# NEW ZEALAND SYNCHROTRON GROUP LIMITED



**ANNUAL REPORT 2015** 

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## CHAIRMAN'S REPORT

The New Zealand Synchrotron Group Ltd (NZSG) has now completed its ninth year of operation 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 second 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 is expected to 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. In anticipation of an agreement by the Commonwealth government, NZSG and the other minor shareholders have been asked to also transfer their shares so that the Commonwealth can achieve 100% ownership. Discussions with other Synchrotron shareholders, the Australian Commonwealth government and the New Zealand government about maintaining New Zealand's role as a stakeholder in the Synchrotron and securing ongoing advantageous access arrangements for New Zealand users are well advanced. Under the proposed new arrangements NZSG's shareholding would be replaced by a partnership arrangement between the Australian and New Zealand governments on synchrotron science that provided for ongoing access to the Synchrotron by New Zealand users. Following consultation with shareholders in April 2015, a business

case has been prepared and submitted to the New Zealand government asking for continued financial support so that New Zealand can maintain the 5% level of access to the Synchrotron.

The company had budgeted for a surplus for the year of \$50,735. 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. While the result from providing secretariat and synchrotron science support activities was slightly ahead of budget, the overall result was heavily influenced by foreign currency considerations, with an overall surplus of \$237,121 being achieved. The board was able to purchase the Australian currency required for the February 2015 payment to SLSA at a very favourable exchange rate generating an unanticipated windfall surplus of \$104,564. In addition, the board has taken a forward contract for next year's payment to SLSA and the Auditor has advised that this must also be valued and treated as a financial derivative, giving a further unexpected surplus of \$59,055. These two factors combined account for the majority of the "non-trading" component of the overall surplus for the year. It should be noted that the value of the forward contract will have to be written down in 2015/16 and so will have a negative effect on next year's performance.

Shareholder equity has increased from \$211,044 to \$511,165. Given the uncertainty in the future ownership of the Synchrotron, funding levels and currency exchange rate movements, the directors believe it is prudent to maintain this level of cash reserves in the short term and to reassess the situation once the future funding arrangements with the government are finalised with a view to purchasing additional beamtime.

Membership of the New Zealand synchrotron user community is set to expand. Following agreement by all shareholders to the resolution put to them on 26 May 2015, the company will issue 163,104 new shares to AUT. Payment is expected in October 2015 after which a Deed of Accession will be circulated to shareholders for signing. AUT researchers will be provided with some proprietary beamtime on the Synchrotron in 2015/16 and will join the other funding institutions for the post July 2016 arrangements.

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 make by Dr Don Smith in assisting the board, administering the New Zealand Synchrotron Support Programme and negotiating the funding and access arrangements. 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.

G. 9. Carnaby

GA Carnaby Chair

## **BUSINESS REVIEW**

### Investment in the Australian Synchrotron and 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 in 2012, 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 was 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.

In 2012 discussions between the Victorian State government and the Commonwealth government resulted in the Commonwealth government taking 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 is providing 5% of the operating funds in return for 5% of the access.

Three of NZSG's shareholders, Ag Research, Plant & Food Research and Lincoln University, are not part of the current funding arrangement and so do not have access to merit time at 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 that governs the access arrangements until 30 June 2016. The second payment of A\$1.39 million to SLSA was made on 28 February 2015.

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 Funding and Access Agreement with SLSA 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 final selections are made by an Access Committee that was established by the board 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 2014 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. New Zealand now receives approximately 200 shifts of beamtime each year.

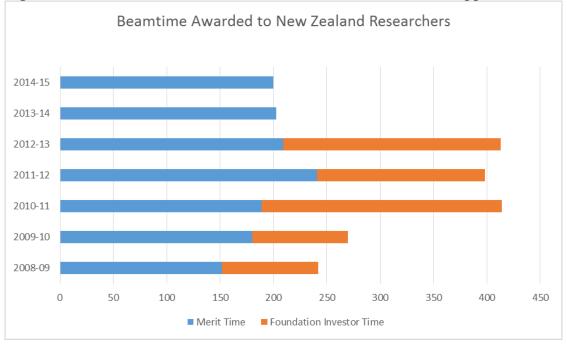


Figure 1: Historical record of beamtime awarded to New Zealand applications

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 52 applications made by New Zealand researchers for beamtime during the 2014/15 year, only 34 (or 65%) were successful. The applicants had requested 418 beamline shifts and were awarded 200 shifts (48% of that requested).

Beamline	No. Shifts	No.	Shifts	No. Appl'ns.	No. A	warded
	Requested	Awa	arded	Received	Bear	mtime
HRIR	6	6	100%	1	1	100%
IMBL	33	12	36%	4	2	50%
IRM	24	18	75%	3	2	67%
$MX (RA)^+$	4	4	100%	2	2	100%
PD	36	12	33%	5	2	40%
SAXS	68	39	57%	19	11	58%
SXR	63	42	67%	4	3	75%
XAS	18	6	33%	3	1	33%
XFM	9	0	0%	1	0	0%
Subtotal	261	139	53%	47	29	62%
MX (CAPs)	157	61	39%	5	5	100%
Overall	418	200	48%	52	34	65%

Table 1: Success Rate for NZ Beamtime Applications - 2014/15\*

<sup>+</sup> Additional MX shifts awarded through the Rapid Access process.

\* A description of the beamlines and the abbreviations used in given on pages 16-17

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.

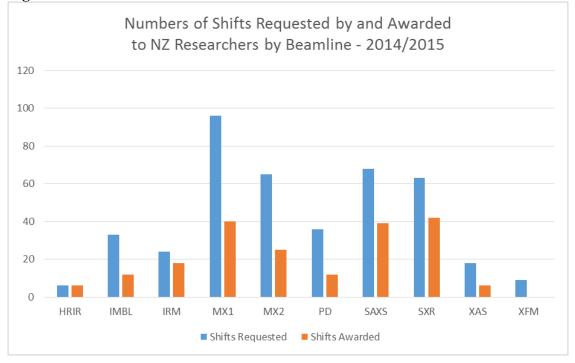


Figure 2: Success Rate for Beamtime Shift Awards to NZ for 2014/15

## **Science Achievements**

A full list of the researchers who received merit beamtime over the past year is given on pages 9 to 15. These projects cover a very broad range of science topics. Many have involved the training of young researchers. Five examples that illustrate the wide applicability of synchrotron science to New Zealand's research needs and the benefit of having access to the Australian Synchrotron are given on page 8.

## 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 from the School. The

remaining places are for self-funded participants, two of whom received \$3,000 travel grants from NZSG.

The table below provides details of the students who were selected to attend the
School in September 2014.

Name	Institution	Details	Comment
Ian Schipper	Victoria University	Postdoc	Funded by Cheiron School
James Bier	University of Waikato	Scientist	Funded by Cheiron School
Penelope Cross	University of Canterbury	Postdoc	Funded by NZSG
Rachel North	University of Canterbury	PhD student	Funded by NZSG
Brad Mansel	Massey University	PhD student	Self-funded
Andrew Chan	University of Auckland	PhD student	Self-funded

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D K W Smith Executive Officer Secretariat

## Examples of Recent New Zealand Use of the Australian Synchrotron

Professor Richard Haverkamp from Massey University has been investigating the use of surgical scaffold materials prepared from natural collagen materials. He used the synchrotron to characterise and understand the structural basis for strength to inform the development of better scaffold materials. This work led to a collaboration with four New Zealand companies in the collagen medical materials field and is part of a wider research programme into the structure of collagen materials using synchrotron techniques which also involves other NZ industries and has attracted international attention.

