

List of Publications

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h-index (web of science): 36
h-index (google scholar): 43

citations (google scholar): ~7100

Submitted Journal Articles

13. HM Bellenbaum, B Bachmann, D Kraus, T Gawne, MP Böhme, T Döppner, ...
Towards Model-free Temperature Diagnostics of Warm Dense Matter from Multiple Scattering Angles
arXiv preprint arXiv:2411.06830
12. P Tolias, T Dornheim, J Vorberger
On the density-density correlations of the non-interacting finite temperature electron gas
arXiv preprint arXiv:2410.22942
11. J Vorberger, T Dornheim, MP Böhme, Z Moldabekov, P Tolias
Green's function perspective on the nonlinear density response of quantum many-body systems
arXiv preprint arXiv:2410.01845
10. ZA Moldabekov, X Shao, M Pavanello, J Vorberger, T Dornheim
Nonlocal vs Local Pseudopotentials Affect Kinetic Energy Kernels in Orbital-Free DFT
arXiv preprint arXiv:2409.12625
9. T Dornheim, HM Bellenbaum, M Bethkenhagen, SB Hansen, MP Böhme, ...
Model-free Rayleigh weight from x-ray Thomson scattering measurements
arXiv preprint arXiv:2409.08591
8. T Dornheim, P Tolias, Z Moldabekov, J Vorberger
Short wavelength limit of the dynamic Matsubara local field correction
arXiv preprint arXiv:2408.04669
7. T Dornheim, Z Moldabekov, S Schwalbe, J Vorberger
Direct free energy calculation from ab initio path integral Monte Carlo simulations of warm dense matter
arXiv preprint arXiv:2407.01044
6. M Šmíd, O Humphries, C Baetz, E Brambrink, T Burian, MS Cho, ...
Plasma screening in mid-charged ions observed by K-shell line emission
arXiv preprint arXiv:2406.06233

5. T Gawne, ZA Moldabekov, OS Humphries, K Appel, C Bächtz, V Bouffetier, ...
Ultra-high Resolution X-ray Thomson Scattering Measurements of Electronic Structures
arXiv preprint arXiv:2403.02776
4. T Dornheim, T Döppner, P Tolias, M Böhme, L Fletcher, T Gawne, ...
Unraveling electronic correlations in warm dense quantum plasmas
arXiv preprint arXiv:2402.19113
3. J Zhang, R Qin, W Zhu, J Vorberger
Ab initio evaluation of the electron-ion energy transfer rate in a non-equilibrium warm dense metal
arXiv preprint arXiv:2401.08184
2. Tobias Dornheim, Tilo Döppner, Andrew D Baczewski, Panagiotis Tolias, Maximilian P Böhme, Zhandos A Moldabekov, Thomas Gawne, Divyanshu Ranjan, David A Chapman, Michael J MacDonald, Thomas R Preston, Dominik Kraus, Jan Vorberger
X-ray Thomson scattering absolute intensity from the f-sum rule in the imaginary-time domain
arXiv preprint arXiv:2305.15305
1. Maximilian P Böhme, Luke B Fletcher, Tilo Döppner, Dominik Kraus, Andrew D Baczewski, Thomas R Preston, Michael J MacDonald, Frank R Graziani, Zhandos A Moldabekov, Jan Vorberger, Tobias Dornheim
Evidence of free-bound transitions in warm dense matter and their impact on equation-of-state measurements arXiv preprint arXiv:2306.17653

