

NEW ZEALAND SYNCHROTRON GROUP LIMITED



ANNUAL REPORT 2014

Contents

Chairman’s Report	1
Business Review	3
Investment in the Australian Synchrotron and Ongoing Access Rights	3
Decisions on Access and Funding Support	4
Use of the Australian Synchrotron by New Zealand Researchers	4
Support for Synchrotron Scientists	6
New Zealand Research Groups Awarded Beamtime	8
Australian Synchrotron	15
Corporate Governance	18
Board Composition	18
Indemnities and Insurance	18
Attendance at Board Meetings	18
Donations	18
Interests Register	18
Financial Statements	20

CHAIRMAN'S REPORT

The New Zealand Synchrotron Group Ltd (NZSG) has now completed its eighth year of operation and of providing support for New Zealand researchers using the Australian Synchrotron.



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 fundamental 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.

The past year was the first in which a new three year interim funding and access regime was in place. Under these interim arrangements New Zealand contributes 5% of the cost of operating the Synchrotron in return for 5% of the beamtime available to Australian and New Zealand users. The funds are provided jointly by the New Zealand government and eight of the company's shareholders. The 5% access level delivers approximately half the number of beamline shifts that was previously achieved when New Zealand researchers had unrestricted access to the merit pool plus dedicated Foundation Investor time. There has therefore been high demand for the available beamtime over the year and the company's Access Committee has had a difficult task taking the needs of the New Zealand research sector and the merit rankings of the Synchrotron's advisory committees into account when making the decisions on who receives the beamtime.

The current funding and access regime will operate until 30 June 2016 after which there may be a substantial change to the ownership structure of the Australian Synchrotron. The Victorian State government, which is the majority shareholder, has offered to transfer its shares to the Commonwealth government at no cost providing a sustainable future operating plan can be put in place. The company is already involved in discussions with other Synchrotron shareholders, the Australian Commonwealth government and the New Zealand government about how New Zealand can maintain its role as a stakeholder in the Synchrotron and secure ongoing advantageous access arrangements for New Zealand users. These discussions are at an early stage, but when the options for the New Zealand research community become clear they will be communicated to shareholders.

The company had budgeted for a surplus for the year of \$54,293. This was to be derived solely from trading operations as the full amortisation of the investment in the Australian Synchrotron was completed in June 2013. The result for the year was a

slightly greater surplus of \$81,049. The underlying trading result was ahead of expectations, but the overall result was heavily influenced by foreign exchange considerations. The budget had provided for expenditure of \$40,000 for the cost of forward exchange rate cover on future payments of the operating cost payment to SLSA. A payment of A\$70,000 was made to cover the 2015 and 2016 payments, but this was not directly expensed. On advice from the Auditor, the payment is being treated as a Derivative Financial Instrument and appears on the balance sheet. Because the New Zealand dollar is higher than the strike rate of the options purchased the Instrument had a value of \$10,441 as of 30 June 2014 and a one-off loss of \$68,718 has been recorded in the accounts. It should also be noted that the government has chosen to pay their share of the operating costs in New Zealand currency. The nominal rate at which their payment was made was considerably lower than the actual rate when the onward payment was made to the Synchrotron operator which resulted in a windfall of \$137k, some of which had been anticipated in the budget.

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 this is supplemented by funds from external sources such as the money received from the Australian Synchrotron to provide funding for travel and the interest on funds the company holds. The company does, however, have cash reserves in excess of \$270,000.

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 its members Professor Vic Arcus, Dr Vladimir Golovko and Dr Geoff Waterhouse who have evaluated all requests for 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 became a member of the Australian Synchrotron Company (ASCo) 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. SLSA is a subsidiary of the Australian Nuclear Science and Technology Organisation (ANSTO). ASCo was deregistered in June 2013, however 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 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 took an increased role in providing operating funding for the facility and a structure was established under which the facility was leased to SLSA. 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 is providing 5% of the operating funds in return for 5% of the access.

Three of NZSG's shareholders decided not to maintain their ability to access beamtime on the Synchrotron. The remaining eight collectively contribute A\$652,750 per annum which is supplemented by funding from the New Zealand government. In total, New Zealand provides A\$1.39 million each year as New Zealand's share of the operating costs. These funds are channelled through the company which entered into a Funding and Access Agreement with SLSA in September 2013 which governs the access arrangements until 30 June 2016.

The first payment of A\$1.39 million to SLSA was made on 28 February 2014.

