> Prof Enzo Lombi Dr Erica Donner	AgResearch Univ Sth Aust Univ Sth Aust	2013-1	X-ray Absorption Spectroscopy (XAS) “Speciation and bio-availability of nanoparticulate copper in soil”	Merit Access 1 day 20-21 March
<b>Dr Vladimir Golovko</b> Dr Aaron Marshall Campbell McNicoll Jan-Yves Ruzicka Faridah Abu Bakar Jared Steven Dr John Kennedy Dr Tim Kemmitt Campbell McNicoll	Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury GNS Science Callaghan Callaghan	2013-1	Powder Diffraction (PD) “Particle size determination using Synchrotron Powder Diffraction for accurate structure-property correlations”	Preferred Access 1 day 20-21 March
<b>Dr Ben Kennedy</b> Matt Edwards Paul Ashwell Felix von Aulock Prof Shane Cronin Dr Natalia Pardo	Canterbury Canterbury Canterbury Canterbury Massey Massey	2013-1	Imaging and Medical (IM) “Bubble collapse in experimental samples representative of volcanic plugs”	Merit Access 2 days 21-23 March (transferred to 26-28 August)

<b>Researchers</b>	<b>Institution</b>	<b>Cycle</b>	<b>Beamline</b>	<b>Access</b>
<b>Dr Chris Squire</b> Prof Ted Baker Dr Shaun Lott Ghader Bashiri Hanna Kwon Neil Paterson Paul Young Thomas Lagautriere Hanna Kwon	Auckland Auckland Auckland Auckland Auckland Auckland Auckland Auckland	2013-1	Macromolecular Crystallography (MX1) “Structural and molecular basis of microbial pathogenesis”	Merit Access 1 day 22-23 March
<b>Dr Chris Squire</b> Prof Ted Baker Dr Shaun Lott Ghader Bashiri Hanna Kwon Neil Paterson Paul Young	Auckland Auckland Auckland Auckland Auckland Auckland	2013-1	Macromolecular Crystallography (MX1) “Structural and molecular basis of microbial pathogenesis”	Preferred Access 1 day 5-6 April
<b>Dr Bridget Ingham</b> Dr Alistair Carr Gad Erlangga Dr Nigel Kirby	IRL Massey Massey Aust. Synch.	2013-1	Small/Wide Angle X-ray Scattering (SAXS) “Using a-SAXS to study Fe-fortification of milk”	Merit Access 3 days 11-14 April
<b>Dr Bridget Ingham</b> Dr Tim Kemmitt	IRL IRL	2013-1	Soft X-ray Spectroscopy (SXR) “Determining the location of Al in Al:ZnO films”	Preferred Access 3 days 17-20 April
<b>Dr Celine Valery</b> Prof Juliet Gerard Dr Renwick Dobson Deepti Mahapatra	Canterbury Canterbury Canterbury Canterbury	2013-1	Small/Wide Angle X-ray Scattering (SAXS) “Nanostructures by short biomimetic self-assembling peptides: high throughput study of molecular packing in the hydrated state”	Preferred Access 1 day 18-19 April
<b>Dr Chris Squire</b> Prof Ted Baker Dr Shaun Lott Ghader Bashiri Hanna Kwon Neil Paterson Paul Young Dr Genevieve Evans	Auckland Auckland Auckland Auckland Auckland Auckland Auckland	2013-1	Micro Crystallography (MX2) “Structural and molecular basis of microbial pathogenesis”	Preferred Access 1 day 23-24 April
<b>Dr Grant Pearce</b> Assoc Prof Emily Parker Prof Juliet Gerard Dr Renwick Dobson Hironui Suzuki Jeremy Keown Francesca Manea	Canterbury Canterbury Canterbury Canterbury Canterbury Macquarie U	2013-1	Small/Wide Angle X-ray Scattering (SAXS) “Biomolecular Interaction Centre, University of Canterbury”	Preferred Access 1 day 23-24 April

