

# Dr Thomas White

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## Research Interests

**High energy density physics, Non-equilibrium plasmas, Density functional theory, Quantum molecular dynamics, X-ray diffraction, Laser-matter interactions**

## Education

DPhil.	<b>Atomic and Laser Physics.</b> Trinity College, University of Oxford, UK Supervisor (G. Gregori)	Sept 2010 – Jan 2015
MPhys.	<b>Physics.</b> University of Bath, UK (First Class with Honors)	Sept 2006 – July 2010

## Appointments

Assistant Professor	Department of Physics, University of Nevada, Reno, USA	Sept 2017 - Present
Affiliate Faculty	Lawrence Berkeley National Laboratory, Berkeley, CA, USA	Nov 2019 - Present
Visiting Scientist	Lawrence Livermore National Laboratory, Livermore, CA, USA	Oct 2018 - Present
Research Assistant	Department of Physics, University of Oxford, UK	Dec 2015 – Aug 2017
Visiting Researcher	Institute of Shock Physics, Imperial College London, UK	Dec 2015 – Aug 2017
Research Associate	Institute of Shock Physics, Imperial College London, UK	Feb 2014 – Dec 2015
Student Researcher	Rutherford Appleton Laboratory, UK	July 2009 – Dec 2009

## Awards and Grants

Mousel-Feltner Excellence in Research Award	<i>University of Nevada, Reno</i>	April 2021
NSF CAREER Award (2045718)	<i>CAREER: Non-Adiabatic Effects in Dense Plasmas</i>	Feb. 2021
LaserNET US Travel Grant	<i>Mutual Diffusion at the Extreme Light Laboratory</i>	March 2020
DOE HEDLP Grant (DE-SC0019268)	<i>Investigation into the transport properties of planetary interiors through inelastic X-ray scattering experiments and quantum molecular dynamics</i>	Aug. 2018
Culham Thesis Prize, Institute of Physics	<i>Best PhD Thesis in the field of Plasma Physics (UK)</i>	May 2016
Aylliffe prize	<i>Highest Undergraduate Grade, University of Bath, UK</i>	July 2010
Heathcoat Trust Bursary	<i>The Heathcoat Trust</i>	Sept. 2006

## Selected Publications

1. RA Davis, WA Angermeier, RKT Hermsmeier, TG White **Ion modes in dense ionized plasmas through nonadiabatic molecular dynamics** Phys. Rev. Research **2**, 043139 (2020)
  2. TG White et al. **Supersonic plasma turbulence in the laboratory** Nature Communications **10**, 1758 (2019)
  3. P Tzeferacos et al. **Laboratory evidence of dynamo amplification of magnetic fields in a turbulent plasma** Nature Communications **9**, 591 (2018)
  4. TG White, S Richardson, BJB Crowley, LK Pattison, JWO Harris, G Gregori **Orbital-free density-functional theory simulations of the dynamic structure factor of warm dense aluminum** Phys. Rev. Lett. **111**, 175002 (2013)
- 34 Peer-Reviewed Publications, N>880 citations, h-index=16 (See complete publication list below)*

## Selected Presentations

1. **Developing X-ray Fresnel Diffractive-Refractive Radiography for Measuring Mutual Diffusion in WDM**  
*American Physical Society DPP, (Nov 11 2020)*
2. **Ion Modes in Warm Dense Methane (Invited)**  
*Lawrence Livermore National Laboratory High Energy Density Science Center's seminar (May, 2019)*

**3. Supersonic Turbulence in the Laboratory***HEDLA High Energy Density Laboratory Astrophysics, Kurashiki, Okayama, Japan (27-30 May 2018)***4. Shock compression of matter towards the study of planetary interiors (Invited)***IOP Plasma Physics Group Annual Conference, Isle of Sky, UK (23-26 May 2016)***Students and Postdoctoral Supervision**

