



International Laboratory for Air Quality and Health

WHO Collaborating Centre

ANNUAL REPORT

2014

**INTERNATIONAL LABORATORY FOR AIR
QUALITY and HEALTH (ILAQH)**

**WORLD HEALTH ORGANISATION
COLLABORATING CENTRE FOR AIR QUALITY
AND HEALTH**

1. Introduction

The International Laboratory for Air Quality and Health (ILAQH) is part of the Institute for Health and Biomedical Innovation (IHBI) and the Institute for Future Environments (IFE), at the Queensland University of Technology (QUT). ILAQH undertakes research, postgraduate training and consultancy in the complex, interdisciplinary field of air quality and its impact on human health, with a specific focus on ultrafine and nanoparticles. The three main aspects of ILAQH research activities are:

- Comprehensive characterisation of indoor and outdoor air, including emission sources;
- Integrated health and environmental risk assessments; and
- Strategies for controlling and managing air pollutants.

To address the challenge related to the interdisciplinary nature of air pollution and its impact on human health, academics from a number of Faculties within QUT are involved with the programs undertaken by the ILAQH, including discipline areas such as: physics, chemistry, microbiology, mathematics, public health and engineering. The expertise of the ILAQH personnel is strengthened by close collaboration with a number of government and non-government organizations. Through joint research, lecturing and postgraduate student supervision, the ILAQH collaborates closely with a number of North American, European and Asian research and tertiary organizations.

The facility is equipped with state of the art instrumentation for aerosol generation, mass and number size classification; monitoring of atmospheric gases; real time biological studies; vehicle emission testing, filter testing, lung deposition studies, and computer modelling. Access to electron microscopy and analytical chemistry facilities is available through the links existing within the Science and Engineering Faculty.

ILAQH has built up a scientific program, which is recognised internationally through a high publication rate in reputable international journals, visits by scholars from around the world to the facility, and invitations to the ILAQH key researchers to address international conferences and participate in international initiatives. In Australia both the Queensland State and the Federal government and non-government organizations regularly seek the expertise of this facility.

ILAQH is a Collaborating Centre of the World Health Organization on Research and Training in the field of Air Quality and Health, since 2004.

2. ILAQH Researchers in 2014

Director

Professor Lidia Morawska, PhD (School of Chemistry, Physics & Mechanical Engineering)

Academic Staff

Professor Godwin Ayoko (School of Chemistry, Physics & Mechanical Engineering)

Professor Zoran Ristovski (School of Chemistry, Physics & Mechanical Engineering)

Dr Branka Miljevic (School of Chemistry, Physics & Mechanical Engineering)

Research Fellows / Associates

Dr Congrong He

Dr Graham Johnson

Dr Mandana Mazaheri

Dr Rohan Jayaratne

Dr Sam Clifford

Dr Svetlana Stevanovic

Research Fellowships

Dr Nurun Nabi

Dr Zhen Liang

Associated Academic Adjunct Staff

Adjunct Prof Giorgio Buonanno (University of Cassino, Italy)

Adjunct Prof Tunga Salthammer (Fraunhofer WKL, Germany)

Adjunct Prof Werner Hoffman (University of Salzburg, Austria)

Postgraduate & Research Co-ordinator

Mrs Rachael Appleby

Ms Chantal Labbe

Doctoral Students

Ali Pourkhesalian (Supervisor: Zoran Ristovski)

Andjelija Milic (Supervisor: Zoran Ristovski)

Bijan Yeganeh (Supervisor: Lidia Morawska)

Ehsan Faghihi (Supervisor: Lidia Morawska)

Farzaneh Hedayat (Supervisor: Zoran Ristovski)

Jana Adamovska (Supervisor: Zoran Ristovski)

Jayan Karunasinghe (Supervisor: Lidia Morawska)

Lingli Guo (Supervisor: Lidia Morawska)

Marc Mallet (Supervisor: Branka Miljevic)

Md Mahmudur Rahman (Supervisor: Lidia Morawska)

