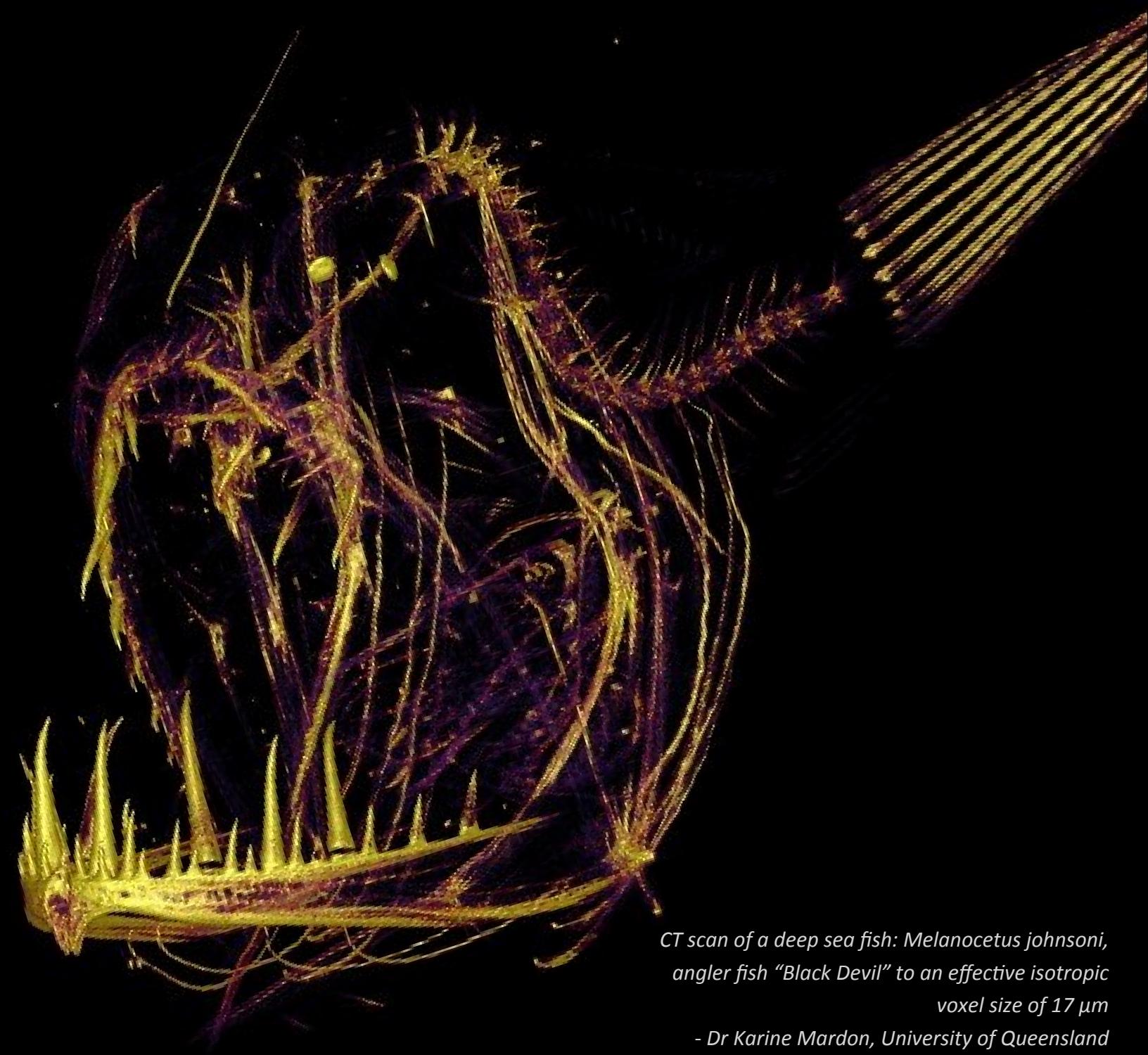




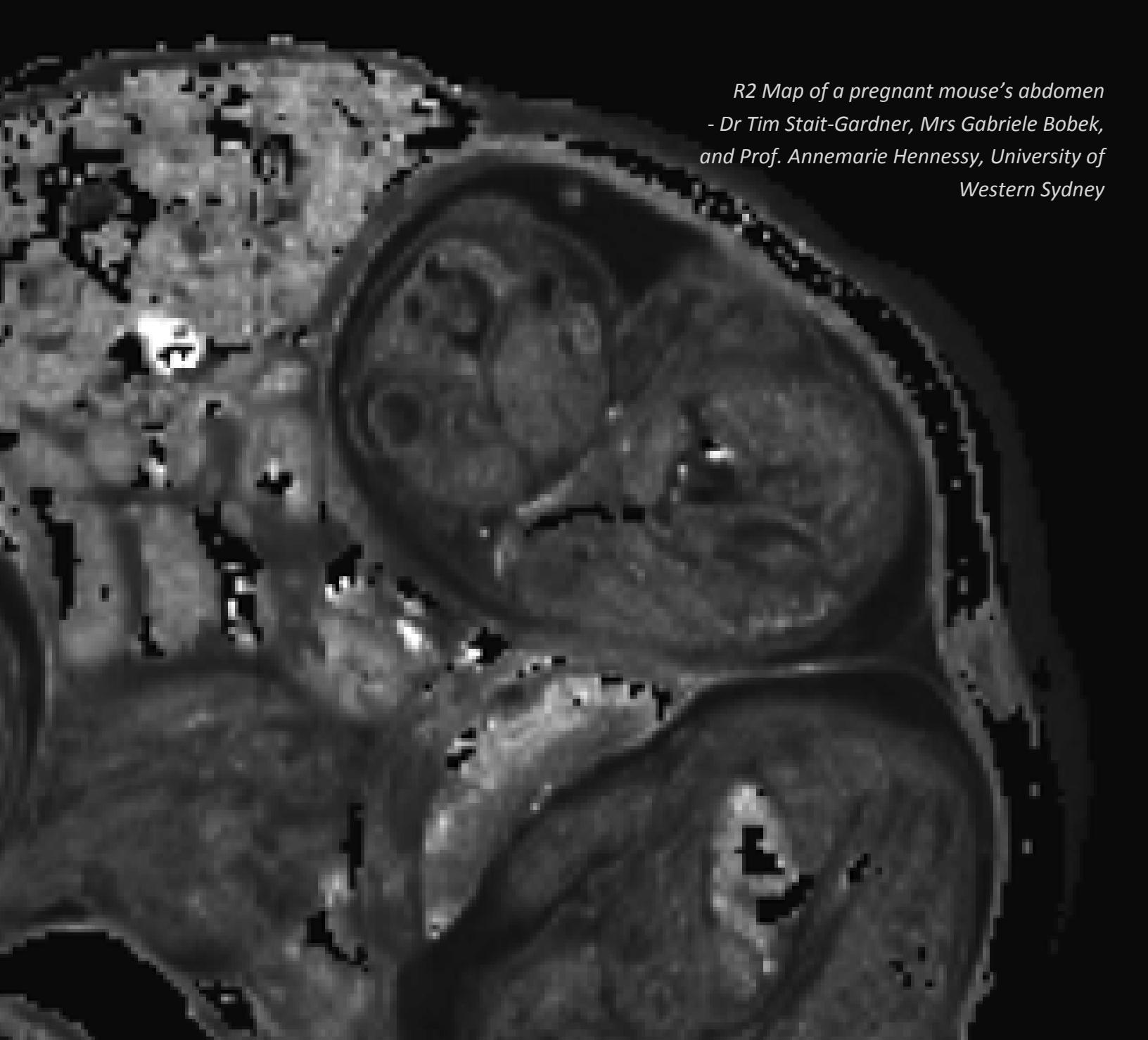
National
Imaging
Facility

NIF Quarterly • Q4, 2012

Exploring Inner Space



*CT scan of a deep sea fish: *Melanocetus johnsoni*, angler fish "Black Devil" to an effective isotropic voxel size of 17 μm*
- Dr Karine Mardon, University of Queensland



R2 Map of a pregnant mouse's abdomen
- Dr Tim Stait-Gardner, Mrs Gabriele Bobek,
and Prof. Annemarie Hennessy, University of
Western Sydney

Director's Message

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NIF's Ride!

What a ride we have been on! I trust that it has been as exciting for you, as it has been for me. Together, we have come to the end of the initial cycle of funding, the National Collaborative Research Infrastructure Strategy. And I believe that together we have been true to the vision of NCRIS. We are National, with nodes in all mainland state capitals. We have provided a focus for collaborative access to world-leading research infrastructure. And together we developed a strategy for future imaging investment in Australia.