The Funding and Access Agreement also provides for the company to influence the way in which the 5% overall entitlement to beamtime is allocated to provide the best advantage for New Zealand. This includes being able to decide on the distribution of beamtime between beamlines and on the ranking of the New Zealand proposals to each beamline. New Zealand researchers from the eight funding institutions are able to apply to the Australian Synchrotron for beamtime. Their applications are assessed

on a merit basis by the Synchrotron's beamline panels, however the selections are not finalized until the company has also considered them

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 has also 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

The Board has established an Access Committee to make the decisions on applications for beamline access and to select researchers to attend the Cheiron School run each year at the SPRing-8 Synchrotron in Japan. The members of the Committee are:

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 Committee met by teleconference throughout the year as required to make their selections. The table at the end of this section of the Annual Report lists the New Zealand researchers who have gained beamline access to the Australian Synchrotron from July 2013 onwards, and where applicable, the funding support provided to them.

Use of the Australian Synchrotron by New Zealand Researchers

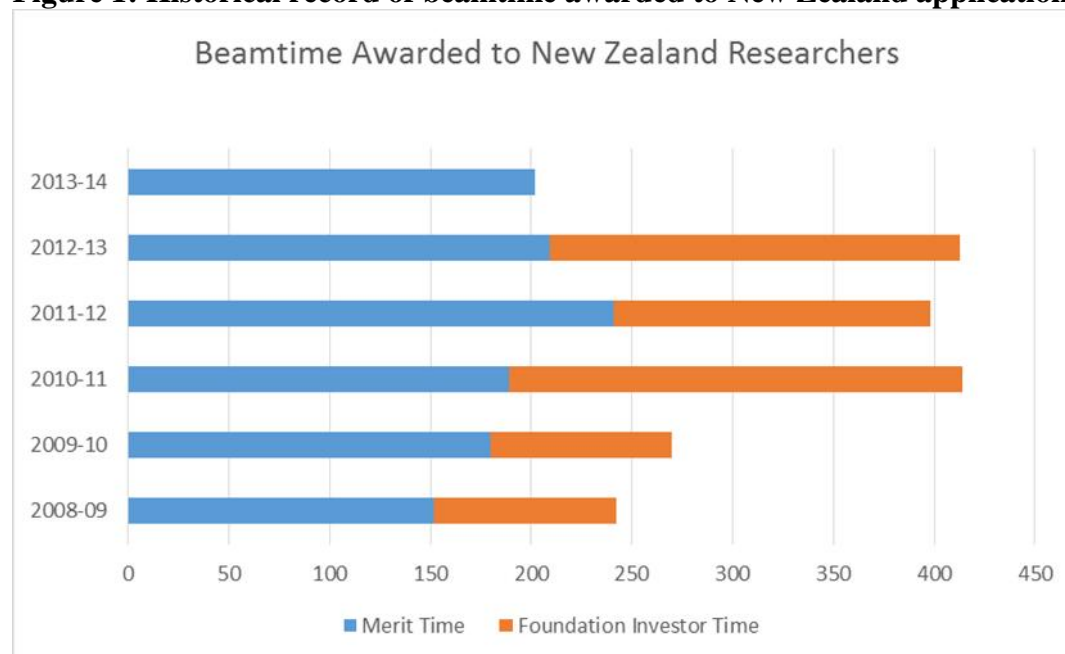
The first of the beamlines was successfully commissioned in mid 2007 and since then all of the originally planned beamlines have become operational. The last of them, the Imaging and Medical Beamline, is not yet fully available, but some merit time has been awarded during the past year. Approximately 80% of the available beamline time is assigned to the "merit access" pool 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, however as explained above, NZSG oversees the ultimate selection of which New Zealand applicants receive beamtime.

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.

Under the new access regime introduced at the Synchrotron in 2013, New Zealand researchers are entitled to receive 5% of the available beamtime. This is considerably

less than had been received under the former funding and access regime when through open access to the merit pool of beamtime and guaranteed access to a set amount of Foundation Investor time, New Zealand received approximately 10% of the available time. Figure 1 shows this change in graphical format.