Megat Mokhtar (Supervisor: Lidia Morawska)

Mostafizur Rahman (Supervisor: Zoran Ristovski)

Nitika Mishra (Supervisor: Lidia Morawska)

Peter McGarry (Supervisor: Lidia Morawska)

Rusdin Laiman (Supervisor: Lidia Morawska)

Sarah Lawson (Supervisor: Zoran Ristovski)

Tenzin Wangchuk (Supervisor: Lidia Morawska)

Tommaso Villa (Supervisor: Lidia Morawska)

Doctoral Students (enrolled in other QUT Schools and other Universities)

Madhumita Iyengar (Urban Development, Supervisor: Simon Washington)

Meisam Babaie (Engineering, Supervisor: Richard Brown)

Md Animul Islam (Engineering, Supervisor: Richard Brown)

Md Jahirul Islam (Engineering, Supervisor: Richard Brown)

Masters Students

Luke Cravigan (Supervisor: Zoran Ristovski)

Praveen Vijaysegaran (Supervisor: Lidia Morawska)

Soon-Che Chan (Supervisor: Godwin Ayoko)

Honours Students

Joel Alroe (Supervisor: Zoran Ristovski)

Reece Brown (Supervisor: Zoran Ristovski)

Postgraduate Completions

Alamsyah Juwono (Supervisor: Lidia Morawska)

Farhad Salimi (Supervisor: Lidia Morawska)

Svetlana Stevanovic (Supervisor: Zoran Ristovski)

Rachel Thomson (Supervisor: Megan Hargreaves)

3. Major Developments

Professor Morawska is currently leading efforts to establish an international, multi-disciplinary centre of research, the '**Australia - China Centre for Advancements in Air Quality Science and Management**', to provide a platform for joint research to further scientific understanding of the multidimensional problem of air pollution and its impact on human health and the environment, to provide technological and innovative solutions to the problem, and to provide input into national policies and thus enabling informed and efficient regularly management and control. The centre was Launched in Beijing from the 5-7 December 2014.

4. Awards and Achievements

- VRES Student Nassib Jabbour won 1st place (out of 80 students) the VRES Three Minute Presentation. Project title called, 'Investigating UFP Production from Concrete Fracture'.

5. Peer Reviewed Publications

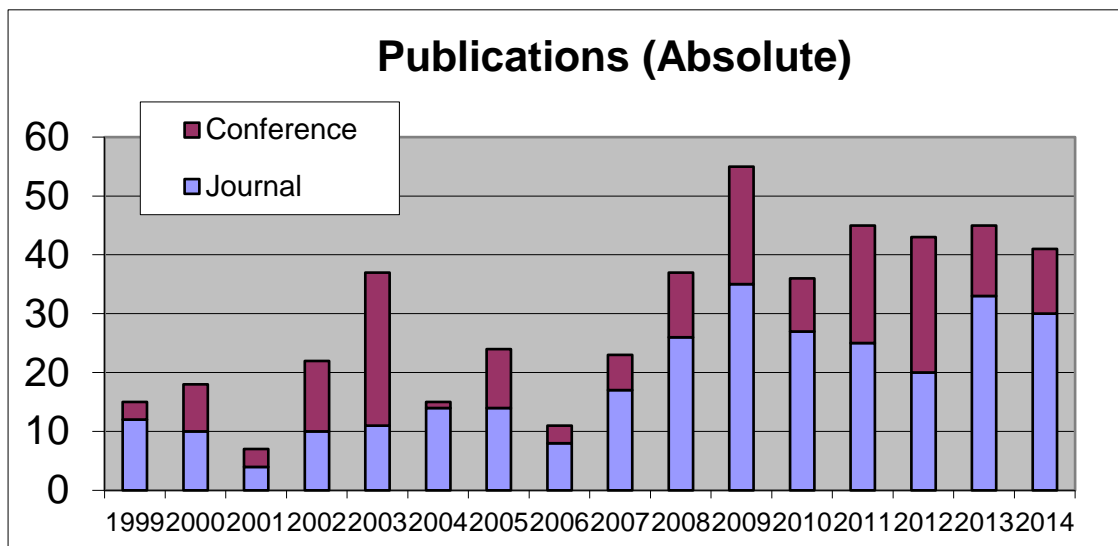


Figure 1. ILAQH Refereed Publications from 1998 – 2014.