Reviewed Journal Articles

154. Michael Bonitz, Jan Vorberger, Mandy Bethkenhagen, Maximilian P Böhme, David M Ceperley, Alexey Filinov, Thomas Gawne, Frank Graziani, Gianluca Gregori, Paul Hamann, Stephanie B Hansen, Markus Holzmann, SX Hu, Hanno Kählert, Valentin V Karasiev, Uwe Kleinschmidt, Linda Kordts, Christopher Makait, Burkhard Militzer, Zhandos A Moldabekov, Carlo Pierleoni, Martin Preising, Kushal Ramakrishna, Ronald Redmer, Sebastian Schwalbe, Pontus Svensson, Tobias Dornheim
Toward first principles-based simulations of dense hydrogen
Physics of Plasmas 31 (11) (2024).
153. Z Moldabekov, J Vorberger, T Dornheim
From density response to energy functionals and back: An ab initio perspective on matter under extreme conditions
Progress in Particle and Nuclear Physics, 104144 (2024).
152. Thomas Gawne, Hannah Bellenbaum, Luke B Fletcher, Karen Appel, Carsten Baehtz, Victorien Bouffetier, Erik Brambrink, Danielle Brown, Attila Cangi, Adrien Descamps, Sebastian Goede, Nicholas J Hartley, Marie-Luise Herbert, Philipp Hesselbach, Hauke Höppner, Oliver S Humphries, Zuzana Konôpková, Alejandro Laso Garcia, Björn Lindqvist, Julian Lütgert, Michael J MacDonald, Mikako Makita, Willow Martin, Mikhail Mishchenko, Zhandos A Moldabekov, Motoaki Nakatsutsumi, Jean-Paul Naedler, Paul Neumayer, Alexander Pelka, Chongbing Qu, Lisa Randolph, Johannes Rips, Toma Toncian, Jan Vorberger, Lennart Wollenweber, Ulf Zastrau, Dominik Kraus, Thomas R Preston, Tobias Dornheim
Effects of mosaic crystal instrument functions on x-ray Thomson scattering diagnostics
Journal of Applied Physics 136 (10) (2024).
151. Tobias Dornheim, Sebastian Schwalbe, Panagiotis Tolias, Maximilian P Böhme, Zhandos A Moldabekov, Jan Vorberger
Ab initio density response and local field factor of warm dense hydrogen
Matter and Radiation at Extremes 9 (5) (2024).
150. T Dornheim, P Tolias, J Vorberger, ZA Moldabekov
Quantum delocalization, structural order, and density response of the strongly coupled electron liquid
Europhysics Letters 147 (3), 36001 (2024).
149. T Dornheim, P Tolias, F Kalkavouras, ZA Moldabekov, J Vorberger
Dynamic exchange correlation effects in the strongly coupled electron liquid
Physical Review B 110 (7), 075137 (2024).
148. T Gawne, ZA Moldabekov, OS Humphries, K Appel, C Baehtz, V Bouffetier, ...
Ultra-high resolution x-ray Thomson scattering measurements at the European X-ray Free Electron Laser
Physical Review B 109 (24), L241112 (2024).
147. F Akhmetov, J Vorberger, I Milov, I Makhotkin, M Ackermann
Ab initio-simulated optical response of hot electrons in gold and ruthenium
Optics Express 32 (11), 19117-19132 (2024).
146. Zhandos A Moldabekov, Thomas D Gawne, Sebastian Schwalbe, Thomas R Preston, Jan Vorberger, Tobias Dornheim