Figure 1: Historical record of beamtime awarded to New Zealand applications



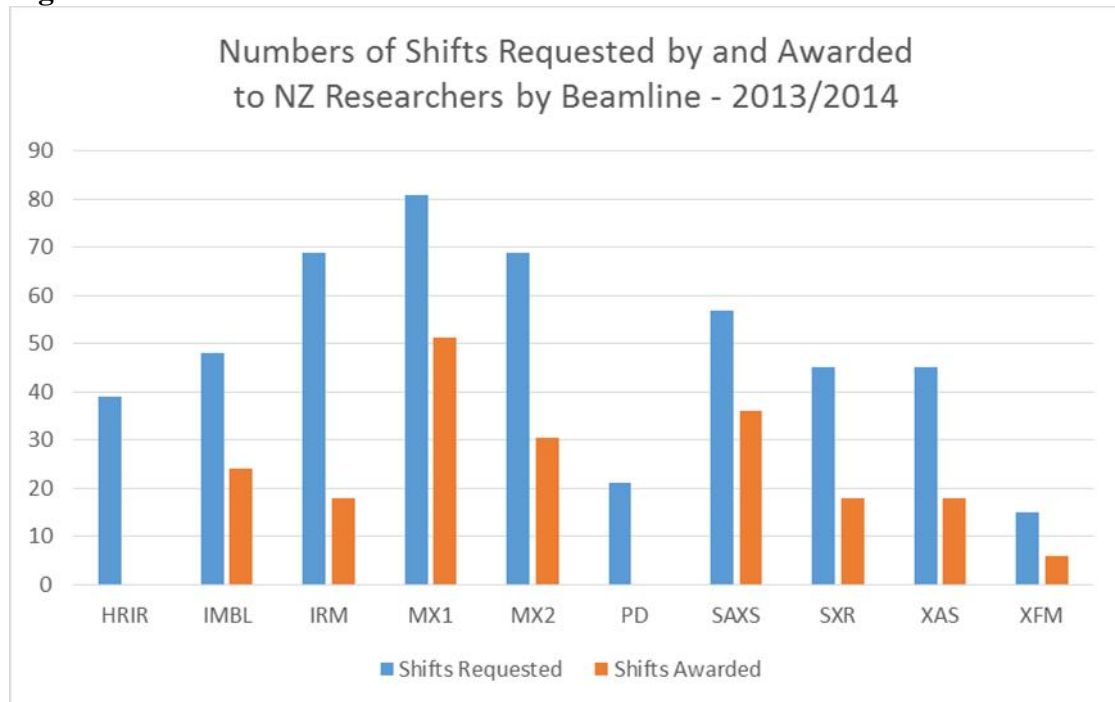
The research community has had to adjust to the reduced level of access. There is now more demand for beamtime and consequently a higher proportion of proposals for beamtime are unsuccessful. This has been compensated for to some extent by increased collaboration between research groups within New Zealand and also with colleagues in Australia. Of 56 applications made by New Zealand researchers for beamtime during the 2013/14 year, only 28 (or 50%) were successful. The applicants had requested 489 beamline shifts and were awarded 202 shifts (41% of that requested).

Table 1: Success Rate for NZ Beamtime Applications – 2013/14

Beamline	No. Shifts Requested	No. Shifts Awarded		No. Appl'ns. Received	No. Awarded Beamtime	
HRIR	39	0	0%	4	0	0%
IMBL	48	24	50%	6	3	50%
IRM	69	18	26%	7	2	29%
PD	21	0	0%	2	0	0%
SAXS	57	36	63%	16	9	56%
SXR	45	18	40%	4	1	25%
XAS	45	18	40%	5	2	40%
XFM	15	6	40%	2	1	50%
Subtotal	339	120	35%	46	18	39%
MX (CAPs)	150	82	55%	10	10	100%
Overall	489	202	41%	56	28	50%

A new system was introduced from the 2013/3 cycle for the administration of proposals for the Crystallography beamlines (MX1 and MX2). Collaborative Access Programmes (CAPs) were established under which larger groups could apply for beamtime for a 12 month period. Three New Zealand-based CAPs were established and two other research teams became part of Australian-based CAPs. Beamtime was awarded to all groups, although not at the levels sought. The treatment of proposals under the CAP system disguises the low success rates for applicants to the other beamlines as can be seen from the preceding table and the two following graphs.

Figure 2: Success Rate for Beamtime Shift Awards to NZ for 2013/14



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 access are entitled. 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 (AOFSRR), six places are made available each year for young researchers to attend the Cheiron School at the SPring-8 Synchrotron in Japan. Two of the students receive full funding for travel and accommodation. The remaining places are for self-funded participants.

The table below provides details of the students who were selected to attend the School in September 2013.

Name	Institution	Details	Comment
Travis Ancelet	GNS Science	Scientist	Fully funded
Huang Saifang	University of Auckland	PhD student	Fully funded
Marco Brenna	Massey University	Postdoc	Self-funded
Alissa Hackett	University of Auckland	PhD student	Self-funded
Wan-Ting Chen	University of Auckland	PhD student	Self-funded
Ali Reza Nazmi ⁺	University of Canterbury	PhD student	Self-funded

+ Ali Reza Nazmi withdrew from attending the School immediately prior to its commencement.



D K W Smith
Executive Officer
Secretariat

New Zealand Research Groups Awarded Beamtime (July 2013 – June 2014)

The following New Zealand research groups were awarded time (merit and preferred) at the Australian Synchrotron between July 2013 and June 2014.