Dr Ben Kennedy from the University of Canterbury has been assessing the feasibility of drilling into magma for geothermal power generation. He has used the infra-red beamline at the Synchrotron to measure water content gradients around bubbles and crystals in fragments of magma recovered during accidental drilling in Iceland.

Proteins can be used for bioplastics and work at Waikato University in collaboration with Adurobiopolymers has led to a protein-based thermoplastic called Novatein. Dr Johan Verbeek and his colleagues from The University of Waikato have developed a process to decolour and deodourise bloodmeal prior to converting it into a plastic. Measurements made at the Synchrotron on the impact of various oxidative treatments of the blood proteins have helped them understand and explain the mechanical behaviour of decoloured bloodmeal plastic and will extend the range of applications for this material.

Dr Luigi Sasso and a team from the University of Canterbury have been exploring the use of industrial waste proteins, therefore turning low-value industrial by-products, such as proteins from hoki fish-eye lenses, a waste materials from the New Zealand fishing industry, into a high-value bionanomaterial specific to the Trans-Tasman area. The Australian Synchrotron has been used to characterise the protein nanomaterials developed in their laboratories. Their work has will build exciting new avenues for the protein bionanomaterials, looking at applications in medical diagnostics, nanocomposites, nanoelectronics and industrial biochemical processes. It has strengthened their connection with local industries, as well as provided possibilities for collaborations with other international experts, thereby placing New Zealand at the forefront of the international scientific field, while advancing a technological approach focused on local sustainability and material-recycling.

Professor Shane Cronin from Massey University (now at The University of Auckland) has used the Medical and Imaging beam-line at the Australian Synchrotron to collect highresolution 3-D reconstructions of the micro-scale pores, and crystal textures within pumice samples taken from a variety of eruptions from Mt. Ruapehu, Mt. Tongariro and Mt. Taranaki stratovolcanoes. The studies highlight the conditions of variability in the eruption mechanisms, and importantly show the conditions under which the most deadly volcanic process, pyroclastic flows, form and are contributing to the design of new and improved eruption scenarios for New Zealand's andesitic stratovolcanoes. The new scenarios, particularly in respect of the triggering of and impacts from unheralded eruptions at Mt. Tongariro, are being used in updated hazard management plans of the Department of Conservation for the iconic Tongariro Alpine Crossing.

## New Zealand Research Groups Awarded Beamtime (July 2014 – June 2015)

The following New Zealand research groups were awarded time (merit and preferred) at the Australian Synchrotron between July 2014 and June 2015.

Researchers	Institution	Cycle	Beamline	Access	Travel Funding
<b>Dr Luigi Sasso</b> Dr Celine Valery Prof Juliet Gerrard Deepti Mahapatra Rishi Pandey	Canterbury RMIT Univ. Canterbury Canterbury Canterbury	2014-2	Infrared Microscope (IRM) "Nanostructures by biomimetic self-assembling peptides: insights into peptide conformation and protonation state"	Merit Access 4 days 2-6 July	\$2,152
Prof Kurt Krause Sigurd Wilbanks Prof Catherine Day Dr Gregory Cook	Otago Otago Otago Otago	2014-2	Macromolecular Crystallography (MX1) "University of Otago Structural Biology Group"	Merit Access 1 day 4-5 July	\$0
<b>Dr Monica Handler</b> Loretta Corcoran Prof Terry Seward Dr Victoria Bennett	VUW VUW VUW ANU	2014-2	X-ray Absorption Spectroscopy (XAS) "Quantitative measurement of the oxidation state and surface complexation of platinum adsorbed onto Fe-Mn oxide and oxyhydroxide surfaces by X-ray absorption techniques."	Merit Access 2 days 29-31 July	\$1,740
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 Auckland	2014-2	Micro Crystallography (MX2) "University of Auckland Structural Biology Collaborative Access Program"	Merit Access 1 day 30-31 July	\$0
<b>Prof Emily Parker</b> Prof Geoff Jameson Prof Vic Arcus	Canterbury Massey Waikato	2014-2	Micro Crystallography (MX2) "Enzymes, Allostery and Evolution"	Merit Access 1 day 31 Jul - 1 Aug	\$4,510
<b>Prof Shane Cronin</b> Dr Natalia Pardo Assoc Prof Ian Smith Rafael Torres-Orozco	Massey Massey Auckland Massey	2014-2	Imaging & Medical (IM) "Understanding magma- expansion and microcrystalline networks that lead to maximum explosive efficiency at stratovolcanoes"	Merit Access 3 days 8-11 August	\$2,136
<b>Dr Matthew Polson</b> Prof Antony Fairbanks Kajitha Suthagar	Canterbury Canterbury Canterbury	2014-2	Macromolecular Crystallography (MX1) "Structure Determination of Furanose Based Tuberculosis Drug Candidates"	Merit Access 1 day 13 August	\$607
<b>Prof Kurt Krause</b> Sigurd Wilbanks Prof Catherine Day Dr Gregory Cook	Otago Otago Otago Otago	2014-2	Micro Crystallography (MX2) "University of Otago Structural Biology Group"	Merit Access 1 day 20-21 August	\$2,003

Researchers	Institution	Cycle	Beamline	Access	Travel Funding
<b>Dr Renwick Dobson</b> Dr Grant Pearce Moritz Lasse Prof Geoff Jameson	Canterbury Canterbury Canterbury Massey	2014-2	Small/Wide Angle X-ray Scattering (SAXS) "Investigating the size, shape and dynamics of a key biosynthetic enzymes"	Merit Access 1 day 23-24 August	\$2,709
<b>Dr Geoff Waterhouse</b> Andrew Chan Wan-Ting Chen Aubrey Dosado Charlotte Vandermeer	Auckland Auckland Auckland Auckland Auckland	2014-3	Soft X-ray Spectroscopy (SXR) "Local electronic structure of oxynitride photocatalysts from synchrotron XPS and NEXAFS measurements"	Merit Access 5 days 10-15 September	\$1,888
<b>Dr Chris Squire</b> Prof Ted Baker Dr Ghader Bashiri Dr David Goldstone Dr Richard Kingston Dr Shaun Lott	Auckland Auckland Auckland Auckland Auckland Auckland	2014-3	Macromolecular Crystallography (MX1) "Auckland University Structural Biology Collaborative Access Proposal 2014-2015"	Merit Access 2 days 16-17 September 30 November	\$0
<b>Prof Emily Parker</b> Prof Geoff Jameson Prof Vic Arcus Dr Andrew Sutherland- Smith	Canterbury Massey Waikato Massey	2014-3	Micro Crystallography (MX2) "Enzymes, Allostery and Evolution"	Merit Access 1 day 27-28 September	\$3,280
<b>Dr Ren Dobson</b> Dr James Murphy Arvind Dr Grant Pearce Chris Horne Dr Moritz Lasse	Canterbury WEHI Canterbury Canterbury Canterbury Canterbury	2014-3	Small/Wide Angle X-ray Scattering (SAXS) "Characterisation of the SmcHD1 Hinge Domain"	Merit Access 1 day 3-4 October	\$2,499
Dr Peter Mace Prof Kurt Krause Dr Sigurd Wilbanks Dr Joel Tyndall Prof Catherine Day Prof Greg Cook	Otago Otago Otago Otago Otago Otago	2014-3	Macromolecular Crystallography (MX1) "University of Otago Structural Biology Group"	Merit Access 1 day 3-4 October	\$2,044
<b>Dr Vlatko Materic</b> Dr Bridget Ingham Robert Holt	Callaghan Callaghan Callaghan	2014-3	Powder Diffraction (PD) "In-situ PD investigation of the unusual thermal stability and high temperature carbonation of portlandite (Ca(OH) <sub>2</sub> ) in the presence of gaseous CO <sub>2</sub>	Merit Access 2 days 8-10 October	\$1,506
<b>Prof Emily Parker</b> Prof Geoff Jameson Prof Vic Arcus Dr Andrew Sutherland- Smith	Canterbury Massey Waikato Massey	2014-3	Macromolecular Crystallography (MX1) "Enzymes, Allostery and Evolution"	Merit Access 1 day 22-24 October	Incl. in above
Dr Chris Squire Prof Ted Baker Dr Ghader Bashiri Dr David Goldstone Dr Richard Kingston Dr Shaun Lott Dr Peter Metcalfe	Auckland Auckland Auckland Auckland Auckland Auckland	2014-3	Micro Crystallography (MX2) "Auckland University Structural Biology Collaborative Access Proposal 2014-2015"	Merit Access 1 day 29-30 October	\$1,452