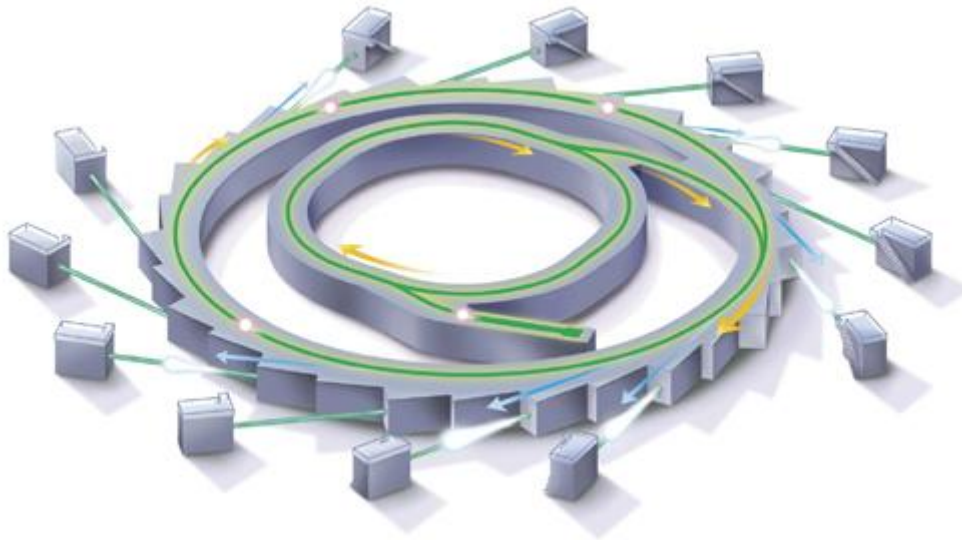
<b>Researchers</b>	<b>Institution</b>	<b>Cycle</b>	<b>Beamline</b>	<b>Access</b>
<b>Assoc Prof Emily Parker</b> Ali Reza Nazmi Dr Grant Pearce Penelope Cross Dr Renwick Dobson Penelope Cross Nicola Blackmore Moritz Lasse	Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury	2013-1	Small/Wide Angle X-ray Scattering (SAXS) “Allosteric control of aromatic amino acid biosynthesis: Complex formation and conformational changes”	Merit Access 1 day 24-25 April
<b>Dr Grant Pearce</b> Assoc Prof Bridget Mabbut Dr Renwick Dobson Dr Celine Valery Prof Juliet Gerard Prof Peter Steel Amy Yewdall Francesca Manea	Canterbury Macquarie U. Canterbury Canterbury Canterbury Canterbury Macquarie U.	2013-1	Small/Wide Angle X-ray Scattering (SAXS) “Characterization of Ring Shaped Protein Complexes”	Merit Access 1 day 25-26 April
<b>Assoc Prof Emily Parker</b> Prof Juliet Gerard Sebastian Reichau Gerd Mittelstaedt Dr Grant Pearce Dr Renwick Dobson Ali Reza Namzi Penelope Cross Emma Livingstone	Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury	2013-1	Small/Wide Angle X-ray Scattering (SAXS) “Regulation and solution structure changes in enzymes of histidine and leucine biosynthesis”	Merit Access 1 day 26-27 April
<b>Prof Wei Gao</b> Xiaojin Wei Saifang Huang Zhendi Yang Dr Filipa Silva Dr. Xue-xian Zhang	Auckland Auckland Auckland Auckland Auckland Massey	2013-1	Infrared Microscope (IRM) “In situ investigation of the impact of metallic copper on bacterial membrane using synchrotron FTIR spectro-microscopy”	Preferred Access 3 days 26-29 April
<b>Prof Kurt Krause</b> Dr Sigurd Wilbanks Dr Sylvia Luckner Dr Karen Knapp Dr Adam Heikal Dr Yoshio Nakatani	Otago Otago Otago Otago Otago	2013-1	Micro Crystallography (MX2) “University of Otago Structural Biology Group”	Preferred Access 1 day 27-28 April
<b>Dr Ben Kennedy</b> Dr Felix von Aulock	Canterbury Canterbury	2013-1	Infrared Microscope (IRM) “Toward an integrated model of water diffusion and bubble deformation”	Merit Access 5 days 30 Apr-5 May
<b>Prof Kurt Krause</b> Dr Sigurd Wilbanks Dr Sylvia Luckner Dr Karen Knapp	Otago Otago Otago Otago	2013-1	Macromolecular Crystallography (MX1) “University of Otago Structural Biology Group”	Preferred Access 1 day 8-9 May
<b>Assoc Prof Emily Parker</b> Prof Geoff Jameson Dr Ali Reza Nazmi Sebastian Reichau Logan Heyes	Canterbury Massey Canterbury Canterbury Canterbury	2013-1	Macromolecular Crystallography (MX1) “Inhibition and allostery of essential bacterial metabolism”	Preferred Access 1 day 9-10 May