Researchers	Institution	Cycle	Beamline	Access	Travel Funding
Prof Emily Parker Prof Geoff Jameson Dr Renwick Dobson Dr Grant Pearce Dr Sebastian Reichau Dr Ali Reza Nazmi Gerd Mittelstaedt	Canterbury Massey Canterbury Canterbury Canterbury Canterbury Canterbury	2013-2	Macromolecular Crystallography (MX1) “Inhibition and allostery of essential bacterial metabolism”	Preferred Access 1 day 5-6 July	\$1,107
Dr Renwick Dobson 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) “University of Melbourne and Bio21 Institute Australian Synchrotron Time: MX beamlines”	Melb. Univ FI time 2 days 5-6 July 2-3 August	\$2,798
Dr Vladimir Golovko Dr Bridget Ingham Gregory Metha Gunther Andersson Jan-Yves Ruzicka	Canterbury Callaghan Adelaide U. Flinders U. Canterbury	2013-2	Small/Wide Angle X-ray Scattering (SAXS) “In-situ particle sizing study of Au cluster aggregation on TiO ₂ nanoparticle supports”	Director’s Access 1 day 9-10 July	\$2,684
Dr Renwick Dobson Dr James Murphy Dr Mortiz Lasse Dr Penelope Cross Katherine Donovan	Canterbury WEHI Canterbury Canterbury Canterbury	2013-2	Small/Wide Angle X-ray Scattering (SAXS) “Pseudokinase domains as modulators of signal transduction pathways”	WEHI Merit Access 1 day 10-11 July	\$2,836
Dr Johan Verbeek Jim Bier Mark Lay Talia Hicks	Waikato Waikato Waikato Waikato	2013-2	Infrared Microscope (IRM) “Spatial resolution of primary and secondary structures in decoloured bloodmeal”	Merit Access 1 day 11-12 July	\$3,510
Dr Johan Verbeek Jim Bier Mark Lay Talia Hicks	Waikato Waikato Waikato Waikato	2013-2	Infrared Microscope (IRM) “Spatial resolution of primary and secondary structures in decoloured bloodmeal”	Preferred Access 3 days 12-15 July	Incl. in above
Prof Kurt Krause Prof Catherine Day Dr Sigurd Wilbanks Dr Gregory Cook	Otago Otago Otago Otago	2013-2	Micro Crystallography (MX2) “University of Otago Structural Biology Group”	Merit Access 1 day 14-15 July	N/A
Prof Richard Haverkamp Katie Sizeland Hannah Wells Richard Edmonds	Massey Massey Massey LASRA	2013-2	X-ray Absorption Spectroscopy (XAS) “Is biochar an environmentally acceptable method for disposal of chrome tanned leather?”	Preferred Access 2 days 18-20 July	\$2,900

Researchers	Institution	Cycle	Beamline	Access	Travel Funding
Dr Grant Pearce Dr Michael Griffin Dr Haydyn Mertens Jeremy Keowns	Canterbury Melb. Univ Aust. Synch. Canterbury	2013-2	Small/Wide Angle X-ray Scattering (SAXS) “Determining the Solution Structure of Rubisco Activase at Low Protein Concentrations”	Preferred Access 1 day 19-20 July	\$881
Dr Chris Squire Prof Ted Baker Dr Paul Young Dr Shaun Lott Dr Ghader Bashiri Hanna Kwon	Auckland Auckland Auckland Auckland Auckland	2013-2	Macromolecular Crystallography (MX1) “Structural and molecular basis of microbial pathogenesis”	Preferred Access 1 day 26-27 July	N/A
Dr Mark Jones Jun Shariffuddin Darrell Patterson Moira Brady	Auckland Auckland Bath Univ Auckland	2013-2	Powder Diffraction (PD) “An in-situ Synchrotron Powder Diffraction study of the calcium carbonate to calcium oxide transformations in green lipped mussel shells for the formation of hydroxyapatite”	Preferred Access 2 days 27-29 July	\$1,454
Dr Shaun Lott Dr Chris Squire Prof Ted Baker	Auckland Auckland Auckland	2013-2	Macromolecular Crystallography (MX1) “Structure-based inhibitor design”	Merit Access 1 day 28-29 July	N/A
Prof Vic Arcus Chelsea Vickers	Waikato Waikato	2013-2	Micro Crystallography (MX2) “Proteins from Mycobacteria and Bacillus”	Preferred Access 1 day 30 -31 July	\$989
Dr Chris Squire Prof Ted Baker Dr Paul Young Dr Shaun Lott Dr Ghader Bashiri Hanna Kwon	Auckland Auckland Auckland Auckland Auckland Auckland	2013-2	Micro Crystallography (MX2) “Structural and molecular basis of microbial pathogenesis”	Preferred Access 1 day 10-11 August	N/A
Dr Renwick Dobson Dr Michael Griffin Hironori Suzuki Deepti Mahapatra Rachel North	Canterbury Melb. Univ. Canterbury Canterbury Canterbury	2013-2	Macromolecular Crystallography (MX1) “University of Melbourne and Bio21 Institute Australian Synchrotron Time: MX beamlines”	Melb. Univ FI time 1 day 13-14 August	\$2,507
Dr Ian Schipper Felix von Aulock Dr Ben Kennedy Matt Edwards	VUW Canterbury Canterbury Canterbury	2013-2	Infrared Microscope (IRM) “Linking water diffusion to textural evolution of basaltic melt”	Merit Access 4 days 13-17 August	\$2,804
Prof Terry Seward Dr Bruce Mountain Nellie Olsen Dr Weihua Liu	VUW GNS Sci VUW/GNS CSIRO	2013-2	X-ray Absorption Spectroscopy (XAS) “X-ray absorption spectroscopy of antimony(III)-sulfide species (thioantimonites) in aqueous solution”	Merit Access 2 days 15-17 August	\$1,595
Prof Kurt Krause 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 1 day 15-16 August	\$1,091