William (Alex) Angermeier	<i>Ph.D. Student</i>	2018-
Cameron Allen	<i>Ph.D. Student</i>	2018-
Jacob Molina	<i>Undergraduate Student (McNair Scholar, NSF EPSCoR Awardee)</i>	2018-
Tyreis Gatson	<i>Undergraduate Student (UNR, PREP Awardee)</i>	2021-
Leonardo Rodriguez	<i>Undergraduate Student (UNR, PREP Awardee)</i>	2021-
Matthew Oliver	<i>Postdoctoral Scholar (now at CLF, STFC, UK)</i>	2018-2020
Previous Undergraduate Advisees:		
	<i>Emily Chau, Wataru Hayashi, Ryan Davis, Garrett Van Mourik, Jacob Excel, Jacob Sprague</i>	2017-2021

**Teaching**

Phys701	Classical Mechanics	Spring 2019-2021
Phys701	Mathematical Physics	Fall 2018-2020
Phys740	Fluid Dynamics	Spring 2018
Phys404/604	Computational Techniques in Physics	Fall 2017
Phys497	Senior Thesis	Spring 2018-2021
Phys693	Special Problems (Topics include DFT-MD, Molecular Dynamics)	2017-2020

**Awarded and Recent Experimental Research Campaigns**

Mutual Diffusion in Warm Dense Deuterium at the NIF	National Ignition Facility, LLNL	Q2 2022
Ultra-fast MeV Electron Diffraction from Gold	APS, LBNL	Q3 2021
Diffraction Radiography at EuFEL	European Free Electron Laser	Q2 2021
Development of a Fresnel Diffraction Radiography Diagnostic	Extreme Light Laboratory, Uni. Neb, Lincoln	Q2 2021
Mutual Diffusion in Warm Dense Matter	Omega Laser Facility, LLE	Q1 2021
High-Resolution meV X-ray Scattering from Warm Dense Gold	Matter in Extreme Conditions, LCLS	Q4 2020
Mutual Diffusion in Warm Dense Matter	Omega Laser Facility, LLE	Q3 2020

**Service and Synergistic Activities**

American Physical Society Division of Plasma Physics (APS DPP) Program Committee	2021-
Jupiter Laser Facility Executive Committee	2021-
Member of the HEDSA Steering Committee	2021-
American Physical Society Division of Plasma Physics (APS DPP) PRIDE Committee	2021-
Served as NSF/NLUF/DOE Proposal Peer Reviewer	2017-
College of Science Podcast (Interview with Dr Gabriela González (LIGO))	Nov 2019
Happy Hour with a Scientist (Laboratory Astrophysics: Explosions, Lasers and Supernova)	April 2018
IAPS4fusion2015 (High speed photography) event	Sept 2015

## Full Publication List

### Submitted

35. J. M. Molina and T. G. White  
**Inclusion of Energy Loss in Models of Laser Irradiated Gold Films via Classical Molecular Dynamics**  
 PRE (Submitted), Preprint available at: arXiv:2101.00499
34. A. A. Angermeier and T. G. White  
**An investigation into the approximations used in wave packet molecular dynamics for the study of warm dense matter**  
 Plasma (Submitted), Preprint available at: arXiv:2104.03441

### Published/Accepted

#### **2021**

35. AFA Bott, P Tzeferacos, L Chen, CAJ Palmer, A Rigby, A Bell, R Bingham, A Birkel, C Graziani, DH Froula, J Katz, M Koenig, MW Kunz, CK Li, J Meinecke, F Miniati, R Petrasso, H-S Park, BA Remington, B Reville, JS Ross, D Ryu, D Ryutov, F Séguin, TG White, AA Schekochihin, DQ Lamb, G Gregori  
**Time-resolved turbulent dynamo in a laser plasma**  
 PNAS **118**(11), e2015729118 (2021)
34. L Wollenweber, TR Preston, A Descamps, V Cerantola, A Comley, JH Eggert, LB Fletcher, G Geloni, DO Gericke, SH Glenzer, S Göde, J Hastings, OS Humphries, A Jenei, O Karnbach, Z Konopkova, R Loetzsch, B Marx-Glowna, EE McBride, D McGonegle, G Monaco, BK Ofori-Okai, CAJ Palmer, C Plückerthun, R Redmer, C Strohm, I Thorpe, T Tschentscher, I Uschmann, JS Wark, TG White, K Appel, G Gregori, U Zastra  
**High-resolution inelastic x-ray scattering at the high energy density scientific instrument at the Free-Electron Laser**  
 Review of Scientific Instruments **92**, 013101 (2021)