6. Competitive Grants (Granted and Applied)

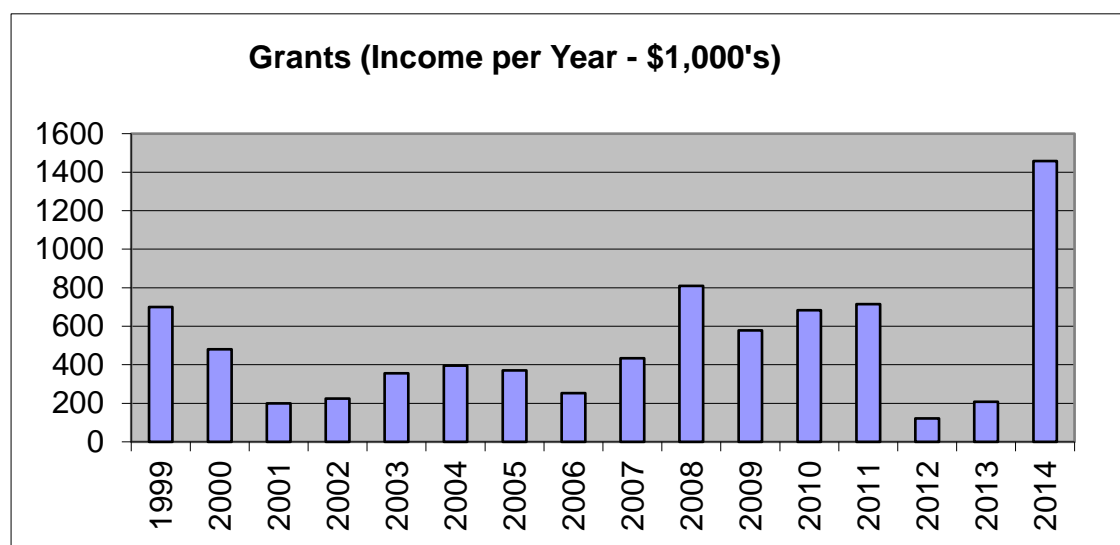


Figure 2. ILAQH Grant Income Distribution per Year (1999-2014)

GRANTED

Grant Title: ARC Discovery Projects

Project Title: Revolutionising protection against air pollution

Chief Investigators: Lidia Morawska, Matthew Dunbabin, Mandana Mazaheri, Sam Clifford, Luke Knibbs

Awarded: \$315,778

Grant Title: ARC Discovery Projects

Project Title: GBR as a significant source of climatically relevant aerosol particles

Chief Investigators: Zoran Ristovski, Melita Keyword, Graham Jones, Branka Miljevic, Robyn Schofield, Annele Virtanen, Robin Modini, Michael Harvey, Graham Johnson, Martin Cope, Tuukka Petaja

Awarded: \$263,500

Grant Title: ARC Linkage Infrastructure, Equipment and Facilities (LIEF)

Project Title: Atmospheric integrated research on burdens and oxidative capacity

Chief Investigators: Peter Rayner, Robyn Schofield, Zoran Ristovski, Peter Nelson, Clare Murphy, Andrew Bowie, or Danijel Belusic, Simon Alexander, Melita Keyword, Alastair Williams, Nicholas Jones, Sarah Lawson, Stephen Wilson, Godwin Ayoko, David Griffith, Branka Miljevic, Steven Siems, Richard Sinnott

Awarded: \$630,000

Grant Title: Cystic Fibrosis Foundation Therapeutics Clinical Research Award

Project Title: Airborne transmission of microorganisms among persons with cystic fibrosis

