

# Zachary Kemp

BSc (Hons), PhD (Physics)



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[zac-k.github.io](http://zac-k.github.io)



## education

- 2012–2016 **Doctor** of Philosophy (Physics) Monash University, Clayton  
Thesis title: “*Sources and effects of errors in vector field electron tomography*”  
Description: This work utilises highly realistic electron microscope image simulations (implemented in C++ and python) to address the accuracy of three-dimensional electromagnetic vector field reconstruction methods.
- 2007–2011 **Bachelor** of Science (Hons) Monash University, Clayton  
Thesis title: “*Tomographic reconstruction of vector fields in the presence of noise*”  
Description: This work examines the noise-stability of the vector tomography reconstruction process.  
Majors: physics, pure mathematics  
Minor: astrophysics



## experience

- 2017-present **Teaching** Associate, Third Level Monash University, Clayton  
PHS3000 - Laboratory
- 2012-present **Teaching** Associate, Second Level Monash University, Clayton  
PHS2061 - Quantum and Thermal Physics PHS2062 - Electromagnetism and Optics
- 2010–2011 **Teaching** Associate, First Level Monash University, Clayton  
PHS1011 - Classical Physics and Relativity ENG1080 - Foundation Physics  
RAD1021 - Radiological Physics PHS1042 - Environmental Physics  
PHS1022 - Fields and Quantum Physics BMS1031 - Medical Biophysics



## awards

- 2012-2015 **Dean's PostGraduate Research Scholarship** Faculty of Science, Monash University  
Awarded to students pursuing a Higher Degree by Research after achieving first class honours.

## publications

- 2017 **Propagation based phase retrieval using artificial neural networks**  
Z D C Kemp  
In peer review (preprint available at [arXiv:1709.09940](https://arxiv.org/abs/1709.09940))
- 2016 **Sources and effects of errors in vector field electron tomography**  
Z D C Kemp  
PhD thesis, Monash University (2016)
- 2016 **Effect of specimen orientation on the accuracy of vector field electron tomography**  
Z D C Kemp, D M Paganin, T C Petersen, M J Morgan  
Optics Express 24.20 (2016): 22366
- 2014 **Analysis of noise-induced errors in vector-field electron tomography**  
Z D C Kemp, T C Petersen, D M Paganin, K M Spiers, M Weyland, M J Morgan  
Physical Review A 90.2 (2014): 023859
- 2011 **Tomographic reconstruction of vector fields in the presence of noise**  
Z D C Kemp  
Honours thesis, Monash University (2011)

## interests and skills

### Physics/mathematics

error analysis, tomography, phase retrieval, image simulation, numerical methods, image processing, electron optics, machine learning, mathematical modelling

### Programming and software

C++, python, TensorFlow, MATLAB, L<sup>A</sup>T<sub>E</sub>X, Photoshop, Blender

### Other skills

technical writing, independent research, teaching, using scientific instrumentation

### Laboratory topics taught

optical spectroscopy,  $\gamma$ -spectroscopy, nuclear decay, Fourier analysis, operational amplifiers, dynamics, buoyancy, photoelectric effect, AC signal filters, Ramsauer-Townsend effect, charge-to-mass ratio of electron, microwave optics, Hall effect in water, and many others

### Personal interests

music production, 3D modelling, game development

## referees

### Prof. David Paganin

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(03) 9396 1574

PhD supervisor

### Dr Tim Petersen

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(03) 9905 9765

PhD supervisor

### Prof. Michael Morgan

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(03) 9905 3645

PhD supervisor

### Theo Hughes

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manager