#### **2020**

33. RA Davis, WA Angermeier, RKT Hermsmeier, TG White  
**Ion modes in dense ionized plasmas through nonadiabatic molecular dynamics**  
 Phys. Rev. Research **2**, 043139 (2020)
32. Adrien Descamps, BK Ofori-Okai, K Appel, V Cerantola, A Comley, JH Eggert, LB Fletcher, DO Gericke, S Göde, O Humphries, O Karnbach, A Lazicki, R Loetzsch, D McGonegle, CAJ Palmer, C Plueckthun, TR Preston, R Redmer, DG Senesky, C Strohm, I Uschmann, TG White, L Wollenweber, G Monaco, JS Wark, JB Hastings, U Zastra, G Gregori, SH Glenzer, EE McBride  
**An approach for the measurement of the bulk temperature of single crystal diamond using an X-ray free electron laser**  
 Scientific Reports **10**, 14564 (2020)
31. LE Chen, AFA Bott, P Tzeferacos, A Rigby, A Bell, R Bingham, C Graziani, J Katz, M Koenig, CK Li, R Petrasso, H-S Park, JS Ross, D Ryu, TG White, B Reville, J Matthews, J Meinecke, F Miniati, EG Zweibel, S Sarkar, AA Schekochihin, DQ Lamb, DH Froula, G Gregori  
**Transport of High-energy Charged Particles through Spatially Intermittent Turbulent Magnetic Fields**  
 ApJ **892** 114 (2020)

#### **2019**

30. Brett Larder, DO Gericke, Scott Richardson, Paul Mabey, TG White, Gianluca Gregori  
**Fast nonadiabatic dynamics of many-body quantum systems**  
Science Advances **5**(11), eaaw1634 (2019)
29. TG White, MT Oliver, P Mabey, M Kühn-Kauffeldt, AFA Bott, LNK Döhl, AR Bell, R Bingham, R Clarke, J Foster, G Giacinti, P Graham, R Heathcote, M Koenig, Y Kuramitsu, DQ Lamb, J Meinecke, Th Michel, F Miniati, M Notley, B Reville, D Ryu, S Sarkar, Y Sakawa, MP Selwood, J Squire, RHH Scott, P Tzeferacos, N Woolsey, AA Schekochihin, G Gregori  
**Supersonic plasma turbulence in the laboratory**  
Nature Communications **10**, 1758 (2019)

**2018**

28. EE McBride, TG White, A Descamps, LB Fletcher, K Appel, FP Condamine, CB Curry, F Dallari, S Funk, E Galtier, M Gauthier, S Goede, JB Kim, HJ Lee, BK Ofori-Okai, M Oliver, A Rigby, C Schoenwaelder, P Sun, Th Tschentscher, BBL Witte, U Zastra, G Gregori, B Nagler, J Hastings, SH Glenzer, G Monaco  
**Setup for meV-resolution inelastic X-ray scattering measurements and X-ray diffraction at the Matter in Extreme Conditions endstation at the Linac Coherent Light Source**  
Review of Scientific Instruments **89**, 10F104 (2018)
27. JC Wood, DJ Chapman, K Poder, NC Lopes, ME Rutherford, TG White, F Albert, KT Behm, N Booth, JSJ Bryant, PS Foster, S Glenzer, E Hill, K Krushelnick, Z Najmudin, BB Pollock, S Rose, W Schumaker, RHH Scott, M Sherlock, AGR Thomas, Z Zhao, DE Eakins, SPD Mangles  
**Ultrafast Imaging of Laser Driven Shock Waves using Betatron X-rays from a Laser Wakefield Accelerator**  
Scientific Reports **8**, 11010 (2018)
26. P Tzeferacos, A Rigby, AFA Bott, AR Bell, R Bingham, A Casner, F Cattaneo, EM Churazov, J Emig, F Fiuza, CB Forest, J Foster, C Graziani, J Katz, M Koenig, C-K Li, J Meinecke, R Petrasso, H-S Park, BA Remington, JS Ross, Dongsu Ryu, D Ryutov, TG White, B Reville, Francesco Miniati, AA Schekochihin, DQ Lamb, DH Froula, G Gregori  
**Laboratory evidence of dynamo amplification of magnetic fields in a turbulent plasma**  
Nature Communications **9**, 591 (2018)
24. A Rigby, J Katz, AFA Bott, TG White, P Tzeferacos, DQ Lamb, DH Froula, G Gregori  
**Implementation of a Faraday rotation diagnostic at the OMEGA laser facility**  
High Power Laser Science and Engineering, **6**, E49 (2018)