Chief Investigators: Scott Bell, Timothy Kidd, Peter Sly, Claire Wainwright, Lidia Morawska, Graham Johnson, Luke Knibbs, Peter O'Rourke, Rachel Thomson, Chris Coulter, Sushil Pandey, Andres Floto, Keith Grimwood

Awarded: \$215,811

Grant Title: Endeavour Scholarship and Fellowship 2015

Chief Investigators: Mandana Mazaheri
Awarded: \$8,000

Grant Title: NHMRC CAR Seed Funding

Project Title: Gene-environment interactions of the effects of ultrafine particulate air pollutants from traffic on respiratory health (UPTECH - genetics)

Chief Investigators: Guy Marks, Wafaa Nabil Ezz, Manuel Ferreira, Christine Cowie, Magda Ellis, Lidia Morawska

Awarded: \$20,000

Grant Title: ACARP

Project Title: Assessment of the DPM health risk impact of diesel exhaust filters

Chief Investigators: Zoran Ristovski

Requested: \$240,000

Grant Title: IHBI ECR

Project Title: Will the use of biofuels increase the overall aerosol burden in urban air: Physicochemical and toxicological properties of Secondary Organic Aerosol (SOA) originating from alternative fuels

Chief Investigators: Branka Miljevic and Svetlana Stevanovic

Requested: \$10,000

Grant Title: Science & Engineering Faculty, QUT

Project Title: Small Equipment Bid

Chief Investigators: Lidia Morawska

Awarded: \$4,900

Grant Title: Science & Engineering Faculty, QUT

Project Title: Small Equipment Bid

Chief Investigators: Branka Miljevic

Awarded: \$3,900

APPLIED (Outcome Still Pending)

APPLIED (Not Successful)

Grant Title: Department of the Environment National Environmental Science Programme (NESP)

Project Title: NESP for Clean Air and Urban Landscapes

Chief Investigators: Lidia Morawska, Richard Fuller, Ben Mullins, Richard de Dear, Melita Keywood, Gavin Fisher, David Wainwright, Zoran Ristovski, Godwin Ayoko, Laurie Buys, Edward Chung, Rosemary Kennedy, Peter Sly, Gail Williams, Assaad Masri, Nicole Gurrán, Grant Wardell-Johnson, Jean-Philippe Croue, Guy Marks, Donna Green, Guy Barnett.

Requested: \$3,851,000.00

Grant Title: ARC Linkage

Project Title: Evolution of Fuel and Transport Technology and its Impact on Urban Atmosphere

Chief Investigators: Lidia Morawska, Zoran Ristovski, Sam Clifford, Mandana Mazaheri, Robin Smit, Martin Cope

Requested: \$180,000

Grant Title: ARC Linkage

Project Title: Coal-Dust from Haulage Trains: quantitative assessment of its characteristics and impacts of the exposure at the receptor sites

Chief Investigators: Lidia Morawska, Zoran Ristovski, Rohan Jayaratne, Robin Smit, Nicole Garland

Requested: \$411,000

Grant Title: ARC Linkage

Project Title: Development of a non-intrusive, robust diesel engine monitoring system to identify the onset of faults affecting the engine performance

Chief Investigators: Tan, Lin, Gu, Ristovski, Brown, Davey

Requested: \$450,000

Grant Title: ARC Discovery Projects

Project Title: New Nanoparticles in the Urban Environment

Chief Investigators: Rohan Jayaratne, Godwin Ayoko, Sam Clifford, Giorgio Buonanno, Hai Guo

Requested: \$444,416

Grant Title: ARC Discovery Projects

Project Title: Controlling airborne respiratory viruses with room air humidity

Chief Investigators: Graham Johnson, Ian Mackay, Luke Knibbs, Caroline Duchaine

Requested: \$499,217

Grant Title: ARC Discovery Projects

Project Title: Will the use of biofuels increase the overall aerosol burden in urban air?