We have provided access to some of the world's best imaging capability to some 8000 users, and have established the National Imaging Facility as a technology leader in Australia. So, where to from here? We can't just offer more of the same. We have survived our birth, and our formative years. It is incumbent upon us to mature and offer our experience, whilst being open to the ideas of others. We need to be always aware of the developments in the field, ready to embrace the unforeseen. And we need to continue to reach out to the wider scientific community.

To that end, from henceforth, we will be sending out a Quarterly Newsletter. It will contain information about new developments, updates to opportunities for NIF staff and NIF users, and articles of interest about the research that is being done through the resources of the National Imaging Facility. Dr Annie Chen, will be responsible for its preparation, so please take the opportunity to spread the word about your node or your research.

It would be remiss of me not to acknowledge the tremendous encouragement and support that I have received from the Governing Board, chaired by Professor David Siddle. Thank you.

I also acknowledge the support of my colleagues, the Node Directors, without whom this project would neither started nor been sustained. Thank you for your role as team leaders.

The heart of NIF has been the Facility Fellows, Platform Development Officers and Informatics Fellows. You make the capability available. Thank you for your determination and perseverance.

And NIF is only of any benefit if there are users. So, thank you to all those of you who have brought your research questions, and worked with us to deliver some great scientific work.

Of course, this all takes organisation. And so I must offer my sincere thanks to Dr Michelle McCleary, who has been on this ride from the beginning, to Dr Simon Nevin, who stepped in for a while, and to Dr Annie Chen, who is now an integral part of the team. Thanks Guys, we couldn't have done it without you.

And naturally this all requires resourcing. I acknowledge not only the financial support from the Australian Government, through NCRIS and EIF, but also the encouragement and facilitation through the staff of the Research Infrastructure Branch of DIISRTE. I also acknowledge the significant support from the various state governments, who have partnered with us. And finally, the institutions have tremendous in their generosity. Not only have they provided 30% of the cash, but have offered open access to their existing equipment, enabling NIF to offer comprehensive coverage of imaging capability.

In closing, I wish all of you, staff, supporters and users a very Joyous Christmas, a Happy New Year, and I look forward to continuing to work with you in 2013.

Professor Graham Galloway
Director of Operations



Welcome to NIF

New Partners and Scientists Joined NIF in 2012

Over the past 5 years, NIF has rapidly expanded from the original 7 Nodes, to currently over 60 scientists and staff members spreading across 13 Universities and scientific organisations in Australia.

In June 2012, all additional EIF (Education Investment Fund, part of Australia's Economic Stimulus Plan) funded Nodes have formally come onboard to NIF, further strengthening our research capabilities and expertise. National Imaging Facility is now as it was envisaged in the EIF Agreement.

The new Nodes include:

- **University of Melbourne**

Node Director: Prof. Roger Ordidge;

- **Monash University**

Node Director: Prof. Gary Egan;

- **Swinburne University of Technology**

Node Director: Prof. Susan Rossell; and

- **University of Western Australia**

Node Director: Winthrop Prof. David Sampson

With the addition of these new Nodes, NIF is expecting to introduce several world-leading imaging technologies which will be made available to the Australian scientific community in the foreseeable future.

For more information about the new Nodes, Directors and instrumentations, please visit: www.anif.org.au.

New Management for the LARIF Node

NIF is proud to welcome SAHMRI (South Australia Health and Medical Research Institute) as the new management for the LARIF Node. SAHMRI is South Australia's flagship research facility, with the mission to fundamentally improve the quality of life for all people, through innovative, world class and groundbreaking health and medical research. Under SAHMRI's governing umbrella, LARIF is a member of the PIRL (Preclinical, Imaging and Research Laboratories), which specialises in animal-based research and ethics consultation.

NIF would also like to extend the warmest welcome to Professor Steve Wesselingh, as the representative Board member for LARIF. Being a pioneer infectious diseases physician with research interests in neurovirology, HIV, and vaccine development, Professor Wesselingh has held extensive leading positions in both academia and industry.

Professor Steve Wesselingh is now the Executive Director for SAHMRI.