**2017**

23. SA Muller, DN Kaczala, HM Abu-Shawareb, EL Alfonso, LC Carlson, M Mauldin, P Fitzsimmons, D Lamb, P Tzeferacos, L Chen, G Gregori, A Rigby, A Bott, TG White, D Froula, J Katz  
**Evolution of the design and fabrication of astrophysics targets for Turbulent Dynamo (TDYNO) experiments on OMEGA**  
Fusion Science and Technology **73**, 434-445 2018
23. M Oliver, T White, P Mabey, M Kühn-Kauffeldt, L Döhl, R Bingham, R Clarke, P Graham, R Heathcote, M Koenig, Y Kuramitsu, DQ Lamb, J Meinecke, T Michel, Francesco Miniati, M Notley, B Reville, S Sarkar, Y Sakawa, Alexander A Schekochihin, P Tzeferacos, N Woolsey, H-S Park, G Gregori  
**Magneto-optic probe measurements in low density-supersonic jets**  
JINST **12** P12001 (2017)
22. TG White, A Tikku, MF Alves Silva, G Gregori, A Higginbotham, DE Eakins  
**Identifying deformation mechanisms in molecular dynamics simulations of laser shocked matter**

Journal of Computational Physics **350**, 16-24 (2017)

21. AFA Bott, C Graziani, P Tzeferacos, TG White, DQ Lamb, G Gregori, AA Schekochihin  
**Proton imaging of stochastic magnetic fields**  
Journal of Plasma Physics, 83(6), 905830614. doi:10.1017/S0022377817000939
20. TG White, JRW Patten, K - H Wan, AD Pullen, DJ Chapman, DE Eakins  
**A single camera three - dimensional digital image correlation system for the study of adiabatic shear bands**  
Strain **53**, (3) e12226 (2017)
19. P Tzeferacos, A Rigby, A Bott, AR Bell, R Bingham, A Casner, F Cattaneo, EM Churazov, J Emig, N Flocke, F Fiuza, CB Forest, J Foster, C Graziani, J Katz, M Koenig, C-K Li, J Meinecke, R Petrasso, H-S Park, BA Remington, JS Ross, D Ryu, D Ryutov, K Weide, TG White, B Reville, F Miniati, AA Schekochihin, DH Froula, G Gregori, DQ Lamb  
**Numerical modeling of laser-driven experiments aiming to demonstrate magnetic field amplification via turbulent dynamo**  
Physics of Plasmas **24**, 041404 (2017)
18. P Mabey, S Richardson, TG White, LB Fletcher, SH Glenzer, NJ Hartley, J Vorberger, DO Gericke, G Gregori  
**A strong diffusive ion mode in dense ionized matter predicted by Langevin dynamics**  
Nature Communications volume 8, Article number: 14125 (2017)

## 2016

17. Michael E Rutherford, David J Chapman, Thomas G White, Michael Drakopoulos, Alexander Rack, Daniel E Eakins  
**Evaluating scintillator performance in time-resolved hard X-ray studies at synchrotron light sources**  
J. Synchrotron Rad. **23**, 685-693 (2016)
16. TD Swinburne, MG Glavicic, KM Rahman, NG Jones, J Coakley, DE Eakins, TG White, V Tong, D Milathianaki, GJ Williams, D Rugg, AP Sutton, D Dye  
**Picosecond dynamics of a shock-driven displacive phase transformation in Zr**  
Phys. Rev. B **93**, 144119 (2016)