Chief Investigators: Branka Miljevic, Zoran Ristovski, Richard Brown, Svetlana Stevanovic, Barbara Danna, Xinming Wang

Requested: \$467,836

Grant Title: ARC Australian Laureate Fellowship

Project Title: Urban atmosphere & transport emissions: global trends, impacts & mitigation

Chief Investigators: Lidia Morawska

Requested: \$3,292,278

Grant Title: ARC Discovery Early Career Researcher Award (DECRA)

Project Title: Health for Air Quality

Chief Investigators: Mandana Mazaheri

Requested: \$395,595

Grant Title: NHMRC CAR Seed Funding

Project Title: An Unmanned Aerial Vehicle based system for sampling emissions from combustion sources for application in exposure assessment and control

Chief Investigators: Lidia Morawska, Branka Miljevic, Rohan Jayaratne, Sam Clifford, Mandana Mazaheri, Tommaso Villa
Requested: \$19,956

Grant Title: 2014 Foundation for Children Grants Scheme
Project Title: How does air quality affect students' performance?
Chief Investigators: Lidia Morawska, Mandana Mazaheri, Sam Clifford
Requested: \$150,000 over two years

Grant Title: 2014 Foundation for Children Grants Scheme
Project Title: Deposition of Airborne Particles in Lungs of Australian Children
Chief Investigators: Lidia Morawska, Claire Wainwright, Ricarda Their, Graham Johnson, Gail Neilson, John Neilson
Requested: \$100,000 in first 12 months and \$60,000 in 2nd 12 months

Grant Title: Marine National Facility, RV Investigator
Project Title: The Great Barrier Reef as a significant source of climatically relevant aerosol particles.
Chief Investigators: Zoran Ristovski, Melita Keywood, Graham Jones, Sarah Lawson, Branka Miljevic, Hilton Swan, Annele Virtanen, Petri Vaattovaara, Hiroshi Tanimoto, Alain Protat, Mike Harvey, Robyn Schofield, Robin Modini, Justin Seymour, Jean-Baptiste Raina
Requested: Application for Sea Time.

Grant Title: 2014 QLD Government Accelerate Fellowships
Project Title: Dust from coal trains: personal exposure assessment and control
Chief Investigators: Mandana Mazaheri
Requested: \$300,000 over 3 years

Grant Title: 2014 Women in Research Grant Scheme
Project Title: Characterisation of multiple ambient air pollutants' spatio-temporal variations in Brisbane urban atmosphere
Chief Investigators: Mandana Mazaheri
Requested: \$9,978.20 over 2 years

7. Other Public Sector / New Consultancy Research Projects Commenced

Project Title: Evolution of Fuel and Transport Technology and its Impact on Urban Atmosphere

Funded By: Department of Science, Information Technology, Innovation and the Arts (DSITIA)

Awarded: \$52,563

Chief Investigators: Lidia Morawska, Zoran Ristovski, Mandana Mazaheri, Samuel Clifford, Robin Smit, Martin Cope

8. Collaboration with WHO

Lidia Morawska

- Attended by invitation as an expert on air pollution, and was appointed a rapporteur for working Group II of the WHO's first 'Consultation Meeting on the Use of Satellite Remote Sensing Data for Estimating Exposure to Air Pollution' meeting which took place in Geneva, Switzerland, from the 30-31 January 2014.
- Attended by invitation as an expert on air pollution, in the 'WHO Expert Meeting: Methods and tools for assessing the health risks of air pollution at local, national and international level' which took place in Bonn, Germany, from the 12-13 May 2014.
- Attended by invitation as an expert on air pollution, and assisted in preparing a presentation (titled: "A framework for directions to improve air quality in the Region, and an action plan for implementation of the directions") for the WPRO 'International Expert Meeting on Air Pollution and Health' which took place in Seoul, the Republic of Korea, from the 19-20 June 2014.
- Attended by invitation as an expert on air pollution, to participate in the first Regional Forum of the WHO Collaborating Centres which was held in Manila, Philippines from the 12-14 November 2014.