*To find out more details about SAHMRI and PIRL, please visit:
www.sahmri.com.*



Professor Steve Wesselingh



NIF Focus Story

UQ Node: World's First Commercial Preclinical MR/PET Imaging Scanner Installed

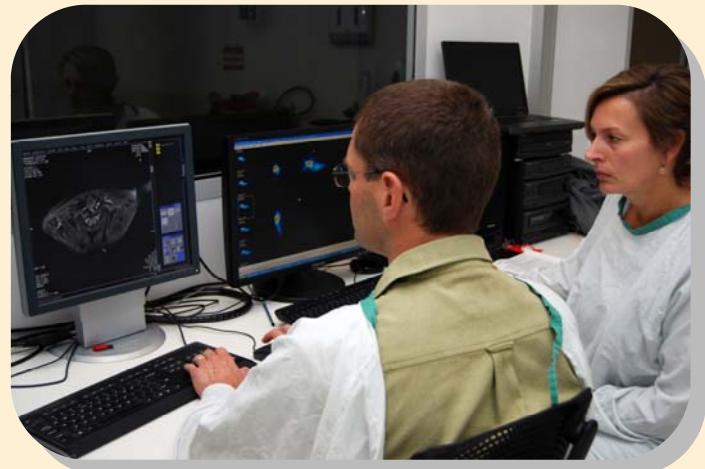
The world's first commercial prototype that combines preclinical MR/PET imaging scanner from Bruker Bio-spin, Germany, has been installed December 2012, at the National Imaging Facility—University of Queensland Node, within the Centre for Advanced Imaging.

This system will allow simultaneous acquisition of MRI and PET images of an animal or sample. The technology combines the exquisite structural and functional characterisation of tissue provided by MRI with the extreme sensitivity of PET imaging of metabolism and tracking of uniquely labeled cell types or cell receptors. The MRI system is comprised of a 7 Tesla, 300 mm bore superconducting magnet, with operating software identical to the Siemens clinical MRI platform. This enables the most direct translation of research outcomes from animals to humans, benefiting a wide range of medical and scientific research. The PET insert has been developed to provide optimal performance in the high magnetic field of the MRI system. The flagship MR/PET is funded as part of the National Collaborative Research Infrastructure Strategy (NCRIS), operation of the system is part of the National Imaging Facility ensures this unique system is available to all Australian Researchers.

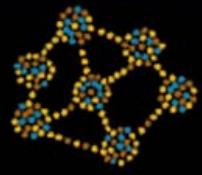
One of the first projects that are performed using the MR/PET is a collaborative project between the Centre of Advanced Imaging at the University of Queensland, and the Eskitis Institute at Griffith University.



The project will focus on the development of multimodal MRI-PET probes, targeting preclinical imaging of tumour hypoxia in the first instance. Using click chemistry, the synthesis of the probes are deliberately modular. This enables the ready transition to a multitude of 'two-tail' bimodal imaging agents, allowing for 'mix-and-match' of reporter groups so that a wide range of multimodal probes can be used to account for the different sensitivities of PET and MRI.



For more details regarding the details, specifications of the flagship instrument, or collaborative opportunities, please contact Prof. Ian Brereton, Dr Gary Cowin, and Dr Karine Mardon at the UQ Node.



NIF Focus Story

USyd/ANSTO Node: Launch of Cyclotron

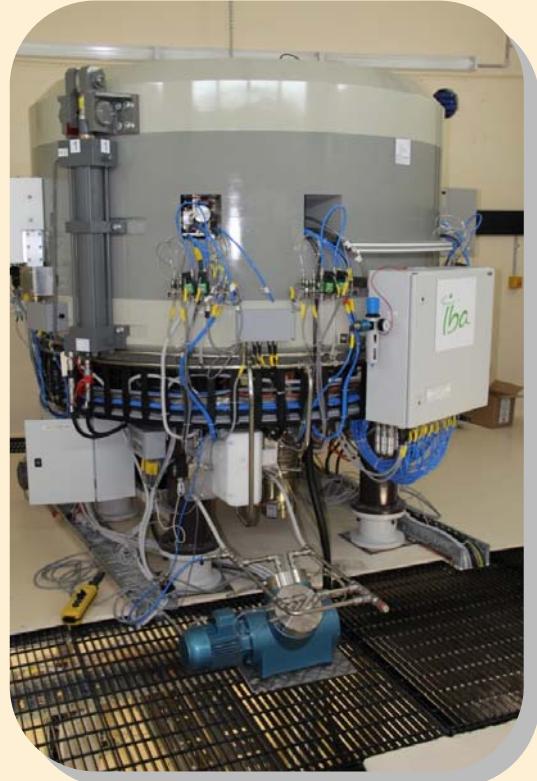
One of the highlights that NIF has accomplished in the past twelve months, is the commissioning of the 18 MeV research cyclotron on the 6th December 2011, by Her Excellency Professor Marie Bashir AC CVO, Governor of New South Wales.