Researchers	Institution	Cycle	Beamline	Access	Travel Funding
<b>Junye Dong</b> Prof Wei Gao Saifang Huang Xin Ouyang Dr Tim Kemmitt Dr Bridget Ingham	Auckland Auckland Auckland Auckland Callaghan Callaghan	2014-3	Powder Diffraction (PD) "Black Anodised Titanium Oxide with Controllable Defects – Enables Absorb Full-Spectrum of Visible Light	Merit Acess 2 days 29-31 October	\$2,138
<b>Prof Terry Seward</b> Dr Nicholas Rae Dr Bernt Johannessen Dr Weihua Liu Dr Barbara Etschmann Prof Joel Brugger	VUW Aust Synch Aust Synch CSIRO Monash U. Monash U.	2014-3	X-ray Adsorption Spectroscopy (XAS) "An XAS study of lead speciation in chloride solutions under hydrothermal conditions"	Aust. Sync time 5 days 29 Oct – 3 Nov	\$0
Dr Peter Mace Prof Kurt Krause Dr Sigurd Wilbanks Dr Joel Tyndall Prof Catherine Day Prof Greg Cook	Otago Otago Otago Otago Otago Otago	2014-3	Micro Crystallography (MX2) "University of Otago Structural Biology Group"	Merit Access 1 day 1-2 November	\$2,044
<b>Prof Kate McGrath</b> Dr Martin Williams Christina Efthymiou Gloria Xun	VUW Massey VUW Austr Synch	2014-3	Small/Wide Angle X-ray Scattering (SAXS) "Structural Characterisation of Protein Amyloid Fibril Gels	Merit Access 1 day 9-10 November	\$0
<b>Prof Emily Parker</b> Gerd Mittelstaedt Emma Livingstone	Canterbury Canterbury Canterbury	2014-3	Macromolecular Crystallography (MX1) "Enzymes, Allostery and Evolution"	Merit Access 1 day 11 November	\$1,688
<b>Prof Richard</b> <b>Haverkamp</b> Katie Sizeland Hanan Kayed Hannah Wells Hannah van Bentum	Massey Massey Massey Massey Massey	2014-3	Small/Wide Angle X-ray Scattering (SAXS) "Structure of Acellular Dermal Matrix Scaffolds"	Merit Access 2 days 11-13 November	\$2,499
<b>Dr Nanette Schleich</b> Dr Stewart Midgley	Otago Monash U.	2014-3	Imaging & Medical (IM) "Dual Energy X-ray Analysis Using Synchrotron Computed Tomography at 30–80 keV"	Monash U time 2 days 11-13 November	\$717
<b>Dr Katie Collins</b> Dr Ian Schipper Dr Michael Gazley Dr James Cramption	VUW VUW CSIRO GNS/VUW	2014-3	Imaging & Medical (IM) "Origins of the Struthiolariidae: Resolving the phylogeny of Cretaceous-Paleogene ostrich- foot snails using synchrotron micro-CT and three-dimensional shape analysis"	Merit Access 2 days 13-15 November	\$1,529
<b>Dr Nanette Schleich</b> Dr Stewart Midgley Dr Andrew Stevenson	Otago Monash U. CSIRO	2015-1	Imaging and Medical Beamline (IMBL) "Dual Energy X-ray Analysis Using Synchrotron Computed Tomography at 30–80 keV"	Monash Merit Access 2 days 4-6 February	\$638

Researchers	Institution	Cycle	Beamline	Access	Travel Funding
<b>Prof Emily Parker</b> Prof Geoff Jameson Prof Vic Arcus Dr Andrew Sutherland- Smith Gerd-Jan Moggre Logan Heyes	Canterbury Massey Waikato Massey Canterbury Canterbury	2015-1	Macromolecular Crystallography (MX1) "Enzymes, Allostery and Evolution"	Merit Access 1 day 5-6 February	\$4,129
Assoc Prof Joel Tyndall Assoc Prof Brian Monk Alia Sagatova Dr Ranji Wilson Manya Sabherwal	Otago Otago Otago Otago Otago Otago	2015-1	Micro Crystallography (MX2) "Membrane spanning drug target (CYP51) in yeast"	Rapid Access 1 day 13-14 February	\$1,750
Dr Chris Squire Prof Ted Baker Dr Ghader Bashiri Dr David Goldstone Dr Richard Kingston Dr Shaun Lott	Auckland Auckland Auckland Auckland Auckland Auckland	2015-1	Macromolecular Crystallography (MX1) "Auckland University Structural Biology Collaborative Access Proposal 2014-2015"	Merit Access 2 days 24-25 February 26 March	\$1,940
Dr Peter Mace Prof Kurt Krause Dr Sigurd Wilbanks Dr Joel Tyndall Prof Catherine Day Prof Greg Cook	Otago Otago Otago Otago Otago Otago	2015-1	Macromolecular Crystallography (MX1) "University of Otago Structural Biology Group"	Merit Access 1 day 26-27 February	\$1,356
Dr Duncan McGillivray Dr Yang Xun Amy Xu Prof Laurence Melton Peter Akers	Auckland Austr Synch Auckland Auckland Auckland	2015-1	Small/Wide Angle X-ray Scattering (SAXS) "Effects of polysaccharide overall/local charge densities on the nanostructure of protein/polysaccharide complex"	Merit Access 1 day 26-27 February	\$2,069
<b>Dr Ian Schipper</b> Prof Colin Wilson Shane Rooyakkers	VUW VUW VUW	2015-1	Imaging and Medical Beamline (IMBL) "Microtextural insights into the origin and significance of mafic components in a silicic ignimbrite from the world's youngest supereruption"	Merit Access 3 days 28 Feb - 3 Mar	\$2,567
Dr Mark Staiger Prof Jőrg Műssig Dr Tim Huber Dr Simone Dimartino Jan Wolfgang Dormanns Dr Benoît Duchemin Dr Kevin Magniez	Canterbury Bremen Canterbury Canterbury Canterbury U. du Havre Deakin U.	2015-1	Infra-red Microscope (IRM) "Characterisation of the fibre- matrix interphase in all-cellulose composites"	Merit Access 2 days 5-7 March	\$2,273
<b>Dr Natalie Plank</b> Dr Bridget Ingham Conor Burke-Govey	VUW Callaghan VUW	2015-1	Small/Wide Angle X-ray Scattering (SAXS) "In situ monitoring of ZnO nanorod and nanowire growth"	Merit Access 1 day 12-13 March	\$2,167