Researchers	Institution	Cycle	Beamline	Access	Travel Funding
Prof Emily Parker Prof Geoff Jameson Dr Renwick Dobson Dr Grant Pearce Dr Sebastian Reichau Dr Ali Reza Nazmi	Canterbury Massey Canterbury Canterbury Canterbury Canterbury	2013-2	Micro Crystallography (MX2) “Inhibition and allostery of essential bacterial metabolism”	Preferred Access 1 day 20-21 August	\$1,913
Dr Ben Kennedy 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 20-22 August	\$2,989
Dr Natalia Pardo 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 24-26 August	\$3,130
Prof Vic Arcus Dr Emma Andrews Tiffany Oulavallickal	Waikato Waikato Waikato	2013-2	Macromolecular Crystallography (MX1) “Proteins from Mycobacteria and Bacillus”	Preferred Access 1 day 26-27 August	\$1,580
Dr Aaron Marshall Dr Brent Johannessen Dr Vladimir Golovko Diandree Padayachee Sophia Mellsop Jared Steven Calvin Lim	Canterbury Aust. Synch Canterbury Canterbury Canterbury Canterbury Canterbury	2013-2	X-ray Absorption Spectroscopy (XAS) “Influence of electrochemical potential on the structure of electrocatalytic gold Nanoparticles”	Preferred Access 1 day 28-29 August	\$1,645
Prof Richard Haverkamp Katie Sizeland Hanan Kayed Hannah Wells Richard Edmonds	Massey Massey Massey Massey LASRA	2013-2	Infrared Microscope (IRM) “Mapping cross linking in collagen materials”	Merit Access 2 days 30 Aug – 1 Sep	\$2,900
Dr Shaun Lott Dr Chris Squire Prof Ted Baker	Auckland Auckland Auckland	2013-2	Micro Crystallography (MX2) “Structure-based inhibitor design”	Merit Access 1 day 31 Aug – 1 Sep	N/A
Dr Nanette Schleich Dr Stewart Midgley	Otago Monash U.	2013-3	Imaging and Medical (IM) “Dual Energy X-ray Analysis Using Synchrotron Computed Tomography at 30–80 keV”	Monash Univ. Merit Access 2 days 19-21 September	\$732
Dr Ian Schipper James White Matt Edwards Dr Jonathan Castro Dr Mike James Dr Hugh Tuffen	VUW Otago Canterbury Monash U. Lancaster U. Lancaster U.	2013-3	Imaging and Medical (IM) “In-conduit annealing of pumice: Nano-scale evidence for multi-stage fragmentation, and controls on volcanic explosivity”	Merit Access 2 days 24-26 September	\$2,511