9. Conference Presentations

Lidia Morawska

Invited to give a presentation at the **CSIRO Air Quality Australia symposium on developing a collaborative research program for the future of Australian air quality**, in Melbourne, on the 7th May 2014. Presentation Title: *Air Quality and the Global Burden of Disease*.

Invited Plenary Speaker at the **Indoor Air 2014 Conference** which was held in Hong Kong, China from the 7-12 July 2014. Presentation title: *Particulate matter and bioaerosols*.

Two Invited Talks at the **Australian College of Toxicology and Risk Assessment Annual Scientific Meeting**, Sydney, NSW, 9-10 October 2014. Presentation titles: (1) *The toxicology of air pollution*; and (2) *What can air pollution research tell us about nanotoxicology*.

Gave invited Opening Keynote Presentation at the **International Conference on Energy and Environment of Residual Building (ICEERB2014)**, held in Zhengzhou, China, 7-10 November 2014. Presentation titled: *Residential houses: will new technologies solve all the challenges?*

Gave two invited presentation at the **Centre for Air Quality and Health Research and Evaluation (CAR) Air Pollution Exposure Assessment Workshop**, from the 10-12 December 2014, Sydney New South Wales. Presentation 1 titled: *What can air pollution research tell us about nanotoxicology?* Presentation 2 titled: *The toxicology of air pollution*.

Zoran Ristovski

Invited Plenary Speaker at the **Aerosol and Health: A challenge for chemical and biological analysis, Analytica 2014**, 1 April 2014, Munich.

Branka Miljevic

Invited seminar lecture at the **University of Rostock, Germany** in the 25 November 2014. Presentation title: *Measurement of oxidative potential of biofuel emissions using a profluorescent nitroxide probe*

Rohan Jayaratne

Presentation at the 15th International Conference on Atmospheric Electricity held in Norman, Oklahoma, USA, in June 2014. Presentation titled: *Suppression of Cluster Ions during Particle Formation Events in the Atmosphere*.

10. Presentations - Other

Lidia Morawska

- *Research Student Orientation* (within Research Student Centre) – QUT Gardens Point Campus, S Block, Level 12, OJW Room, Brisbane, 14 March 2014.
- *Air Quality Reports on Our Mobiles: Do We Care? Grand Challenge Lecture Series* (within the Institute for Future Environments) – QUT Gardens Point Campus, P Block, Level 5, Room 514, Brisbane, 6 June 2014.
- *Final Seminar and Examination Process* (within Research Student Centre Seminar) – QUT Gardens Point Campus, V Block, Level 7, Room 714, Brisbane, 15 October 2014.
- *Fundamentals of indoor aerosol science and practice: modern approaches, techniques and solutions* (Training Course Lecture) at the Indoor Air 2014 Conference which was held in Hong Kong, China from the 7-12 July 2014.

Rohan Jayaratne

- *Ions and Charged Particles in the Environment and their Potential Human Health Effects* – Invited talk for the CAR Seminar Series, 1 September 2014.

PhD Student – Md Mahmudur Rahman

- *Documentary on International Mother Language Day* – QUT BA Club in February 2014.

PhD Student – Jayanandana Karunasinghe

- The ILAQH research project on “*Development of Land use regression model for ultrafine particles in Brisbane*” was displayed at QUT booth on International GIS day held at QUT Garden Point Campus on 19 November 2014 together with other spatial projects of QUT. The spatial maps and other relevant model information to the project were showed off on one of eight monitor system of HPC installed at the booth. A short interview about the project was given to the video of the GIS day. Also assistance was made in helping to set up booth, present other QUT GIS projects such as 3D visualisation of built environment in Brisbane and QUT GIS and Spatial programs at QUT booth. GIS day was organised by GIS people and QUT coordinator for the programme was Dr Bernadette Savage.