## 2015

15. U Zastra, P Sperling, C Fortmann-Grote, A Becker, T Bornath, R Bredow, T Döppner, T Fennel, LB Fletcher, E Förster, S Göde, G Gregori, M Harmand, V Hilbert, T Laarmann, HJ Lee, T Ma, KH Meiwes-Broer, JP Mithen, CD Murphy, M Nakatsutsumi, P Neumayer, A Przystawik, S Skruszewicz, J Tiggesbäumker, S Toleikis, TG White, SH Glenzer, R Redmer, T Tschentscher  
**Ultrafast electron kinetics in short pulse laser-driven dense hydrogen**  
J. Phys. B: At. Mol. Opt. Phys. **48** 224004 (2015)
14. LB Fletcher, HJ Lee, T Döppner, E Galtier, B Nagler, P Heimann, C Fortmann, S LePape, T Ma, M Millot, A Pak, D Turnbull, DA Chapman, DO Gericke, J Vorberger, T White, G Gregori, M Wei, B Barbreil, RW Falcone, C-C Kao, H Nuhn, J Welch, U Zastra, P Neumayer, JB Hastings, SH Glenzer  
**Ultrabright X-ray laser scattering for dynamic warm dense matter physics**  
Nature Photonics volume 9, pages274-279(2015)
13. NJ Hartley, P Belancourt, DA Chapman, T Döppner, RP Drake, DO Gericke, SH Glenzer, D Khaghani, S LePape, T Ma, P Neumayer, A Pak, L Peters, S Richardson, J Vorberger, TG White, G Gregori  
**Electron-ion temperature equilibration in warm dense tantalum**  
High Energy Density Physics **14**, 1-5 (2015)

## 2014

12. LB Fletcher, HJ Lee, B Barbrel, M Gauthier, E Galtier, B Nagler, T Döppner, S LePape, T Ma, A Pak, D Turnbull, T White, G Gregori, M Wei, RW Falcone, P Heimann, U Zastra, JB Hastings, SH Glenzer  
**Exploring Mbar shock conditions and isochorically heated aluminum at the Matter in Extreme Conditions end station of the Linac Coherent Light Source**  
Review of Scientific Instruments 85, 11E702 (2014)
11. TG White, P Mabey, DO Gericke, NJ Hartley, HW Doyle, D McGonegle, DS Rackstraw, A Higginbotham, G Gregori  
**Electron-phonon equilibration in laser-heated gold films**  
Phys. Rev. B 90, 014305 (2014)
10. Ulf Zastra, Philipp Sperling, Arno Becker, T Bornath, R Bredow, Tilo Doepfner, Siarhei Dziarzhytski, Thomas Fennel, LB Fletcher, Eckhart Foerster, Carsten Fortmann, SH Glenzer, Sebastian Goede, Gianluca Gregori, Marion Harmand, Vinzenz Hilbert, B Holst, Tim Laarmann, Hae Ja Lee, Tammy Ma, JP Mithen, Rolf Mitzner, CD Murphy, Motoaki Nakatsutsumi, Paul Neumayer, Andreas Przystawik, Sebastian Røling, Michael Schulz, Bjoern Siemer, Slawomir Skruszewicz, Josef Tiggesbaeumker, Sven Toleikis, Thomas Tschentscher, Thomas White, Michael Woestmann, Helmut Zacharias, Ronald Redmer  
**Equilibration dynamics and conductivity of warm dense hydrogen**  
Phys. Rev. E 90, 013104 (2014)
9. CRD Brown, Dirk O Gericke, Marco Cammarata, Byeoung Ick Cho, T Döppner, K Engelhorn, E Förster, C Fortmann, D Fritz, E Galtier, SH Glenzer, Marion Harmand, P Heimann, NL Kugland, DQ Lamb, HJ Lee, RW Lee, H Lemke, M Makita, A Moinard, CD Murphy, B Nagler, P Neumayer, K-U Plagemann, R Redmer, D Riley, FB Rosmej, P Sperling, Sven Toleikis, SM Vinko, Jan Vorberger, S White, TG White, Kathrin Wünsch, U Zastra, D Zhu, Thomas Tschentscher, Gianluca Gregori  
**Evidence for a glassy state in strongly driven carbon**  
Scientific Reports volume 4, Article number: 5214 (2014)
8. U Zastra, P Sperling, M Harmand, A Becker, T Bornath, R Bredow, S Dziarzhytski, T Fennel, LB Fletcher, E Förster, S Göde, G Gregori, V Hilbert, D Hochhaus, B Holst, T Laarmann, HJ Lee, T Ma, JP Mithen, R Mitzner, CD Murphy, M Nakatsutsumi, P Neumayer, A Przystawik, S Røling, M Schulz, B Siemer, S Skruszewicz, J Tiggesbäumker, S Toleikis, T Tschentscher, T White, M Wöstmann, H Zacharias, T Döppner, SH Glenzer, R Redmer  
**Resolving Ultrafast Heating of Dense Cryogenic Hydrogen**  
Phys. Rev. Lett. 112, 105002 (2014)
7. Tammy Ma, L Fletcher, A Pak, DA Chapman, RW Falcone, C Fortmann, E Galtier, DO Gericke, G Gregori, J Hastings, OL Landen, S Le Pape, HJ Lee, B Nagler, P Neumayer, D Turnbull, J Vorberger, TG White, K Wünsch, U Zastra, SH Glenzer, T Döppner  
**Observations of strong ion-ion correlations in dense plasmas**  
Physics of Plasmas 21, 056302 (2014)
6. TG White, NJ Hartley, B Borm, BJB Crowley, JWO Harris, DC Hochhaus, T Kaempfer, K Li, P Neumayer, LK Pattison, F Pfeifer, S Richardson, APL Robinson, I Uschmann, G Gregori  
**Electron-Ion Equilibration in Ultrafast Heated Graphite**  
Phys. Rev. Lett. 112, 145005 (2014)