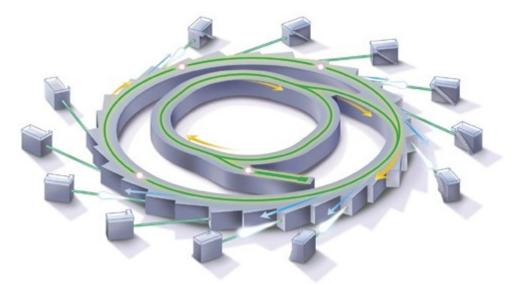
Researchers	Institution	Cycle	Beamline	Access	Travel Funding
Prof Emily Parker Prof Geoff Jameson Prof Vic Arcus Dr Andrew Sutherland- Smith Matt Polson Chelsea Vickers Heng Zhang	Canterbury Massey Waikato Massey Canterbury Waikato Waikato	2015-1	Micro Crystallography (MX2) "Enzymes, Allostery and Evolution"	Merit Access 1 day 25-26 March	Incl. in above
Dr Peter Mace Prof Kurt Krause Dr Sigurd Wilbanks Dr Joel Tyndall Prof Catherine Day Prof Greg Cook	Otago Otago Otago Otago Otago Otago	2015-1	Micro Crystallography (MX2) "University of Otago Structural Biology Group"	Merit Access 1 day 9-10 April	Incl. in above
<b>Dr David Goldstone</b> Dr Jeremy Keown Dr Richard Kingston Martin Rennie	Auckland Auckland Auckland Auckland	2015-1	Small/Wide Angle X-ray Scattering (SAXS) "Investigation of antiviral proteins Structural Biology at University of Auckland"	Merit Access 1 day 17-18 April	\$1,995
<b>Dr Renwick Dobson</b> Prof Emily Parker Dr Grant Pearce Chris Horne Dr Gill Norris	Canterbury Canterbury Canterbury Canterbury Massey	2015-1	Small/Wide Angle X-ray Scattering (SAXS) "University of Canterbury SAXS collaborative program"	Merit Access 1 day 21-22 April	\$2,665
<b>Prof Jeff Tallon</b> Dr James Storey Dr Bridget Ingham Wayne Crump Dr Tim Kemmitt	VUW VUW Callaghan VUW Callaghan	2015-1	Soft X-ray Spectroscopy (SXR) "Relating charge distribution to transition temperature in high-Tc superconductors"	Merit Access 4 days 21-25 April	\$2,585
Dr Chris Squire Prof Ted Baker Dr Ghader Bashiri Dr David Goldstone Dr Richard Kingston Dr Shaun Lott Dr Genevieve Evans Dr Yi Tian Ting Ngoc Anh Tho Ho	Auckland Auckland Auckland Auckland Auckland Auckland Auckland Auckland	2015-1	Micro Crystallography (MX2) "Auckland University Structural Biology Collaborative Access Proposal 2014-2015"	Merit Access 1 day 24-25 April	Incl in above
<b>Dr Tilo Soehnel</b> Daniel Wilson Dr Bernt Johannessen Prof Kevin Smith	Auckland Auckland Austr Synch Auckland	2015-1	X-ray Absorption Spectroscopy (XAS) "Oxidation state studies of Mo in Cu <sub>5</sub> Sb <sub>1-x</sub> Mo <sub>x</sub> O <sub>6</sub> "	Merit Access 2 days 1-3 May	\$2,287
<b>Dr Mark Lay</b> Dr John Verbeek Talia Hicks	Waikato Waikato Waikato	2015-1	THz/Far Infra-red (FIR) "Effect of oxidative treatment and thermoplastic processing on protein structure in bloodmeal decoloured with peracetic acid"	Merit Access 2 days 5-7 May	\$2,446
<b>Dr Grant Pearce</b> Prof Emily Parker Dr Renwick Dobson Dr Nicky Blackmore Dr Rahau Shirazi	Canterbury Canterbury Canterbury Canterbury Callaghan	2015-2	Small/Wide Angle X-ray Scattering (SAXS) "University of Canterbury SAXS collaborative program"	Merit Access 1 day 4-5 June	\$2,679

Researchers	Institution	Cycle	Beamline	Access	Travel Funding
<b>Dr Chris Squire</b> Prof Ted Baker Dr Ghader Bashiri Dr David Goldstone Dr Richard Kingston Dr Shaun Lott	Auckland Auckland Auckland Auckland Auckland Auckland	2015-2	Macromolecular Crystallography (MX1) "Auckland University Structural Biology Collaborative Access Proposal 2014-2015"	Merit Access 2 days 10-11 June 7-8 August	\$730
<b>Prof Emily Parker</b> Prof Geoff Jameson Prof Vic Arcus Dr Andrew Sutherland- Smith	Canterbury Massey Waikato Massey	2015-2	Macromolecular Crystallography (MX1) "Enzymes, Allostery and Evolution"	Merit Access 1 day 16-17 June	TBA
Dr Peter Mace Prof Kurt Krause Dr Sigurd Wilbanks Dr Joel Tyndall Prof Catherine Day Prof Greg Cook Dr Yoshio Nakatani Jessica Petri	Otago Otago Otago Otago Otago Otago Otago Otago	2015-2	Macromolecular Crystallography (MX1) "University of Otago Structural Biology Group"	Merit Access 1 day 24-25 June	\$3,045
<b>Dr Ben Kennedy</b> Dr Hugh Tuffen Dr Kim Berlo Dr Ian Schipper Dr Felix von Aulock Kaylon Higginbotham	Canterbury Lancaster U. McGill U. VUW Liverpool U. Canterbury	2015-2	Infra-red Microscope (IRM) "What happens when you drill into a magma chamber?"	Merit Access 4 days 25-29 June	\$1,967
<b>Dr Renwick Dobson</b> Dr Suzuki Hinori Arvind Ravichandran Alex Law Dr Michael Griffin	Canterbury Canterbury Canterbury Canterbury Melbourne U.	2014-3 to 2015-2	Macromolecular Crystallography (MX1) "University of Melbourne, Bio21 Institute, and Affiliated Researchers Collaborative Access Programme Group"	Merit Access 1.5 shifts (1 day) Various dates	N/A
<b>Dr Renwick Dobson</b> Dr Sarah Kessans Rachel North Chris Horne Dr Michael Griffin	Canterbury Canterbury Canterbury Canterbury Melbourne U.	2014-3 to 2015-2	Micro Crystallography (MX2) "University of Melbourne, Bio21 Institute, and Affiliated Researchers Collaborative Access Programme Group"	Merit Access 0.75 shifts (0.5 day) Various dates	N/A
<b>Dr Grant Pearce</b> Dr Renwick Dobson Dr Michael Griffin	Canterbury Canterbury Melbourne U.	2014-3 to 2015-2	Macromolecular Crystallography (MX1) "University of Melbourne, Bio21 Institute, and Affiliated Researchers Collaborative Access Programme Group"	Merit Access 1.5 shifts (1 day) Various dates	N/A
<b>Dr Grant Pearce</b> Dr Renwick Dobson Dr Michael Griffin	Canterbury Canterbury Melbourne U.	2014-3 to 2015-2	Micro Crystallography (MX2) "University of Melbourne, Bio21 Institute, and Affiliated Researchers Collaborative Access Programme Group"	Merit Access 0.75 shifts (0.5 day) Various dates	N/A