<b>Researchers</b>	<b>Institution</b>	<b>Cycle</b>	<b>Beamline</b>	<b>Access</b>
<b>Chris Squire</b> Prof Ted Baker Dr Paul Young Dr Shaun Lott Ghader Bashiri Hanna Kwon	Auckland Auckland Auckland Auckland Auckland	2013-2	Macromolecular Crystallography (MX1) “Structural and molecular basis of microbial pathogenesis”	Merit Access 1 day 4-5 June
<b>Marco Brenna</b> Prof Shane Cronin	Massey	2013-2	X-ray Fluorescence Microscopy (XFM) “Hyper-enrichment of incompatible trace elements in phonolite eruptives; a sweating magma chamber or residual liquids?”	Preferred Access 3 days 6-9 June
<b>Dr Renwick Dobson</b> Dr Michael Griffin Dr Sarah Kessans Jennifer Crowther Dr Muge Kasanmascheff Rachel North Arvind Ravichandran Katherine Donovan	Canterbury Melb. Univ. Canterbury Canterbury Canterbury Canterbury Canterbury Canterbury	2013-2	Micro Crystallography (MX2)	Melb. Univ FI time 3 days 7-8 June 5-6 July 2-3 August
<b>Dr Tilo Soehnel</b> Morgan Allison	Auckland Auckland	2013-2	Powder Diffraction (PD) “Structural studies of (M'M') <sub>3</sub> Si <sub>2</sub> Sn <sub>7</sub> O <sub>16</sub> (M=Mn,Fe,Co)”	Preferred Access 1 day 14-15 June
<b>Prof Kurt Krause</b> Prof Catherine Day Dr Sigurd Wilbanks Dr Gregory Cook Emma Scaletti	Otago Otago Otago Otago Otago	2013-2	Macromolecular Crystallography (MX1) “University of Otago Structural Biology Group”	Merit Access 2 days 16-17 June, and 15-16 August
<b>Prof Vic Arcus</b> Dr Emma Summers Dr Judith Burrows Emma Andrews Tiffany Oulavallickal Erica Prentice Chelsea Vickers	Waikato Waikato Waikato Waikato Waikato Waikato	2013-2	Macromolecular Crystallography (MX1) “Proteins from Mycobacteria and Bacillus”	Merit Access 1 day 18-19 June
<b>Dr Grant Pearce</b> Dr Renwick Dobson Assoc Prof Bridget Mabbutt Dr Michael Griffin Hayden Mertens Prof Juliet Gerard Dr Celine Valery Prof Peter Steel	Canterbury Canterbury Macquarie U. Melbourne U. Aust. Synch Canterbury Canterbury Canterbury	2013-2	Small/Wide Angle X-ray Scattering (SAXS) “Assembly of Ring shaped proteins into higher order assemblies”	Preferred Access 1 day 18-19 June
<b>Assoc Prof Emily Parker</b> Dr Renwick Dobson Dr Grant Pearce Penelope Cross Dr Sebastian Reichau Dr Ali Reza Nazmi	Canterbury Canterbury Canterbury Canterbury Canterbury	2013-2	Small/Wide Angle X-ray Scattering (SAXS) “Allosteric control of aromatic amino acid biosynthesis: Complex formation and conformational changes”	Preferred Access 1 day 26-27 June

<b>Researchers</b>	<b>Institution</b>	<b>Cycle</b>	<b>Beamline</b>	<b>Access</b>
<b>Dr Vince Carbone</b> Dr Ron Ronimus Dr Linley Schofield	AgResearch AgResearch AgResearch	2013-2	Macromolecular Crystallography (MX1) “Structural characterization of the archaeal enzyme glycerol-1-phosphate dehydrogenase (G1P) and Thioredoxin (Trx) from the syphilis causative pathogen, <i>Treponema pallidum</i> ”	Merit Access 1 day 26-27 June
<b>Chris Squire</b> Prof Ted Baker Dr Paul Young Dr Shaun Lott Ghader Bashiri Hanna Kwon	Auckland Auckland Auckland Auckland Auckland	2013-2	Micro Crystallography (MX2) “Structural and molecular basis of microbial pathogenesis”	Merit Access 1 day 30 Jun – 1 Jul