Jointly operated by NIF scientists at the University of Sydney (Brain and Mind Research Institute, BMRI) and ANSTO (Australian Nuclear Science and Technology Organisation), the \$25 million research equipment is dedicated to biomedical researchers, features three main attractions:

- Production of fluorine-18 and carbon-11 radio isotopes for molecular imaging, enabling scientists and medical professionals to better visualise inside the body;
- Connection with Australia's most advanced radio-

labelling laboratory, which the probes can be used to measure molecular concentrations that are as low as "a glass of wine diluted in Sydney Harbour", noted by Professor Steve Meikle (NIF USyd/ANSTO Node);

- State-of-art biomedical imaging laboratory, equipped with advanced imaging analysis and modeling capabilities, including PET, PET/CT, and PET/SPECT/CT scanners, autoradiography, radiometabolite analysis and tissue counting facilities.



"The cyclotron and imaging facilities will enable scientists to gain valuable insights into complex interactions between genetics, biochemical activity, and behavior" said CEO for Dr Adi Paterson (NIF Board representative for the USyd/ANSTO Node).

For more details regarding the USyd/ANSTO Cyclotron, or collaborative project initiatives, please contact Prof. Richard Banati, or Dr Will Ryder at the USyd/ANSTO Node.



NIF Review

NIF Users Survey

As part of the self-review process that NIF has conducted in 2012, an 'Users Survey' was established and distributed to all user communities at all Nodes.

The summarised results are as below:

User Community—51% are first-time users:

- RHD students 28%, Postdoctoral fellows 27%, Teaching academia 41%, Industry/Community 4%

Research Field:

- 63% Neuroscience, 17% Organ imaging, 17% Image analysis/Informatics, 12% Molecular/Genomics, 9% Materials, 5% Spectroscopy, 32% Other (Forensic pathology, social psychology, biomechanics, cancer and immunology).

Promotion of NIF:

- 46% collaboration, 37% word of mouth.

Impact and Outcomes (top 3):

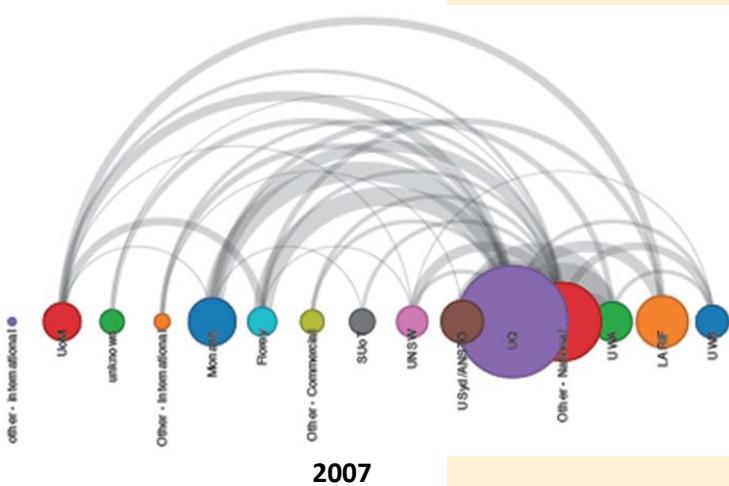
- Promoted research collaboration opportunities, publication achievement, conference presentation.

Users' Comments:

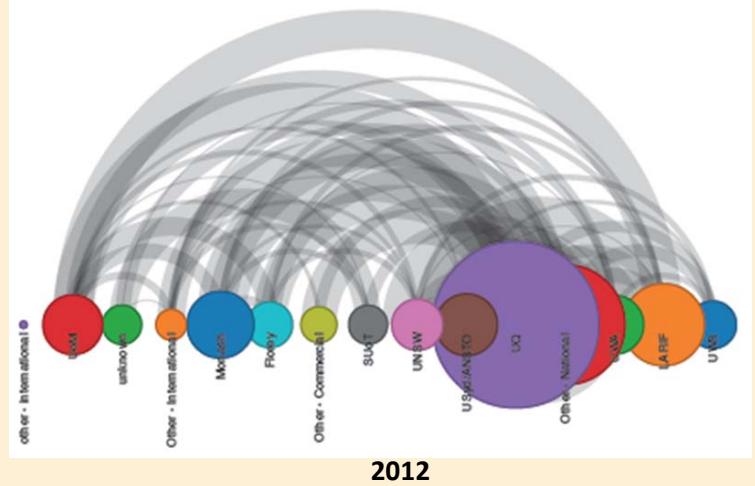
- "Excellent support, highly recommended."
- "[Staff] was extremely help in suggesting the most appropriate project approach and was very accommodating."
- "All the interaction I've had with the Facility Fellows are excellent."
- "[NIF Facility Fellow] was extremely helpful."