Researchers	Institution	Cycle	Beamline	Access	Travel Funding
<b>Prof Paul Kruger</b> Dr David Turner A/P Michael Gardiner Chris Fitchett David Young Shane Verma Rob Stanisland	Canterbury Monash U. Tasmania U. Canterbury Canterbury Canterbury	2014-3 to 2015-2	Macromolecular Crystallography (MX1) "Chemical Crystallography of Functional Molecules, Complexes and Materials'	Merit Access 3.0 shifts (1 day) Various dates	N/A
Prof Paul Kruger Dr David Turner A/P Michael Gardiner Chris Fitchett David Young Shane Verma Rob Stanisland	Canterbury Monash U. Tasmania U. Canterbury Canterbury Canterbury	2014-3 to 2015-2	Micro Crystallography (MX2) "Chemical Crystallography of Functional Molecules, Complexes and Materials'	Merit Access 1.0 shift (0.3 day) 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 and is still not in full 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 turned to the possibility of adding new beamlines to expand the facilities capabilities. The Australian Synchrotron 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. This is expected to be reactivated once the long term ownership and future funding arrangements for the facility have been decided.

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 agreed to 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.

More recently, the Victorian government has decided to withdraw from majority ownership of the Synchrotron and has offered to transfer its shares to the Commonwealth government at no cost, subject to a number of conditions. The Commonwealth government is expected to agree to this proposition and has commenced discussions with ASHCo's minor shareholders, including NZSG, so that it can assume full ownership. Pending a decision on a long term funding strategy for the Synchrotron, the Commonwealth government has agreed to continue providing the majority of the operating funding for the 2016/17 year.

The Commonwealth has offered New Zealand the opportunity to continue participating in the Synchrotron. A continuing contribution from New Zealand towards the facility's operating costs is expected. Tentatively, an offer of A\$1.5 million per year has been made by NZSG which would secure and maintain New Zealand's share of the beamtime at 5%.

The current shareholding in the Synchrotron is a strategically important and tangible representation of New Zealand's partnership in the Synchrotron. As maintaining access for New Zealand researchers is the primary long term goal and, recognising that the facility will in future be owned by the Australian government, a country to country declaration that affirms the cooperation between the two nations on synchrotron science and the ability for New Zealand researchers to access the Synchrotron is being developed to give NZSG's shareholders sufficient reassurance to approve the steps leading to the transfer of NZSG's interests in the Synchrotron to the Commonwealth government. The directors believe a formal country-to-country agreement will give shareholders greater influence than the present minority shareholding position, and therefore the confidence to continue participating in the sector-wide partnership with the government to fund ongoing access to the facility.

## **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 2015 were:

Dr Garth Carnaby, Chair Dr Desmond Darby, formerly at 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	5	-
Professor Ian Shaw	6	5	-

## **Donations**

The company did not make any donations during the period from establishment up to 30 June 2015.

## **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.

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

Director	Organisation/Entity	Nature of Interest
<b>Dr GA Carnaby</b> Shares Held Beneficiary of Trusts	GA Carnaby & Associates Ltd Carnaby Trust	Controlling majority Trustee and discretionary beneficiary
Offices Held	National Provident Fund Canterbury Development Corporation	Annuity/Defined benefit Chair
	Canterbury Economic Development Trustee Ltd	Chair
	NZ Food Innovation (South Island) Ltd	Chair
	Lincoln University	Chair, Research & Commercialisation Committee
	Dodd-Walls Centre of Research Excellence	Chair
	BioResource Processing Alliance Seed Research Centre, Lincoln	Chair Chair
	Univ. NZ Food Innovation Network	Director
Dr D Darby		
Shares Held	Vector Ltd Sound Direction Ltd	Minority shareholder
Offices Held	Sound Direction Ltd Sound Direction Ltd GNS Science NZ Association of Scientists	Majority shareholder Director Senior manager Council member
Prof GB Jameson		
Shares Held Beneficiary of Trusts	Tower Ltd Estate of MEB Jameson	Minority shareholder Discretionary beneficiary
Offices Held Other Interests	Massey University Te Manawa Museums Trust Board	Employee
Prof JB Metson		
Shares Held	Vector Energy Pacific Lithium	Minority shareholder Minority shareholder
Offices Held	University of Auckland MBIE	Employee Chief Science Adviser
Other Interests	Australian Synchrotron	Science Advisory Committee member
<b>Prof IC Shaw</b>		
Offices Held Other Interests	University of Canterbury Sandoz GmbH, Austria New Zealand Pharmaceuticals	Employee Consultant Consultant

## New Zealand Synchrotron Group Limited Financial Statements

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for the year ended 30 June 2015



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The Board has pleasure in presenting the annual report of the New Zealand Synchrotron Group Limited ("NZSG") incorporating the financial statements and the auditors' report, for the year ended 30 June 2015.

The Company has taken advantage of the reporting concessions available to it under sections 211(3) of the Companies Act 1993.

The Board of NZSG has authorised these financial statements presented on pages 6 to 17 for issue on 23 October 2015.

For and on behalf of the Board

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G. 9. Carnaby

Garth Carnaby Chairperson

23 October 2015 Date

Desmond Darby

Desmond Darb Director

23 October 2015 Date





## Independent Auditors' Report

to the readers of the New Zealand Synchrotron Group Limited's Financial Statements for the year ended 30 June 2015

The Auditor-General is the auditor of the New Zealand Synchrotron Group Limited (the "Company"). The Auditor-General has appointed me, Lesley Mackle, using the staff and resources of PricewaterhouseCoopers, to carry out the audit of the financial statements of the Company on her behalf.

#### Opinion

We have audited the financial statements of the Company on pages 6 to 17, that comprise the statement of financial position as at 30 June 2015, the statement of comprehensive revenue and expense, statement of changes in equity, and statement of cash flows for the year ended on that date and the notes to the financial statements that include accounting policies and other explanatory information.

In our opinion, the financial statements of the Company:

- present fairly, in all material respects:
  - the financial position as at 30 June 2015; and
  - its financial performance and cash flows for the year then ended; and
- comply with generally accepted accounting practice in New Zealand and have been prepared in accordance with Public Sector Public Benefit Entities Standards.

Our audit was completed on 23 October 2015. This is the date at which our opinion is expressed.

The basis of our opinion is explained below. In addition, we outline the responsibilities of the Board of Directors and our responsibilities, and we explain our independence.