Researchers	Institution	Cycle	Beamline	Access	Travel Funding
Dr Chris Squire Assoc Prof Peter Metcalf Prof Ted Baker Dr Shaun Lott Dr Alok Mitra Dr David Goldstone Dr Richard Kingston	Auckland Auckland Auckland Auckland Auckland Auckland	2013-3	Macromolecular Crystall. (MX1) Micro Crystallography (MX2) “University of Auckland Structural Biology Collaborative Access Program”	Merit Access 4 days 2-3 October 18-19 October 14-15 November 6-7 December	N/A
Prof Kurt Krause Sigurd Wilbanks Prof Catherine Day Dr Gregory Cook Josh Wright	Otago Otago Otago Otago Otago	2013-3	Macromolecular Crystall. (MX1) Micro Crystallography (MX2) “University of Otago Structural Biology Group Collaborative Access Programme”	Merit Access 1 day 4-5 October 28-29 November	N/A
Prof Emily Parker Prof Geoff Jameson Prof Vic Arcus Chelsea Vickers Gerd Mittelstaed Tiffany Oulavallickal Dr Emma Andrews Logan Heyes Gerd-Jan Moggre	Canterbury Massey Waikato Waikato Canterbury Waikato Waikato Canterbury Canterbury	2013-3	Macromolecular Crystall. (MX1) Micro Crystallography (MX2) “Enzymes, Allostery and Evolution – Collaborative Access Programme”	Merit Access 4 days 5-6 October 29-30 October 26-27 November 12-13 December	\$9,256
Prof Emily Parker Prof Geoff Jameson Penelope Cross Ali Reza Namzi Nicky Blackmore Rachel North	Canterbury Massey Canterbury Canterbury Canterbury Canterbury	2013-3	Small/Wide Angle X-ray Scattering (SAXS) “Allosteric control of aromatic amino acid biosynthesis: Engineered allostery and complex formation”	Merit Access 1 day 15-16 October	\$2,368
Dr Celine Valery Prof Juliet Gerard Dr Renwick Dobson Rishi Pandey Deepti Mahapatra	Canterbury Canterbury Canterbury Canterbury Canterbury	2013-3	Infrared Microscopy (IRM) “Nanostructures by short biomimetic self-assembling peptides: insights into peptide conformation and protonation state”	Merit Access 2 days 24-26 October	\$2,189
Dr Virginia Toy Dr Mark Pearce Dr Chris Ryan Dr James Cleverley	Otago CSIRO CSIRO CSIRO	2013-3	X-ray Fluorescence Microscopy (XFM) “Raising the TitaniQ: Quantifying the effects of recrystallization on the Titanium in Quartz thermometer”	Merit Access 2 days 13-15 November	N/A
Prof Richard Haverkamp Katie Sizeland Hanan Kayed Hannah Wells	Massey Massey Massey Massey	2013-3	Small/Wide Angle X-ray Scattering (SAXS) “Looseness in Leather”	Merit Access 2 days 17-19 December	\$2,668
Dr Bridget Ingham Dr Nigel Kirby Dr Alistair Carr Alice Smialowska	Callaghan Innov. Aust. Synch Massey Massey	2014-1	Small/Wide Angle X-ray Scattering (SAXS) “Using Anomalous SAXS to Study Fe- fortification of Milk”	Aust Synch time 3 days 31 Jan-3 Feb	\$2,636
Dr Ben Kennedy Felix von Auclock Dr Ian Schipper James Colwyn Matt Edwards	Canterbury Canterbury VUW Canterbury Canterbury	2014-1	Imaging & Medical (IM) “Bubble collapse in experimental samples representative of volcanic plugs”	Merit Access 3 days 6-9 February	\$2,607