## Australian Synchrotron

A synchrotron is a large research facility that generates an extremely intense beam of electromagnetic radiation ('light') that can be used for scientific experiments. The radiation is produced by taking a stream of electrons travelling at close to the speed of light, and deflecting them with magnetic fields. The light covers the electromagnetic spectrum from the infrared to the hard x-ray region.



Electrons are generated in the linear accelerator (linac), and progress into the smaller 'booster' ring, where they are further accelerated up to their final velocity (99.99% of the speed of light, a kinetic energy of 3.0 GeV). At this point they are 'injected' into the larger storage ring, where they circulate for a period of hours to days. The electron beam is steered and focused by magnetic fields. At each point where the beam is deflected, electromagnetic radiation is produced tangential to the beam path. 'Insertion devices', undulators and wigglers, are periodic magnet structures that serve to increase the radiation flux by up to five orders of magnitude. The radiation produced can be used in many different experiments and techniques. The light is channelled from the ring down a number of 'beam lines', each of which is optimised for a particular experimental technique.

The status of the various beam lines at the Australian Synchrotron can be summarised as follows:

- Protein crystallography (PX1) was the first beam line to become operational and began accepting general users in January 2008. This technique uses x-ray diffraction to determine the structure of proteins, used in drug design and understanding biochemical interactions.
- Infrared spectroscopy and microscopy (IR) also came online in early 2008. The beam line features two endstations: an FTIR spectrometer and an infrared microscope.
- Powder diffraction (PD) began taking general users in February 2008 and was fully operational by May 2008. This beam line is a general purpose diffraction beam line with several sample environments for observing changes in materials structure as a function of temperature, pressure, time, etc.

- The soft x-ray absorption spectroscopy (SXR) beamline was available for general users from the September-December 2008 cycle. It operates at low x-ray energies and is most useful for surface studies.
- Final commissioning of the X-ray absorption spectroscopy (XAS) beam line was completed at the end of 2008 and became available to general users from January 2009. This technique is useful for probing elemental valence states and determining the local structure around an atomic species of interest.
- Small-angle x-ray scattering (SAXS), combined with wide-angle x-ray scattering (WAXS) is a useful technique for determining large scale (1-100 nm), short-range order in materials. This beam line came online at the beginning of 2009.
- The commissioning of the second protein crystallography and small-molecule crystallography beamline (PX2) was completed in mid 2009. It complements the existing protein crystallography beam line and is able to measure micron-sized crystals and other weakly-scattering or hard to crystallise systems.
- The microspectroscopy beam line (XFM) construction was also completed in early 2009. This beamline combines the high spatial resolution of a microscope with the information that can be gleaned through x-ray fluorescence spectroscopy.
- The medical imaging and therapy beam line is has only recently become available for limited use. It was redesigned from its original concept. The redesign involved a 150 m long enclosure being built which extends well outside the synchrotron building.



The New Zealand Synchrotron Group was one of ten foundation investors, each of whom has contributed A\$5 million towards the initial suite of beam lines. This investment secured preferred (as-of-right) access for each foundation investor, spread over all the beam lines. For NZSG this typically amounted to approximately 3 days per beam line per four-month cycle. Proposals for preferred access are submitted at the same time as general access and undergo an internal selection process. The criteria the NZSG access committee has adopted seeks to favour new users to obtain beam time. The preferred access arrangements for foundation investors ceases in August 2013.

With the completion of the initial suite of nine beamlines, thoughts have now turned to the possibility of adding new beamlines to expand the facilities capabilities. The Australian Synchrotron has consulted with the research communities in Australia and New Zealand and a Science Case to add a further 10 beamlines and make other upgrades to the facility was published in July 2010. Consideration of this Case was set aside while arrangements were made to secure operating funding from the Australian Commonwealth and the Victorian State Governments and the other Foundation Investors. New Zealand has been offered the opportunity to contribute to the



development and secure ongoing access for New Zealand researchers to the enhanced facility and this is expected to be reactivated in the next 12 months.