#### **Basis** of opinion

We carried out our audit in accordance with the Auditor-General's Auditing Standards, which incorporate the International Standards on Auditing (New Zealand). Those standards require that we comply with ethical requirements and plan and carry out our audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

Material misstatements are differences or omissions of amounts and disclosures that, in our judgement, are likely to influence readers' overall understanding of the financial statements. If we had found material misstatements that were not corrected, we would have referred to them in our opinion.

An audit involves carrying out procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on our judgement, including our assessment of risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, we consider internal control relevant to the preparation of the Company's financial statements in order to design audit procedures that are appropriate in the circumstances but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control.



An audit also involves evaluating:

- the appropriateness of accounting policies used and whether they have been consistently applied;
- the reasonableness of the significant accounting estimates and judgements made by the Board of Directors;
- the adequacy of the disclosures in the financial statements; and
- the overall presentation of the financial statements.

We did not examine every transaction, nor do we guarantee complete accuracy of the financial statements.

We believe we have obtained sufficient and appropriate audit evidence to provide a basis for our audit opinion.

#### **Responsibilities of the Board of Directors**

The Board of Directors is responsible for the preparation and fair presentation of financial statements for the Company that comply with generally accepted accounting practice in New Zealand and have been prepared in accordance with Public Sector Public Benefit Entities Standards.

The Board of Directors' responsibilities arise from the Companies Act 1993.

The Board of Directors is also responsible for such internal control as it determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error. The Board of Directors is also responsible for the publication of the financial statements, whether in printed or electronic form.

#### **Responsibilities of the Auditor**

We are responsible for expressing an independent opinion on the financial statements and reporting that opinion to you based on our audit. Our responsibility arises from section 15 of the Public Audit Act 2001.

#### Independence

When carrying out the audit, we followed the independence requirements of the Auditor-General, which incorporate the independence requirements of the External Reporting Board.

Other than the audit, we have no relationship with or interests in the Company.

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Phienaterhouse Coopen

PricewaterhouseCoopers

Lesley Mackle On behalf of the Auditor-General Wellington, New Zealand

#### New Zealand Synchrotron Group Limited Statement of comprehensive revenue and expenses for the year ended 30 June 2015

		2015 Unaudited	2015	2014
		budget	Actual	Actual
	Note	\$	\$	\$
Revenue				
Income for Australian Operations	3	1,779,037	1,663,373	1,681,764
Income for NZ Operations	4	199,878	184,152	198,404
Gain/(Loss) on fair value of Derivative	4	-	59,055	(68,718)
Interest income	4	20,000	27,529	20,832
Total Revenue		1,998,915	1,934,109	1,832,283
Expenses				
Amortisation	11		-	-
Australian Synchrotron Group costs		1,735,380	1,513,804	1,544,939
Other operating cost	6	212,800	183,790	206,296
Operating expenditure		1,948,180	1,697,594	1,751,235
Total surplus for the period		50,735	236,515	81,048
Other comprehensive income			-	~
Total comprehensive revenue and expense	2	50,735	236,515	81,048

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The above statement of comprehensive revenue and expense should be read in conjunction with the accompanying notes on pages 10 -17  $\,$ 

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#### New Zealand Synchrotron Group Limited Statement of changes in equity for the year ended 30 June 2015

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	Notes	Share capital \$	Retained earnings \$	Total equity \$
Balance as at 30 June 2013		2,824,036	(2,631,040)	192,996
Net surplus Other comprehensive income Total comprehensive loss			81,048  81,048	81,048  81,048
Balance as at 30 June 2014		2,824,036	(2,549,992)	274,044
Net surplus Other comprehensive income Total comprehensive loss			236,515 	236,515  236,515
Balance as at 30 June 2015		2,824,036	(2,313,477)	510,559

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These financial statements should be read in conjunction with the accompanying notes on pages 10 - 17



New Zealand Synchrotron Group Limited Statement of financial position as at 30 June 2015

ASSETS	Note	2015	2014
Current assets		\$	\$
Cash and cash equivalents	8	452,149	274 725
Trade and other receivables	9	6,575	274,725
Derivative financial instruments	10	69,496	12,446
Investment in ASHC	11	-	10,441
Total current assets		528,220	297,612
TOTAL ASSETS			
IOTAL ASSETS		528,220	297,612
LIABILITIES			
Current liabilities			
Trade and other payables	13	17,661	23,568
Total current liabilities		17,661	23,568
TOTAL LIABILITIES		17,661	23,568
Net assets		510,559	274,044
EQUITY			
Share capital	17	2,824,036	2 924 925
Retained earnings	17		2,824,036
TOTAL EQUITY		(2,313,477) <b>510,559</b>	(2,549,992)
		510,555	274,044

For and on behalf of the Board

G. 9. Carneby

Garth Carnaby Chair Person

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Date: 23 October 2015

Desmond Darby

Director

Date: 23 October 2015

These financial statements should be read in conjunction with the accompanying notes on pages 10 - 17

#### New Zealand Synchrotron Group Limited Statement of cash flows for the year ended 30 June 2015

	Notes	2015 \$	2014 \$
Cash flows from operating activities Receipts			
<u>Necelpis</u>			
Interest	4	27,529	20,832
Proceeds from income for Australian and New			
Zealand operations		1,857,801	1,947,817
		1,885,330	1,968,650
Payments			
Australian Synchrotron Group Costs		(1,524,722)	(1,612,954)
Less: Cash applied to Derivative Asset		0	(79,159)
Other expenses	6	(183,184)	(206,296)
Total cash applied		(1,707,906)	(1,898,409)
Net cashflows from operating activities	19	177,424	70,241
Net increase in cash and cash equivalents	19	177,424	70,241
Cash and cash equivalents at 1 July	8	274,725	204,484
Cash and cash equivalents at 30 June	8	452,149	274,725

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These financial statements should be read in conjunction with the accompanying notes on pages 10 - 17

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#### Note 1. General information

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New Zealand Synchrotron Group Limited ("the Company") was formed on 13 September 2006. The Company is a Public Sector Public Benefit Entity. The purpose of the Company is to provide a minimum amount of research access in the Australian Synchrotron for the period 1 July 2013 to 30 June 2016 for researchers from New Zealand. In addition, the Company also promotes synchrotron science, assists the development of capability of New Zealand researchers in synchrotron science and manages the access of New Zealand researchers to the Australian Synchrotron. It has eleven shareholders who are all either New Zealand universities, Crown Research Institutes or Crown Entities. The company is managed by a five person board elected by the shareholders, including an independent Chair. The Chair receives remuneration; the other directors do not. The Royal Society of New Zealand has been contracted to provide secretariat services to the Board.

The Company's revenue consists of fees paid by shareholders to provide support services and funds provided by the Australian Synchrotron for travel funding grants. Its registered office is 6 Turnbull Street, Thorndon, Wellington.

The financial statements are prepared on a going concern basis. The Company is in the process of renegotiating agreements for securing future access to the Australian Synchrotron and expect to complete the process prior to the expiry of the existing contract with Synchrotron Light Source Australia Pty Ltd.

The financial statements have been approved for issue by the Board on 23 October 2015.