- Excitation signatures of isochorically heated electrons in solids at finite wave number explored from first principles*
Physical Review Research 6 (2), 023219 (2024).
145. MG Gorman, D McGonegle, RF Smith, S Singh, T Jenkins, RS McWilliams, B Albertazzi, SJ Ali, L Antonelli, MR Armstrong, C Baetz, OB Ball, S Banerjee, AB Belonoshko, A Benuzzi-Mounaix, CA Bolme, V Bouffetier, R Briggs, K Buakor, T Butcher, S Di Dio Cafiso, V Cerantola, J Chantel, A Di Cicco, S Clarke, AL Coleman, J Collier, GW Collins, AJ Comley, F Coppari, TE Cowan, G Cristoforetti, H Cynn, A Descamps, F Dorchie, MJ Duff, A Dwivedi, C Edwards, JH Eggert, D Errandonea, G Fiquet, E Galtier, A Laso Garcia, H Ginestet, L Gizzi, A Gleason, S Goede, JM Gonzalez, M Harmand, NJ Hartley, PG Heighway, C Hernandez-Gomez, A Higginbotham, H Höppner, RJ Husband, TM Hutchinson, H Hwang, AE Lazicki, DA Keen, J Kim, P Koester, Z Konopkova, D Kraus, A Krygier, L Labate, Y Lee, H-P Liermann, P Mason, M Masruri, B Massani, EE McBride, C McGuire, JD McHardy, S Merkel, G Morard, B Nagler, M Nakatsutsumi, K Nguyen-Cong, A-M Norton, II Oleynik, C Otzen, N Ozaki, S Pandolfi, DJ Peake, A Pelka, KA Pereira, JP Phillips, C Prescher, TR Preston, L Randolph, D Ranjan, A Ravasio, R Redmer, J Rips, D Santamaria-Perez, DJ Savage, M Schoelmerich, J-P Schwinkendorf, J Smith, A Sollier, J Spear, C Spindloe, M Stevenson, C Strohm, T-A Suer, M Tang, M Toncian, T Toncian, SJ Tracy, A Trapananti, T Tschentscher, M Tyldesley, CE Vennari, T Vinci, SC Vogel, TJ Volz, J Vorberger, JPS Walsh, JS Wark, JT Willman, L Wollenweber, U Zastra, E Brambrink, K Appel, MI McMahon
Shock compression experiments using the DiPOLE 100-X laser on the high energy density instrument at the European x-ray free electron laser: Quantitative structural analysis of liquid Sn
Journal of Applied Physics 135 (16) (2024).
144. T Dornheim, S Schwalbe, MP Böhme, ZA Moldabekov, J Vorberger, ...
Ab initio path integral Monte Carlo simulations of warm dense two-component systems without fixed nodes: Structural properties
The Journal of Chemical Physics 160 (16) (2024).
143. J Vorberger, TR Preston, N Medvedev, MP Böhme, ZA Moldabekov, ...
Revealing non-equilibrium and relaxation in laser heated matter
Physics Letters A 499, 129362 (2024).
142. G Röpke, T Dornheim, J Vorberger, D Blaschke, B Mahato
Virial coefficients of the uniform electron gas from path-integral Monte Carlo simulations
Physical Review E 109 (2), 025202 (2024).
141. T Dornheim, S Schwalbe, ZA Moldabekov, J Vorberger, P Tolias
Ab Initio Path Integral Monte Carlo Simulations of the Uniform Electron Gas on Large Length Scales
The Journal of Physical Chemistry Letters 15, 1305-1313 (2024).
140. ZA Moldabekov, X Shao, M Pavanello, J Vorberger, F Graziani, ...
Imposing correct jellium response is key to predict the density response by orbital-free DFT
Physical Review B 108 (23), 235168 (2023).
139. Zhandos Moldabekov, Sebastian Schwalbe, Maximilian P Böhme, Jan Vorberger, Xuecheng Shao, Michele Pavanello, Frank R Graziani, Tobias Dornheim
Bound-State Breaking and the Importance of Thermal Exchange–Correlation Effects in Warm