In 2012 discussions were held between the Victorian State government and the Commonwealth government regarding the future funding of the operating costs for the Synchrotron. Foundation investors, including NZSG were involved in those discussions. The outcome was that the Commonwealth government would take an increased role in providing operating funding for the facility and a structure was established under which the facility was leased to a new subsidiary of the Australian Nuclear Science and Technology Organisation (ANSTO), the Synchrotron Light Source Australia Pty Ltd (SLSA) which became the new operator with effect from 1 January 2013. An operating funding package of A\$100 million over four years from 1 July 2012 to 30 June 2016 was negotiated with the funding being provided by both the Australian research sector and the Victorian State and Commonwealth governments. New Zealand was invited to participate in this arrangement and NZSG has agreed to provide 5% of the operating funds in return for 5% of the future access. Agreements establishing the funding and access arrangements for New Zealand were signed in July 2013.

# CORPORATE GOVERNANCE

## Board Composition

The company operates with a board comprising of 5 directors, including an independent chairman. Interim directors were appointed initially. These were replaced by a permanent board following elections which were held in April 2007.

The Directors during the period up to 30 June 2013 were:

Dr Garth Carnaby, Chair  
Dr Desmond Darby, GNS Science  
Professor Geoffrey Jameson, Massey University  
Professor James Metson, The University of Auckland  
Professor Ian Shaw, University of Canterbury

## Indemnities and Insurance

The Board has taken Directors and Officers Liability Insurance with Lumley General Insurance Limited. Coverage of up to \$5 million has been obtained.

## Attendance at Board Meetings

The following table shows the attendance at meetings of the Board for each director and the fees paid.

Director	No. meetings held during the year	No. meetings attended	Fees paid
Dr Garth Carnaby	6	6	\$6,000
Dr Desmond Darby	6	5	-
Professor Geoffrey Jameson	6	6	-
Professor James Metson	6	6	-
Professor Ian Shaw	6	4	-

## Donations

The company did not make any donations during the period from establishment up to 30 June 2013.

## Interests Register

During the course of undertaking its normal business activities in supporting the development of synchrotron science, the company provides assistance towards the travel costs for research staff from its shareholders. The practice at meetings of the board is for directors from organisations who are receiving financial support to declare an interest and to refrain from voting on that particular matter. During the period up to 30 June 2013 support was provided to staff from The University of Auckland, Massey University, the University of Canterbury and GNS Sciences.

The following significant entries relating to the directors were recorded in the Interests Register during the period.

<b>Director</b>	<b>Organisation/Entity</b>	<b>Nature of Interest</b>
<b>Dr GA Carnaby</b>		
Shares Held	GA Carnaby & Associates Ltd	Controlling majority
Beneficiary of Trusts	Carnaby Trust	Trustee and discretionary beneficiary
	National Provident Fund	Annuity/Defined benefit
Offices Held	Canterbury Development Corporation	Chair
	Canterbury Economic Development Trustee Ltd	Chair
	Food Innovation South Island	Chair
	Lincoln University	Entrepreneur in Residence
Other Interests	TEC/Ministry of Education	Adviser re PBRF
<b>Dr D Darby</b>		
Shares Held	Vector Ltd	Minority shareholder
	Sound Direction Ltd	Majority shareholder
Offices Held	Sound Direction Ltd	Director
	GNS Science	Senior manager
	NZ Association of Scientists	Council member
<b>Prof GB Jameson</b>		
Shares Held	Tower Ltd	Minority shareholder
Beneficiary of Trusts	Estate of MEB Jameson	Discretionary beneficiary
Offices Held	Massey University	Employee
<b>Prof JB Metson</b>		
Shares Held	Vector Energy	Minority shareholder
	Pacific Lithium	Minority shareholder
Offices Held	University of Auckland	Employee
Other Interests	RIAG	Chair
<b>Prof IC Shaw</b>		
Offices Held	University of Canterbury	Employee
Other Interests	Sandoz GmbH, Austria	Consultant



**New Zealand Synchrotron Group  
Limited  
Financial statements  
for the year ended 30 June 2012**