NIF Collaborative Research Map

In 2012 NIF has engaged Raven Consulting Group to assist in investigating the achievements of NIF. Overall, the outcomes are promising. As indicated by the Collaborative Research Arc diagrams below, NIF is performing well forming strong networks within the organisation, and is bringing great value to the Australian research community. The review is a on-going process and formal results will be circulated amongst the NIF community.



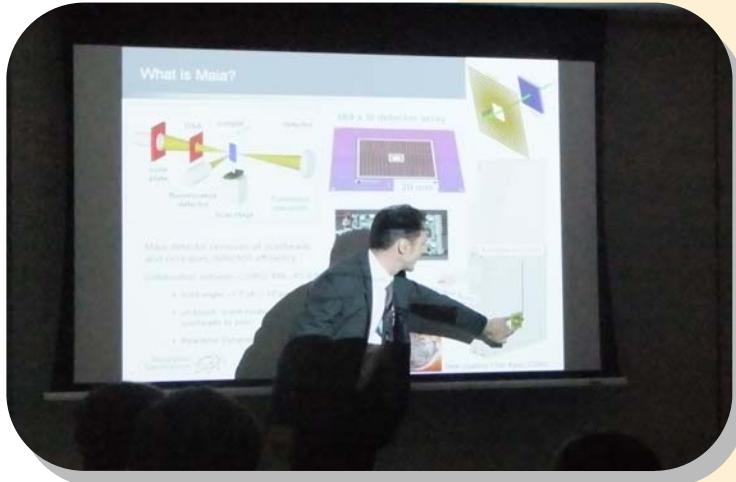
2007



2012

Australian Synchrotron — Monash Biomedical Imaging, 25th-26th October 2012

For two days in October, NIF held an intensive scientific workshop for Facility Fellows from all NIF Nodes at the NIF Monash University Node (Monash Biomedical Imaging). The workshop was a great networking opportunity for the Fellows to showcase their research work, and also share their expertise with their fellow scientists.



NIF Facility Fellows Workshop



To encourage collaborative research linkage amongst the Nodes, the workshop carried three main streams including MR, PET, and Informatics. Scientists with common research expertise were able to discuss significant research advances they have achieved in their fields, and also establish common goals and strategies to further improve the scientific operations of NIF as a nationwide research organisation.

As means to facilitate promotion and collaborative opportunities, tours at the Australian Synchrotron and Monash Biomedical Imaging were also included as a part of the workshop. The NIF Fellows were able to meet the scientists from the Australian Synchrotron, and also learn the various applications and capabilities of the beamlines.

