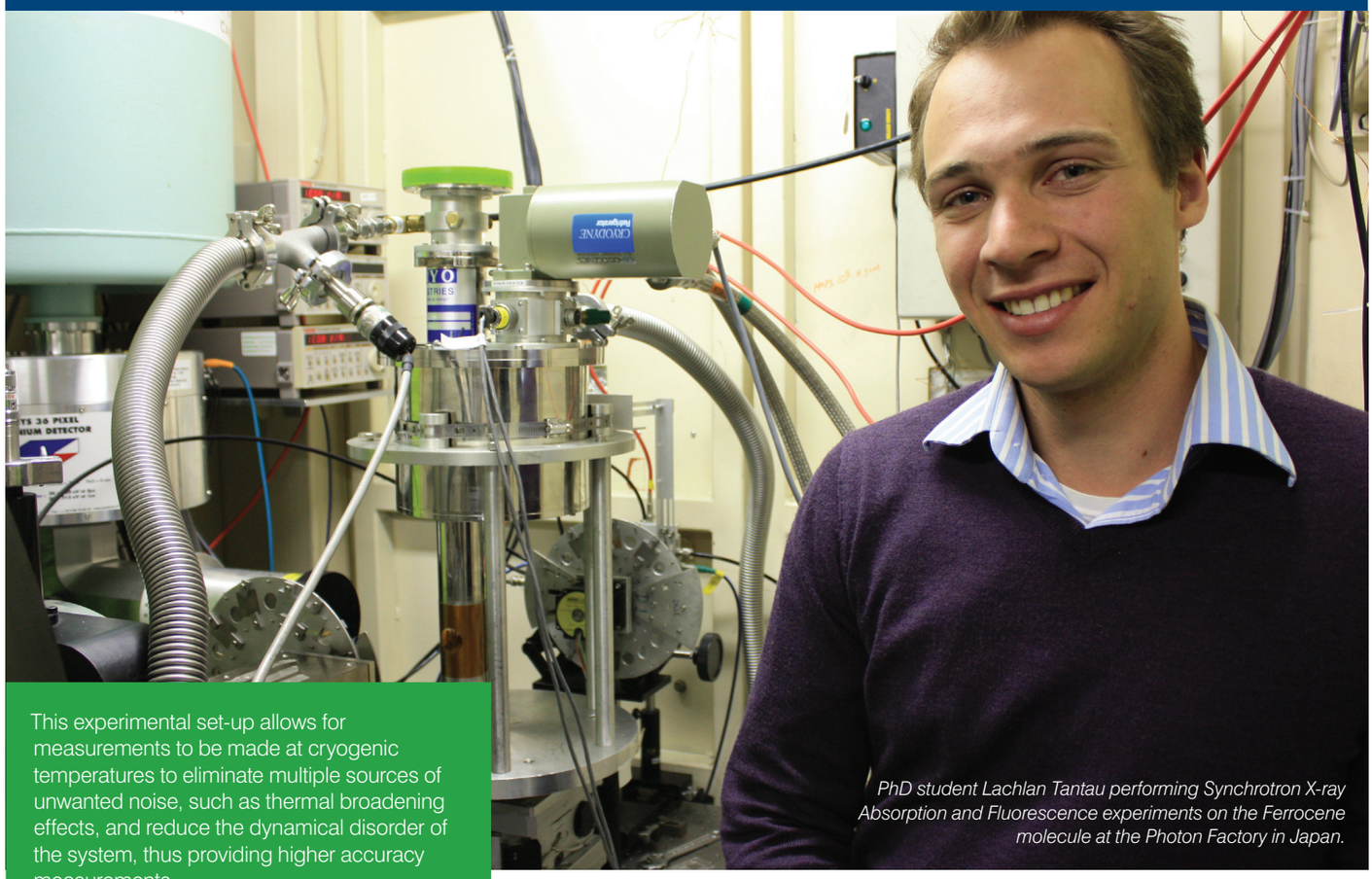
THE UNIVERSITY OF MELBOURNE

PHYSICS
CHEMICAL PHYSICS SPECIALISATION
SCIENCES AT MELBOURNE



PhD student Lachlan Tantau performing Synchrotron X-ray Absorption and Fluorescence experiments on the Ferrocene molecule at the Photon Factory in Japan.

This experimental set-up allows for measurements to be made at cryogenic temperatures to eliminate multiple sources of unwanted noise, such as thermal broadening effects, and reduce the dynamical disorder of the system, thus providing higher accuracy measurements.

We apply our techniques developed from measuring interactions between light and matter (physics) to analyse molecules such as Ferrocene (chemistry) - the infamous molecule whose structure is still disputed since its discovery won the Nobel Prize. This is a great example of the amalgamation of physics and chemistry.