#### Note 2. Significant accounting policies

#### (a) Basis of preparation

The financial statements of the Company have been prepared in accordance with Generally Accepted Accounting Practice in New Zealand (NZ GAAP). They comply with Public Benefit Entity Standards Reduced Disclosure Regime (PBE Standards RDR) and authoritative notices that are applicable to entities that apply PBE Standards.

The Company is eligible and has elected to report in accordance with Tier 2 PBE Standards RDR on the basis that the Company has no public accountability and is not large as defined in XRB A1. The Directors have elected to report in accordance with Tier 2 PBE Accounting Standards and in doing so has taken advantage of all applicable Reduced Disclosure Regime ("RDR") disclosure concessions.

The significant accounting policies adopted in the preparation of the financial statements are set out below. These policies have been consistently applied to all the periods presented, unless otherwise stated.

#### Statutory base

New Zealand Synchrotron Group Limited ("NZSG" or the "Company") is a company registered under the Companies Act 1993.

The financial statements have been prepared in accordance with the Financial Reporting Act 2013.

#### Basis of measurement

These financial statements have been prepared under the historical cost convention, as modified by the revaluation of certain assets as identified in specific accounting policies below.

#### (b) Changes in accounting policy

In the prior year, the Company prepared financial statements based on NZ IFRS and other applicable financial reporting standards, as appropriate for public benefit entities that applied differential reporting concessions. There were no changes to recognition, measurement or reclassification from the transition to Public Sector PBE standards.

#### (c) Foreign currency translation

Functional and presentational currency

The financial statements are presented in New Zealand dollars, which is the Company's functional and presentation currency. Foreign currency transactions are translated into the functional currency using the exchange rates prevailing at the dates of the transactions. Foreign exchange gains and losses resulting from the settlement of such transactions and from the translation at year end exchange rates of monetary assets and liabilities denominated in foreign currencies are recognised in the statement of comprehensive revenue and expenses.



#### (d) Revenue recognition

Revenue from exchange transactions comprises the fair value for the sale of goods and services, excluding Goods and Services Tax, rebates and discounts . Revenue is recognised when services are rendered.

#### (e) Interest income

Interest income is recognised on a time proportion basis using the effective interest method. When a receivable is impaired, NZSG reduces the carrying amount to its recoverable amount, being the estimated future cash flow discounted at original effective interest rate of the instrument, and continues unwinding the discount as interest income. Interest income on impaired loans is recognised using the rate of interest used to discount the future cash flows for the purpose of measuring the impairment loss.

#### (f) Government grants, sponsorships and donations

Government grants and non-government grants are recognised as revenue when they become receivable unless there is an obligation to return the funds if conditions of the grant are not met. If there is such an obligation, the grants are initially recorded as grants received in advance and recognised as revenue when conditions of the grant are satisfied.

#### (g) Income Tax

From 1 July 2009 the NZSG has been granted a Tax Exemption under Section CW49 of the Income Tax Act 2007. As a consequence NZSG will have no ongoing liability for Income Tax.

#### (h) Goods and Services Tax (GST)

The statement of comprehensive revenue and expenses has been prepared so that all components are stated exclusive of GST. All items in the statement of financial position are stated net of GST, with the exception of receivables and payables, which include GST invoiced.

#### (i) Cash and cash equivalents

Cash and cash equivalents includes cash on hand, deposits held at call with financial institutions, and other short term highly liquid investments with original maturities of three months or less, that are readily convertible to known amounts of cash, and which are subject to an insignificant risk of changes in value.

#### (j) Trade receivables

Trade receivables are recognised initially at fair value and subsequently measured at amortised cost, less provision for doubtful debts.

The recoverability of trade receivables is reviewed on an ongoing basis. Debts which are known to be uncollectible are written off. A provision for doubtful receivables is established when there is objective evidence that NZSG will not be able to collect all amounts due according to the original terms of receivables. The amount of the provision is the difference between the asset's carrying amount and the present value of estimated future cash flows, discounted at the effective interest rate. The amount of the provision is recognised in the statement of comprehensive revenue and expenses.

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#### (k) Derivative financial instruments

Derivatives are categorised as financial assets and liabilities held for trading. Derivatives are initially recognised at fair value on the date a derivative contract is entered into and are subsequently remeasured at their fair value. Gains and losses arising from changes in the fair value of the derivative financial instruments are presented in the statement of comprehensive revenue and expenses within gain/(loss) on fair value of derivatives. The fair value of derivative financial instruments are determined by using valuation techniques. Valuation techniques used include the use of comparable recent arm's length transactions, reference to other instruments that are substantially the same, option pricing models and other valuation techniques commonly used by market participants making the maximum use of market inputs and relying as little as possible on entity-specific inputs.

#### (I) Investments and other financial assets

NZSG classifies its investments in the following categories: loans and receivables. The classification depends on the purpose for which the investments were acquired. Management determines the classification of its investments at the initial recognition and re-evaluates this designation at every reporting date.

Loans and receivables are non derivative financial assets with fixed or determinable payments that are not quoted in an active market. They arise when NZSG provides money, goods or services directly to a debtor with no intention of selling the receivable. They are included in current assets, except for those with maturities greater than 12 months after the balance sheet date which are classified as non-current assets. 'Trade and other receivables' and 'cash and cash equivalents' are classified as loans and recievables in the statement of financial position.

Loans and receivables are subsequently carried at amortised cost using the effective interest method.

#### (m) Trade and other payables

These amounts represent liabilities for goods and services provided to NZSG prior to the end of financial year which are unpaid. The amounts are unsecured and are usually paid within 30 days of recognition. Trade and other payables are recognised initially at fair value and subsequently measured at amortised cost using the effective interest method.

#### (n) Sponsorship and donations expense

Through the ordinary course of its activities the Company provides sponsorships and makes donations to advance its stated objectives. The Company recognises a liability for this expenditure when the recipient meets any eligibility criteria attached to a sponsorship or donation agreement.





#### (o) Statement of Cash Flows

The following are the definitions of the terms used in the Statement of Cash Flows:

- i) Cash is considered to be cash on hand, cash in transit, bank accounts and deposits with a maturity of no more than 3 months from the date of acquisition;
- ii) Investing activities are those relating to acquisition, holding and disposal of investment in ASHC and investments not falling within the definition of cash;
- iii) Financing activities are those activities which result in changes in the size and composition of the capital structure of the Company. This includes equity, debt not falling within the definition of cash.

All other activities are classified as operating activities:

	Income for Australian operations any receives support from the Government and shareholders ian Synchrotron costs.	2015 \$	2014 \$
	Ministry of Business Innovation and Employment Shareholder	983,000 680,373 1,663,373	983,000 698,764 1,681,764
Note 4.	Income from New Zealand operations / other income	2015 \$	2014 \$
(a)	Grants from shareholders for operating costs of NZSG Contribution from the Australian Synchrotron towards travel	109,878	109,878
	costs	74,274 184,152	<u>88,526</u> <u>198,404</u>
(b)	Gain/(Loss) on fair value of Derivative instrument Interest	59,055 27,529 86,584	(68,718) (47,886)

#### Note 5. Australian Synchrotron Group costs

As detailed in note 12 (a) the Company makes an annual contribution to the ongoing operating costs of the Australian Synchrotron.