11. Activities – Other

Mandana Mazaheri

- Providing expert advice for particulate matter sampling and analysis to be conducted by Bloomberg News in 9 cities around the world, including in China, India, and the US in 2014.
- Australia-China Centre for Air Quality Science and Management: CI Mazaheri has been invited to contribute to the development of the Centre's scientific program in December 2014, and beyond, in the multidisciplinary research conducted by the Centre.
- Volunteered my services to TSXPO (Tertiary Studies Exposition) and QUT Open Day (July 2014), promoting higher education and providing expert advice to prospective students on course options, research areas and scholarships.

12. Media Appearances

Lidia Morawska

Many media appearances / interviews, for example:

- ABC interview on Hazelwood Coal Mine Fire in Victoria, 28 February 2014 – there were 75 pieces of coverage that used quotes and many more journalists and editors who were influenced by them.
- Bloomberg interview on China air pollution solutions, 3 March 2014.
- Seven News interview on the adverse health effects on children caused by idling vehicles outside schools during pickup and drop-off, 11 April 2014.
- Quest Newspapers interview on the impact of dust in the area of Acacia Ridge, 8 September 2014.
- Yale Centre for Environmental Communication, Climate Connections Radio, interview on about the issue of traffic emissions, 15 October 2014.

Mandana Mazaheri

- Providing expert advice in relation to air pollution and children's health at schools and conducting road-side air quality measurements at pickup/drop off areas of two Brisbane schools on 29 April 2014. This was reported by Australia's Channel 7 and went on air nationally on 6 May 2014.

13. Visitors

- Prof Nurun Nabi, RUET, Bangladesh. May 2013 – May 2015.
Visiting Research Fellow
- Ms Natascha Savic, Karlsruhe University of Technology in Karlsruhe, Germany. 10 October 2013 to 10 October 2014.
Visiting Internship (Student)
- Mr Pierre Bourchereau, Nantes University, France. 3 March 2014 to 3 September 2014.
Visiting Internship (Student)
- Mr Antoine Jolivet, Ecole Nationale Supérieure de Chimie de Rennes, France. 28 April 2014 to 1 August 2014.
Visiting Internship (Student)
- Ms Manon Chataing, Polytech Clermont Ferrand, France. 19 May 2014 to 8 August 2014.
Visiting Internship (Student)
- Mr Thomas Maisonnier, Nantes University, France. 1 June 2014 to 31 August 2014.
Visiting Internship (Student)
- Mr Chunlei Li, Fudan University, China. 23 June 2014 to 23 June 2015.
Visiting Research Fellow
- Ms Zhen Liang, Donghua University, China. 23 June 2014 to 23 June 2015.
Visiting Research Fellow
- Adjunct Professor Giorgio Buonanno, University of Cassino, Italy, Germany, 14 July – 25 July 2014.
- Dr Marcelo Pereira, Federal Institute of Education, Science and Technology of Santa Catarina, Brazil. 3 October 2014 to 25 January 2015.
Visiting Research Fellow
- Ms Jenni Alanen, Tampere University of Technology, Finland. 20 October 2014 to 20 October 2015.
- Prof Hai Guo, Hong Kong Polytechnic University, 13 February 2014; 17 April 2014; 15 August 2014; and 29-31 October 2014.
- Mr Nassib Jabbour, QUT, 1 December 2014 – 28 February 2015.
VRES Student
- Mr Joel Alroe, QUT, 1 December 2014 – 28 February 2015.
VRES Student
- Adjunct Professor Werner Hoffman, University of Salzburg, Austria, 14 July – 25 July 2014.
- Prof. Gerhard Kasper, Karlsruhe Institute of Technology, Germany. 26 September 2014.
- Professor Erik Uhde, Fraunhofer Wilhelm-Klauditz-Institute (WKI), Germany, 21 November – 12 December 2014
- Adjunct Professor Tunga Salthammer, Fraunhofer Wilhelm-Klauditz-Institute (WKI), Germany, 28 November – 19 December 2014.