We are No. 1 in Australia

"Physics and Astronomy" at the University of Melbourne is No.1 in Australia, No.3 in Asia and No.24 in the world.
(QS World University Rankings 2013)

"Physical sciences" at the University of Melboure is No.1 Australia, No.2 in Asia, and No.26 in the world.
(Times Higher Education World University Rankings 2012-2013)

Chemical Physics is the study of nature at its most fundamental level, from the quantum mechanics of the building blocks of matter, to the application to theoretical chemistry, inorganic, physical and organic chemistry, to the building blocks of life and their structure and function. Physics underpins the foundations of our society, from the generation of power and processing of information, to our understanding of the physical processes of life and our impact on the environment. Physics provides tools for modelling future climates, medical diagnosis and therapy, and acts as a catalyst in shaping our ideas for future industries. Chemical Physics provides the scales of complexity to manage complex companies and the science underpinning them.

Studying chemical physics as a Bachelor of Science major provides deep insights into quantum systems, synchrotron science, optics and biophysics. Graduates develop problem-solving skills and an understanding of complex phenomena which can be applied to all areas of life including careers in patent offices, biomedicine, engineering, defence, synchrotron research, finance and modelling, education, photonics, nanotechnology, IT!

Physics is for people who want to know the truth about nature and the world around them – the nano and the material world – and want to understand something new, with careers that engage them for life.

www.bsc.unimelb.edu.au

Which courses offer Physics?

Bachelor of Science

Breadth in another undergraduate degree

Careers and graduate pathways

Plan A: Research pathways with this major

We link directly into research in Physics, Chemistry, Bioscience, Medical Physics, Nanotechnology, Engineering, and research in other areas including industrial research. Masters and Honours pathways for most of these can proceed via the School of Physics and associated research centres. The School of Physics has strong research interests in areas from astrophysics, atomic physics, computing, cosmology, materials science, optics, particle physics, synchrotron science and X-ray science.

Plan B: Careers you can pursue with this major

Our graduates are creators, analysts, modellers, researchers and can find work in all areas including:

- Research and development (scientists, inventors laboratory managers
- Synchrotrons (New devices, patents, theories, programs, facilities
- Government (policy making, environmental facts, defence, CSIRO, ANSTO, research positions)
- Education (teachers, lecturers, curriculum developers, textbook writers, policy making)
- Business (IT, sales, inventions, finance, consulting, management, analysis)
- Manufacturing (engineering, mining, modelling, forecasting)
- Legal (patent law, technology commercialisation)
- Communications (publishing, editing, writing, marketing, on-line material and websites)

And work all over including: Synchrotrons and EBITs, universities, schools and prestigious research institutes all over the world, Macquarie Bank, ASIO, CSIRO, ANSTO, WEHI, Howard Florey Institute, Austin Hospital, Australian Synchrotron, Boston Consulting, Australian Stock Exchange, Department of Human Services, DSTO, Bureau of Meteorology, Ernst & Young, Australian Strategic Policy Institute, GBC Scientific Equipment, Google, mining and bioinformatics.

Plan C: Graduate/professionally-oriented courses

- Professionally focused graduate degrees in the sciences and technology, including the Master of Science
- Graduate degrees preparing for a wide range of professions including engineering, law, medicine, optometry and other health sciences, and teaching.

Sample course plan

BACHELOR OF SCIENCE (Physics) - Chemical Physics specialisation

Year 1	Physics 1	Accelerated Mathematics 1*	Chemistry 1	Breadth
	Physics 2: Physical Science and Technology	Accelerated Mathematics 2*	Chemistry 2	Breadth
Year 2	Quantum Mechanics and Special Relativity	Thermal and Classical Physics	Chemistry: Reaction and Synthesis	Breadth or Elective*
	Electromagnetism and Optics	Real Analysis	Chemistry: Structure and Properties	Breadth
Year 3	Quantum Physics	Electrodynamics	Reactivity and Mechanism	Breadth or Elective
	Specialised Topics in Chemistry B	Laboratory Work A	Statistical Physics	Breadth

Subjects leading to the major

Major subjects

Other science subjects to complement the major

Breadth

*Students who do not have a study score of at least 38 in VCE Specialist Mathematics 3/4 can complete Calculus 2 and Linear Algebra at first-year level, and Vector Calculus at second-year level.

These subjects are only examples and suggestions. Keep in mind that, depending on your interests, your course plan might look different from this one and that you will not need to choose your major until the end of second year.

Major: All Bachelor of Science students must complete one major. A major comprises 50 points (four subjects) at third-year level that build on first- and second-year study.

Breadth component: All Bachelor of Science students must take subjects from outside the sciences, technology and engineering systems areas of study. This is referred to as "breadth" and more information can be found at http://breadth.unimelb.edu.au

Your breadth subject choices should total at least 50 points (four subjects) of your undergraduate degree. An additional component of 25 points (two subjects) is free to be taken as either core science, breadth, or a combination of the two. You may take no more than 37.5 points (three subjects) of breadth at first-year level.

For a complete overview of subjects available in the Sciences, visit the Course and Subject Handbook website: http://handbook.unimelb.edu.au

www.bsc.unimelb.edu.au

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