Note 6.Included in other operating costs(a)Remuneration of auditorDuring the year the following fees were paid or payablefor services provided by the OAG appointed auditor –Lesley Mackle with assistance fromDring water beyong Connect	2015	2014
PricewaterhouseCoopers.	\$	Ş
Statutory audit services	7,750	7,350
	**************************************	
(b) Foreign exchange (gains) / losses		
During the year the following exchange (gains) / losses were made on transactions between New Zealand and		
Australia.	2015	2014
	Ś	Ś
Foreign exchange (gains) / losses	(9,582)	4.674
	(3)302/	4,074



#### (c) Support for Synchrotron Science

During the year the following fees were paid or payable for services provided.

	2015 \$	2014 \$
Travel costs reimbursed to related parties	73,379	91,144
Asia Oceania Forum for Synchrotron		
Radiation Research Membership	8,147	4,091
	81,526	95,236

#### (d) Secretariat and other operating costs

During the year the following fees were paid or payable for services provided.

	2015 \$	2014 خ
Secretariat services from the Royal Society	Ŧ	÷
and Board costs	100,718	94,677
Preparation of Investment Case	-	290
Insurance	2,950	3,179
Other	428	890
	104,096	99,036
Total other operating costs	183,790	206,296

#### Note 7. Income Tax

From 1 July 2009 the NZSG has been granted a Tax Exemption under Section CW49 of the Income Tax Act 2007. As a consequence NZSG does not have an ongoing liability for Income Tax.

#### Note 8. Cash and cash equivalents

	2015	2014
	\$	\$
Cash	316,430	182,258
Foreign currency - AUD	135,719	92,467
	452,149	274,725
All the bank balances are held with the Bank of New Zea	aland.	

#### Note 9. Trade and other receivables

	2015	2014
	\$	\$
Trade receivables	5,100	6,603
Prepayments	1,475	1,475
Goods and Services Tax receivable	_	4,368
Total trade and other receivables	6,575	12,446



#### Note 10. Derivative financial instruments

	2015	2014
	\$	\$
Western Union Forward cover	69,496	10,441
Derivative financial instruments	69,496	10,441

The following derivatives have been entered into with Western Union.

(a) Forward foreign exchange contracts

2015 were \$725,389 (2014: Nil). At 30 June 2015, the fair value amounted to \$69,494 (2014: Nil).

(b)	At 30 June 2015	Notional	Strike Price	Fair Value
	Forward foreign exchange option (Maturity: February 2016)	\$759,012	0.86	\$ -

At 30 June 2014	Notional	Strike Price	Fair Value
Forward foreign exchange option (Maturity: February 2015 and	\$759,012	0.86	\$10,441
February 2016)			

#### Note 11. Investment in the ASHC

	2015	2014
	\$	\$
Investments in ASHC	5,713,750	5,713,750
Accumulated amortisation	(5,713,750)	(5,713,750)
Current year amortisation	-	-
Net investment in ASHC		<del>.</del>

The investment in the ASHC was amortised on a straight line basis over a period of five years as this was management's best estimate of the access period to use the synchrotron. However the new access arrangement does not rely on NZSG being a shareholder. And the shares now have zero value and cannot be traded for any cash return.

#### Note 12. Commitments

#### (a) Agreement with Synchrotron Light Source Australia Pty Ltd

An agreement has been signed on the 31st July 2013, between NZSG and Synchrotron Light Source Australia Pty Ltd whereby NZSG undertakes to provide AUD4.17m over three years in return for 5% of the access. As part of the Participants' Agreement entered into with 8 of the shareholders, these funds will be received directly from the Participants or MBIE on their behalf when required to fulfil these obligations.

#### (b) Agreement with MBIE

The company has entered into a 3 year agreement with the Ministry of Business, Innovation and Employment for Crown Funding totalling AUD2,211,750 over the period 1 July 2013 to 30 June 2016.

#### Note 13. Trade and other payables

	2015	2014 \$
	\$	
Creditors	-	1,946
Accruals	13,256	21,622
Goods and Services Tax payable	4,405	-
Total trade and other payables	17,661	23,568

The amount owed to a related party (University of Canterbury) as at 30 June 2015 \$5,100. (2014: \$12,333).



#### Note 14. Contingent liabilities

There were no significant contingent liabilities at 30 June 2015. (2014: nil)

#### Note 15. Related parties

Related parties comprise of the shareholders identified in Note 17. There have been a number of related party transactions during the year ended 30 June 2015.

These transactions include grants from shareholders as per Note 4 and for operating and travel costs reimbursed as per note 6. The amount receivable from Synchrotron Light Source Australia as at 30 June 2015 is travel costs of \$5,100 - 2 research projects. (2014: \$6,603 - 3 research projects).

#### Note 16. Events occurring after balance date

At the August board meeting the directors resolved to issue 163,104 new shares to Auckland University of Technology (AUT) at an issue price of AUD0.50 per share. The shares will be issued once payment has been received from AUT. This is expected to be in October 2015.

Note 17.	Share capital		
	Shareholding value at cost	2015	2014
		\$	\$
	The University of Auckland	509,217	509,217
	The University of Waikato	190,357	190,357
	Massey University	428,317	428,317
	Victoria University of Wellington	237,966	237,966
	University of Canterbury	285,546	285,546
	Lincoln University	28,557	28,557
	Otago University Holdings Ltd	285,546	285,546
	AgResearch Ltd	285,546	285,546
	Institute of Geological and Nuclear Sciences Ltd	190,357	190,357
	The New Zealand Institute for Plant and Food Research Ltd	190,357	190,357
	Callaghan Innovation	192,270	192,270
		2,824,036	2,824,036
The sha	res held at 30 June are:	2015	2014
		# of shares held	# of shares held
	The University of Auckland	436,319	436,319
	The University of Waikato	163,104	163,104
	Massey University	367,001	367,001
	Victoria University of Wellington	203,897	203,897
	University of Canterbury	244,668	244,668
	Lincoln University	24,467	24,467
	Otago University Holdings Ltd	244,668	244,668
	AgResearch Ltd	244,668	244,668
	Institute of Geological and Nuclear Sciences Ltd	163,104	163,104
	The New Zealand Institute for Plant and Food Research Ltd	163,104	163,104
	Callaghan Innovation	163,104	163,104
		2,418,104	2,418,104

The amount recognised in the balance sheet as paid in capital is the New Zealand dollar equivalent at the date of issue.



#### Note 18. Financial instruments

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Classification of financial assets by category	Fair value through Profit or Loss	Loans and Receivables
2015	\$	\$
Cash and cash equivalents	-	452,149
Trade & other receivables	-	5,100
Derivative	69,496	-
Total	69,496	457,249
2014		\$
Cash and cash equivalents	-	274,725
Trade & other receivables	-	6,603
Derivative	10,441	-
Total	10,441	281,328
Classification of financial liabilities by category		

#### Measured at amortised cost

	2015	2014
	\$	\$
Trade & other payables	13,256	23,568
Total	13,256	23,568

#### Note 19. Reconciliation of profit with cash flows from operating activities

	2015 \$	2014 \$
Surplus (Loss) after tax Add/(Less) non-cash items	236,515	81,048
Amortisation of Australian Synchrotron	-	-
Movement in working capital		
Trade and other receivables	10,276	67,649
Derivative financial instruments	(59,055)	(10,441)
Trade and other payables	(10,918)	(68,016)
Net Cash outflow from operating activities	176,818	70,241