## 2013

5. TG White, S Richardson, BJB Crowley, LK Pattison, JWO Harris, G Gregori  
**Orbital-free density-functional theory simulations of the dynamic structure factor of warm dense aluminum**

Phys. Rev. Lett. 111, 175002 (2013)

4. S White, G Nersisyan, B Kettle, TWJ Dzelzainis, K McKeever, CLS Lewis, A Otten, K Siegenthaler, D Kraus, M Roth, T White, G Gregori, DO Gericke, R Baggott, DA Chapman, Kathrin Wünsch, J Vorberger, D Riley  
**X-ray scattering from warm dense iron**  
High Energy Density Physics **9**, 3, 573-577 (2013)

## 2012

3. TG White, Jan Vorberger, CRD Brown, BJB Crowley, P Davis, SH Glenzer, JWO Harris, DC Hochhaus, S Le Pape, T Ma, CD Murphy, P Neumayer, LK Pattison, S Richardson, DO Gericke, G Gregori  
**Observation of inhibited electron-ion coupling in strongly heated graphite**  
Scientific Reports volume 2, Article number: 889 (2012)
2. M Harmand, CD Murphy, CRD Brown, M Cammarata, T Döppner, S Düsterer, D Fritz, E Förster, E Galtier, J Gaudin, SH Glenzer, S Göde, G Gregori, V Hilbert, D Hochhaus, T Laarmann, HJ Lee, H Lemke, K-H Meiwes-Broer, A Moinard, P Neumayer, A Przystawik, H Redlin, M Schulz, S Skruszewicz, F Tavella, T Tschentscher, T White, U Zastra, S Toleikis  
**Plasma switch as a temporal overlap tool for pump-probe experiments at FEL facilities**  
JINST **7** P08007 (2012)

## 2011

1. U Zastra, V Hilbert, C Brown, T Döppner, S Dziarzhyski, E Förster, SH Glenzer, S Göde, G Gregori, M Harmand, D Hochhaus, T Laarmann, HJ Lee, K-H Meiwes-Broer, P Neumayer, A Przystawik, P Radcliffe, M Schulz, S Skruszewicz, F Tavella, J Tiggesbäumker, S Toleikis, TG White  
**In-situ determination of dispersion and resolving power in simultaneous multiple-angle XUV spectroscopy**  
JINST **6** P10001 (2011)