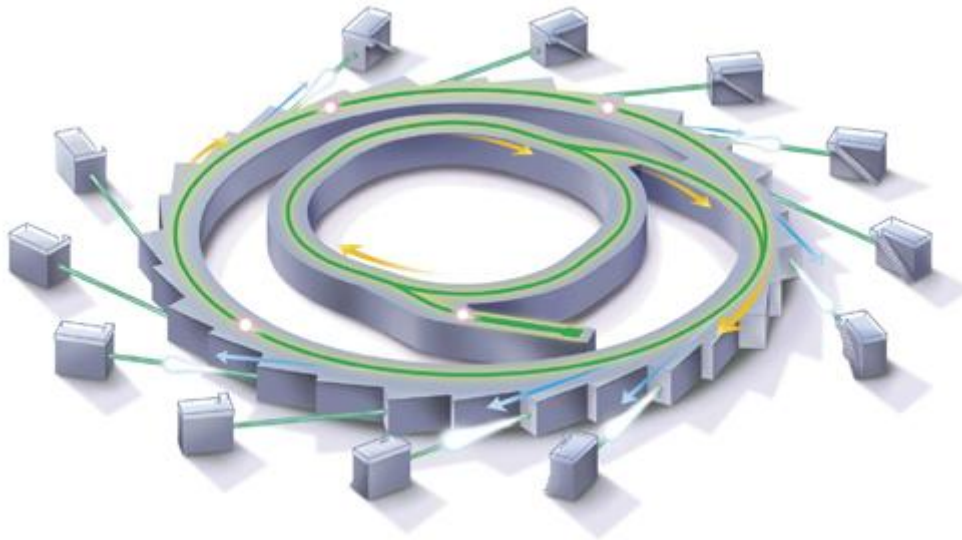
Researchers	Institution	Cycle	Beamline	Access	Travel Funding
Dr John Verbeek Dr Mark Lay Jim Bier Prof Richard Haverkamp	Waikato Waikato Waikato Massey	2014-1	Small/Wide Angle X-ray Scattering (SAXS) "Chain alignment and deformation during tensile strain and stress relaxation of thermoplastic protein"	Merit Access 2 days 14-16 February	\$2,490
Prof Kurt Krause Sigurd Wilbanks Prof Catherine Day Dr Gregory Cook Dr Peter Mace Martina Foglizzo	Otago Otago Otago Otago Otago Otago	2014-1	Macromolecular Crystall. (MX1) Micro Crystallography (MX2) "University of Otago Structural Biology Group Collaborative Access Programme"	Merit Access 2 days 20-21 February 2-3 May	\$2,089
Dr Martin Williams Bradley Mansel Dr Leif Lundin	Massey Massey CSIRO	2014-1	Small/Wide Angle X-ray Scattering (SAXS) "Building structure-function bridges in soft biopolymeric materials: Probing the architecture of polysaccharide gels"	CSIRO time 3 days 20-23 February	\$1,758
Prof Emily Parker Prof Geoff Jameson Prof Vic Arcus Gerd Mittelstaed Chelsea Vickers Erica Prentice Dr Emma Andrews Logan Heyes Gerd-Jan Moggre	Canterbury Massey Waikato Canterbury Waikato Waikato Waikato Canterbury Canterbury	2014-1	Small/Wide Angle X-ray Scattering (SAXS) "Allosteric control of aromatic amino acid biosynthesis: Engineered allostery and complex formation"	Merit Access 3 days 27-28 February 2-3 April 3-4 May	\$5,730
Prof Emily Parker Dr Penelope Cross Dr Ali Reza Nazmi Prof Geoff Jameson Nicola Blackmore Dr Moritz Lasse	Canterbury Canterbury Canterbury Massey Canterbury Canterbury	2014-1	Small/Wide Angle X-ray Scattering (SAXS) "Allosteric control of aromatic amino acid biosynthesis: Engineered allostery and complex formation"	Merit Access 1 day 2-3 March	\$2,708
Dr Bridget Ingham Prof David Williams Monika Ko	Callaghan Auckland Auckland	2014-1	Small/Wide Angle X-ray Scattering (SAXS) "In situ monitoring of electrochemically-induced precipitation of FeCO ₃ in solution"	Merit Access 2 days 13-15 March	\$1,799
Dr Vladimir Golovko Dr Bridget Ingham A/P Gunther Andersson A/P Gregory Metha Dr Tim Kemmett Campbell McNicoll	Canterbury Callaghan. Flinders U. Adelaide U. Callaghan. Canterbury	2014-1	Soft X-ray Spectroscopy (SXR) "Novel approach to synthesis of blue titania - an investigation of the nature and location of the key species effecting the electronic structure and catalytic properties"	Flinders U. time 5 days 18-23 March	N/A
Dr Grant Pearce Dr Ren Dobson Dr Michael Griffin Dr Haydn Mertens Jeremy Keown Penelope Cross	Canterbury Canterbury Melb Univ Aust Synch Canterbury Canterbury	2014-1	Small/Wide Angle X-ray Scattering (SAXS) "Correlating the Biological Function and Oligomeric State of Rubisco Activase"	Merit Access 1 day 25-26 March	\$2,394