- Dense Hydrogen*
Journal of Chemical Theory and Computation 20 (1), 68-78 (2023).
138. Long Yang, Lingen Huang, Stefan Assenbaum, Thomas E Cowan, Ilja Goethel, Sebastian Göde, Thomas Kluge, Martin Rehwald, Xiayun Pan, Ulrich Schramm, Jan Vorberger, Karl Zeil, Tim Ziegler, Constantin Bernert
Time-resolved optical shadowgraphy of solid hydrogen jets as a testbed to benchmark particle-in-cell simulations
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137. F Akhmetov, I Milov, IA Makhotkin, M Ackermann, J Vorberger
Electron-phonon coupling in transition metals beyond Wang's approximation
Physical Review B 108 (21), 214301 (2023).
136. T Dornheim, P Tolias, S Groth, ZA Moldabekov, J Vorberger, B Hirshberg
Fermionic physics from ab initio path integral Monte Carlo simulations of fictitious identical particles
The Journal of Chemical Physics 159 (16) (2023).
135. K Ramakrishna, M Lokamani, A Baczewski, J Vorberger, A Cangi
Impact of electronic correlations on high-pressure iron: insights from time-dependent density functional theory
Electronic Structure 5 (4), 045002 (2023).
134. T Dornheim, MP Böhme, ZA Moldabekov, J Vorberger
Electronic density response of warm dense hydrogen on the nanoscale
Physical Review E 108 (3), 035204 (2023).
133. T Dornheim, ZA Moldabekov, P Tolias, M Böhme, J Vorberger
Physical insights from imaginary-time density-density correlation functions
Matter and Radiation at Extremes 8 (5) (2023).
132. T Dornheim, J Vorberger, ZA Moldabekov, M Böhme
Analysing the dynamic structure of warm dense matter in the imaginary-time domain: theoretical models and simulations
Philosophical Transactions of the Royal Society A 381 (2253), 20220217 (2023).
131. P Hamann, L Kordts, A Filinov, M Bonitz, T Dornheim, J Vorberger
Prediction of a roton-type feature in warm dense hydrogen
Physical Review Research 5 (3), 033039 (2023).
130. ZA Moldabekov, J Vorberger, M Lokamani, T Dornheim
Averaging over atom snapshots in linear-response TDDFT of disordered systems: A case study of warm dense hydrogen
The Journal of Chemical Physics 159 (1) (2023).
129. Tilo Doeppner, Mandy Bethkenhagen, D Kraus, P Neumayer, DA Chapman, B Bachmann, RA Baggott, MP Böhme, L Divol, RW Falcone, LB Fletcher, OL Landen, MJ MacDonald, AM Saunders, M Schörner, PA Sterne, J Vorberger, BBL Witte, A Yi, R Redmer, SH Glenzer, DO Gericke
Observing the onset of pressure-driven K-shell delocalization
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Unravelling the nonlinear ideal density response of many-body systems
Europhysics Letters 142 (4), 44001 (2023).
127. ZA Moldabekov, M Pavanello, MP Böhme, J Vorberger, T Dornheim
Linear-response time-dependent density functional theory approach to warm dense matter with adiabatic exchange-correlation kernels
Physical Review Research 5 (2), 023089 (2023).
126. D Kraus, J Vorberger, NJ Hartley, J Lütgert, M Rödel, D Chekrygina, T Döppner, T van Driel, RW Falcone, LB Fletcher, S Frydrych, E Galtier, DO Gericke, SH Glenzer, E Granados, Y Inubushi, N Kamimura, K Katagiri, MJ MacDonald, AJ MacKinnon, T Matsuoka, K Miyanishi, EE McBride, I Nam, P Neumayer, N Ozaki, A Pak, A Ravasio, AM Saunders, AK Schuster, MG Stevenson, K Sueda, P Sun, T Togashi, K Voigt, M Yabashi, T Yabuuchi
Indirect evidence for elemental hydrogen in laser-compressed hydrocarbons
Physical Review Research 5 (2), L022023 (2023).
125. D Ranjan, K Ramakrishna, K Voigt, OS Humphries, B Heuser, MG Stevenson, J Lütgert, Z He, C Qu, S Schumacher, PT May, A Amouretti, K Appel, E Brambrink, V Cerantola, D Chekrygina, LB Fletcher, S Göde, M Harmand, NJ Hartley, SP Hau-Riege, M Makita, A Pelka, AK Schuster, M Šmíd, T Toncian, M Zhang, TR Preston, U Zastra, J Vorberger, D Kraus
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124. T Dornheim, P Tolias, ZA Moldabekov, J Vorberger
Energy response and spatial alignment of the perturbed electron gas
The Journal of Chemical Physics 158 (16) (2023).
123. Tobias Dornheim, Damar C Wicaksono, Juan E Suarez-Cardona, Panagiotis Tolias, Maximilian P Böhme, Zhandos A Moldabekov, Michael Hecht, Jan Vorberger
Extraction of the frequency moments of spectral densities from imaginary-time correlation function data
Physical Review B 107 (15), 155148 (2023).
122. Tobias Dornheim, Maximilian P Böhme, David A Chapman, Dominik Kraus, Thomas R Preston, Zhandos A Moldabekov, Niclas Schlünzen, Attila Cangi, Tilo Döppner, Jan Vorberger