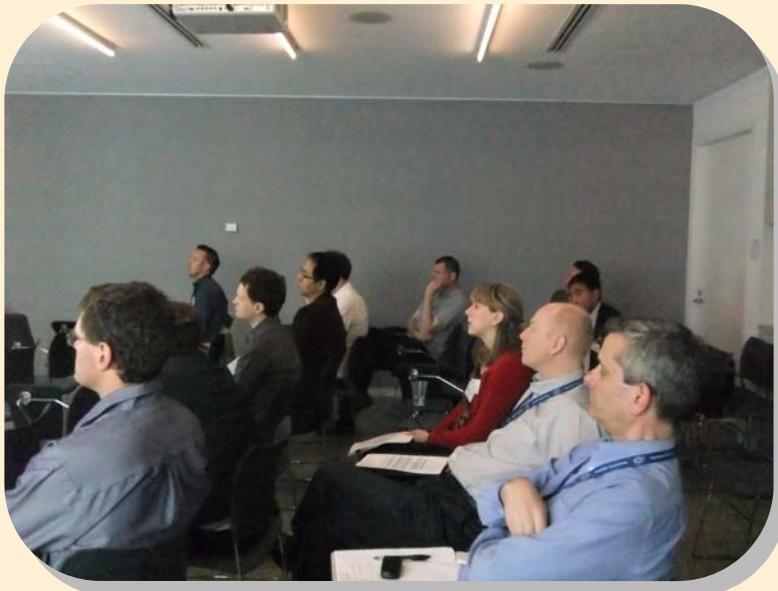
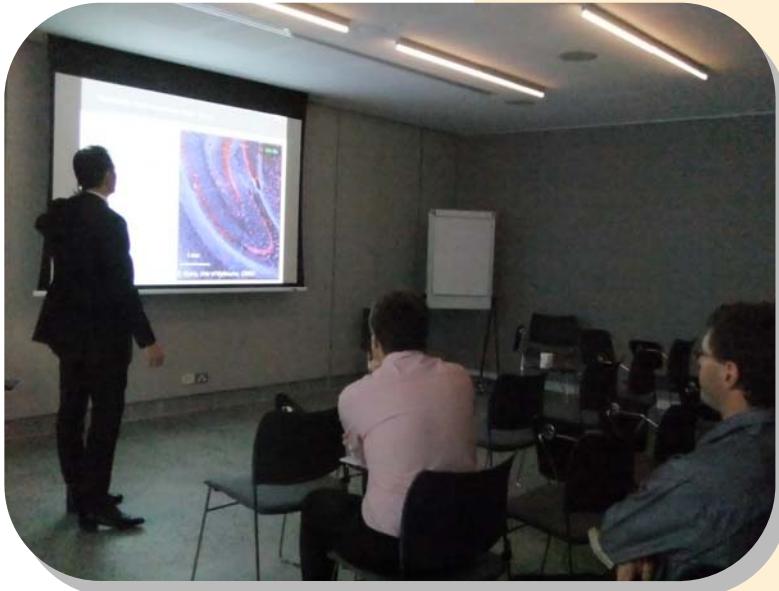
Overall, the workshop was a success and cheers to everyone involved.



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NIF Facility Fellows Workshop





Announcements

Subsidised Access Scheme

One of the key benefits that NIF provides for the Australian research community is the provision of subsidised access grants that is available through application. Since NIF's establishment in 2007, more than \$100k subsidy (18 rounds) has been offered, assisting early career researchers to gain access to various cutting edge imaging technologies that NIF has to offer. This grant scheme has facilitated a wide of scientists to achieve critical data and solve scientific problems of significance.

NIF is looking forward to continuously supporting the Australian research community, promoting strategic research initiatives. The next round of NIF Subsidised Access will close **early February, 2013**. For application details, please go to: www.anif.org.au/access/access-pricing/access-subsidy.html.

Future NIF Technology

With new Nodes coming onboard, NIF is expecting to acquire and implement numerous flagship instruments that will provide significant research imaging capabilities to the wider Australian research community. These instruments include:

- *The University of Queensland: 7T Whole body MRI and Cyclotron (2013);*
- *The University of Melbourne: 7T Whole body MRI (2013);*
- *The University of Western Australia: Small animal 9.4T MRI (2013).*

2013 Conference Opportunities

- **Australian Neuroscience Society Inc 33rd Annual Meeting;** 3–6 February 2013. Melbourne, Victoria.
<http://www.sallyjayconferences.com.au/ans2013/>
- **International Society for Magnetic Resonance in Medicine: 21st Annual Meeting & Exhibition;** 20–26 April 2013. Salt Lake City, Utah, USA.
<http://ismrm.org/13/>
- **The Australian and New Zealand Society for Magnetic Resonance 2013 / Asia-Pacific NMR;** 27–31 October 2013. Brisbane, Queensland.
<http://apnmr2013.org/>
- **The Sixth Annual World Molecular Imaging Congress;** 18–21 September 2013. Savannah, Georgia, USA.
<http://www.wmicmeeting.org/>



Do you have news?!

Published a paper? Formed new collaborations? Discovered something?

Any updates from your Node — we need to know!

Email: communications@anif.org.au

Or: a.chen1@uq.edu.au



*Diffusion Tensor Imaging of self-diffusion
in hardwoods*

- Dr Gary Cowin, University of Queensland

- Dr Roger Meder, CSIRO Plant Industry

NIF Nodes:

University of Queensland

University of Western Australia

University of New South Wales

University of Sydney / ANSTO

University of Western Sydney

University of Melbourne

Monash University

Florey Institute of Neuroscience and
Mental Health

Swinburne University of Technology

Large Animal Research & Imaging
Facility



Exploring Inner Space

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