Researchers	Institution	Cycle	Beamline	Access	Travel Funding
Christina Efthymiou Dr Li Day	VUW CSIRO	2014-1	Small/Wide Angle X-ray Scattering (SAXS) "Casein Protein Structure Assembly"	CSIRO time 2 days 26-28 March	\$841
Dr Chris Squire Assoc Prof Peter Metcalf Prof Ted Baker Dr Shaun Lott Dr Alok Mitra Dr David Goldstone Dr Richard Kingston	Auckland Auckland Auckland Auckland Auckland Auckland	2014-1	Macromolecular Crystall. (MX1) Micro Crystallography (MX2) "University of Auckland Structural Biology Collaborative Access Program"	Merit Access 2 days 26-27 March 1-2 April	N/A
Dr Jerome Leveneur Prof Mark Ridgway Dr John Kennedy Pierre Couture Andrew Chan Tushara Prakash Prof Grant Williams	GNS Sci ANU GNS Sci GNS Sci Auckland VUW VUW	2014-1	Soft X-ray Spectroscopy (SXR) "A novel approach to band gap depth profiling: angle and energy resolved -XPS and -PEY-XANES"	Merit Access 6 days 8-14 April	\$2,380
Dr Tilo Soehnel A/Prof Clement Ulrich Daniel Wilson Paul Graham	Auckland Uni NSW Auckland Uni NSW	2014-1	Far Infrared (FIR) "Pressure dependent IR spectroscopy studies of the phase transition in Cu ₅ SbO ₆ "	UNSW Access 3 days 28 Apr-1 May	N/A
Dr Terry Seward Nellie Olsen Dr Bruce Mountain	VUW GNS Sci GNS Sci	2014-1	X-ray Absorption Spectroscopy (XAS) "X-ray absorption spectroscopy of antimony(III)-sulfide species (thioantimonites) in aqueous solution"	Merit Access 4 days 8-12 May	\$2,621
Dr Tilo Soehnel Dr Trevor Findlayson Cory Leung Hyung Been Kang	Auckland Melb Univ Auckland Auckland	2014-2	Powder Diffraction (PD) "Structural Phase transitions in Cu _{1-x} CoxSb ₂ O ₆ "	Melb. U. time 4 days 12-16 June	tba
Dr Grant Pearce Dr Renwick Dobson Dr Michael Griffin Jeremy Keown Serena Watkin Amy Yewdall	Canterbury Canterbury Melb Univ Canterbury Canterbury Canterbury	2014-2	Small/Wide Angle X-ray Scattering (SAXS) "Investigations into how ATP triggers hexamer formation of Rubisco activase"	Merit Access 1 day 17-18 June	tba
Dr Chris Squire Assoc Prof Peter Metcalf Prof Ted Baker Dr Shaun Lott Dr Alok Mitra Dr David Goldstone Dr Richard Kingston	Auckland Auckland Auckland Auckland Auckland Auckland	2014-2	Macromolecular Crystall. (MX1) Micro Crystallography (MX2) "University of Auckland Structural Biology Collaborative Access Program"	Merit Access 1 day 18-19 June	tba
Prof Emily Parker Prof Geoff Jameson Prof Vic Arcus	Canterbury Massey Waikato	2014-2	Small/Wide Angle X-ray Scattering (SAXS) "Allosteric control of aromatic amino acid biosynthesis: Engineered allostery and complex formation"	Merit Access 1 day 20-21 June	tba

Researchers	Institution	Cycle	Beamline	Access	Travel Funding
Prof Emily Parker Dr Penelope Cross Gerd Mittelstaed	Canterbury Canterbury Canterbury	2014-2	Small/Wide Angle X-ray Scattering (SAXS) “Allosteric control of amino acid biosynthesis: Engineered allostery using discrete domains”	Merit Access 1 day 20-21 June	tba
Dr Renwick Dobson Dr Suzuki Hinori Dr Sarah Kessans Dr Muge Kasanmascheff Dr Michael Griffin	Canterbury Canterbury Canterbury Canterbury Melb Univ	2013-3 to 2014-2	Macromolecular Crystall. (MX1) Micro Crystallography (MX2) “University of Melbourne, Bio21 Institute, and Affiliated Researchers Collaborative Access Programme Group”	Merit Access MX1 13.5 shifts (4.5 days) MX2 13.1 shifts (4.3 days) Various dates	N/A
Dr Paul Kruger Dr David Turner A/Prof Michael Gardiner	Canterbury Monash U. Univ of Tasmania	2013-3 to 2014-2	Macromolecular Crystall. (MX1) Micro Crystallography (MX2) “Chemical Crystallography of Functional Materials and Molecules”	Merit Access MX1 3.5 shifts (1.16 days) MX2 3.25 shifts (1.08 days) Various dates	N/A

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 (MX1) 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 (MX2) 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 in addition to unrestricted access to the merit beamtime pool. The preferred access arrangements for foundation investors ceased 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	5	5	\$6,000
Dr Desmond Darby	5	5	-
Professor Geoffrey Jameson	5	5	-
Professor James Metson	5	5	-
Professor Ian Shaw	5	3	-

Donations

The company did not make any donations during the period from establishment up to 30 June 2014.

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 2014 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.

Director	Organisation/Entity	Nature of Interest
Dr GA Carnaby		
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
Dr D Darby		
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
Prof GB Jameson		
Shares Held	Tower Ltd	Minority shareholder
Beneficiary of Trusts	Estate of MEB Jameson	Discretionary beneficiary
Offices Held	Massey University	Employee
Other Interests	Te Manawa Museums Trust Board	Board member
Prof JB Metson		
Shares Held	Vector Energy	Minority shareholder
	Pacific Lithium	Minority shareholder
Offices Held	University of Auckland	Employee
	MBIE	Chief Science Adviser
Other Interests	Australian Synchrotron	Science Advisory Committee member
Prof IC Shaw		
Offices Held	University of Canterbury	Employee
Other Interests	Sandoz GmbH, Austria	Consultant
	New Zealand Pharmaceuticals	Consultant

**New Zealand Synchrotron Group
Limited
Financial statements
for the year ended 30 June 2014**