Imaginary-time correlation function thermometry: A new, high-accuracy and model-free temperature analysis technique for x-ray Thomson scattering data
Physics of Plasmas 30 (4) (2023).
121. K Ramakrishna, M Lokamani, A Baczewski, J Vorberger, A Cangi
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Physical Review B 107 (11), 115131 (2023).
120. Tobias Dornheim, Zhandos A Moldabekov, Kushal Ramakrishna, Panagiotis Tolias, Andrew D Baczewski, Dominik Kraus, Thomas R Preston, David A Chapman, Maximilian P Böhme, Tilo Döppner, Frank Graziani, Michael Bonitz, Attila Cangi, Jan Vorberger
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Journal of Chemical Theory and Computation **19** (4), 1286-1299 (2023).
118. ZA Moldabekov, M Lokamani, J Vorberger, A Cangi, T Dornheim
Non-empirical mixing coefficient for hybrid XC functionals from analysis of the XC kernel
The Journal of Physical Chemistry Letters **14** (5), 1326-1333 (2023).
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Ab initio path integral Monte Carlo simulations of hydrogen snapshots at warm dense matter conditions
Physical Review E **107** (1), 015206 (2023).
116. Z Moldabekov, M Lokamani, J Vorberger, A Cangi, T Dornheim
Assessing the accuracy of hybrid exchange-correlation functionals for the density response of warm dense electrons
J. Chem. Phys. **158**, 094105 (2023).
115. Tobias Dornheim, Maximilian Böhme, Dominik Kraus, Tilo Döppner, Thomas R Preston, Zhandos A Moldabekov, Jan Vorberger
Accurate temperature diagnostics for matter under extreme conditions
Nature Communications **13** (1), 7911 (2022).
114. Anja Katharina Schuster, Katja Voigt, Benjamin Klemmed, Nicholas J Hartley, J Lütgert, M Zhang, C Bähz, A Benad, C Brabetz, T Cowan, T Doeppner, DJ Erb, A Eychmueller, S Facsko, RW Falcone, LB Fletcher, S Frydrych, GC Ganzenmüller, Dirk O Gericke, SH Glenzer, J Grenzer, U Helbig, S Hiermaier, R Hübner, A Laso Garcia, HJ Lee, MJ MacDonald, Emma Elizabeth McBride, P Neumayer, A Pak, A Pelka, I Prencipe, A Prosvetov, A Rack, A Ravasio, R Redmer, D Reemts, M Rödel, Markus Schölmerich, D Schumacher, M Tomut, SJ Turner, AM Saunders, P Sun, J Vorberger, A Zettl, D Kraus
Recovery of release cloud from laser shock-loaded graphite and hydrocarbon targets: in search of diamonds
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113. T Dornheim, J Vorberger, Z Moldabekov, G Röpke, WD Kraeft
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High Energy Density Physics **45**, 101015 (2022).
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Electronic pair alignment and roton feature in the warm dense electron gas Communications Physics **5** (1), 304 (2022).
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- Tadashi Togashi, Tommaso Vinci, Katja Voigt, Jan Vorberger, Makina Yabashi, Toshinori Yabuuchi, Lisa MV Zinta, Alessandra Ravasio, Dominik Kraus
Diamond formation kinetics in shock-compressed C-H-O samples recorded by small-angle x-ray scattering and x-ray diffraction
 Science Advances **8** (35), eabo0617 (2022).
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Static Electronic Density Response of Warm Dense Hydrogen: Ab Initio Path Integral Monte Carlo Simulations
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108. T Dornheim, P Tolias, ZA Moldabekov, A Cangi, J Vorberger
Effective electronic forces and potentials from ab initio path integral Monte Carlo simulations
 The Journal of Chemical Physics **156** (24), (2022).
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Proton stopping measurements at low velocity in warm dense carbon
 Nature Communications **13** (1), 2893 (2022).
106. Z. Moldabekov, J. Vorberger, T. Dornheim
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105. Luke B Fletcher, Jan Vorberger, Will Schumaker, Charles Ruyer, Sebastian Goede, Eric Galtier, Ulf Zastrau, Eduardo P Alves, Scott D Baalrud, Rory A Baggott, B Barbreil, Z Chen, T Döppner, M Gauthier, E Granados, JB Kim, D Kraus, HJ Lee, MJ MacDonald, R Mishra, A Pelka, A Ravasio, C Roedel, AR Fry, R Redmer, F Fiuza, DO Gericke, SH Glenzer
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101. Z. Moldabekov, T. Dornheim, J. Vorberger, A. Cangi
Benchmarking exchange-correlation functionals in the spin-polarized inhomogeneous electron gas under warm dense conditions
Physical Review B **105** (3), 035134 (2022).
100. [OA] D. Zahn, F. Jakobs, H. Seiler, T.A. Butcher, D. Engel, J. Vorberger, U. Atxitia, Y. William Windsor, R. Ernstorfer
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