

Curriculum Vitae

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Citizenship: Germany

Date of Birth: February, 12th, 1977
Place of Birth: Neustrelitz, Germany

Professional Experience

- Postdoctoral Research Fellow, June 2007 – present
Centre for Fusion, Space & Astrophysics, University of Warwick, Coventry, UK
 - Postdoctoral Fellow, July 2005 – May 2007
Geophysical Laboratory, Carnegie Institution of Washington, Washington D.C., USA
 - Scientific Assistant, January 2002 – December 2004
Institut für Physik, E.-M.-Arndt Universität Greifswald, Germany
 - Research:
 - quantum statistics using Green's function techniques
 - classical statistics using integral equations
 - first principle numerical methods (DFT, MD, MC, PIMC, DFT-MD)
 - equation of state, self energy, spectral function,
pair correlation function and Wigner function
for dense quantum plasmas
 - equation of state, ionic and electronic properties of warm
dense matter and strongly coupled plasmas, mixing properties
 - theory for x-ray Thomson scattering
 - thermodynamics, ionic, and electronic properties of solids
and liquids under high pressure
- Programming: Fortran, Scripts, Maple, Mathematica, IDL
Codes: CPMD, VASP, Abinit, Siesta, Wien2k, VMD, Opium, FHI

Education

- Ph.D. in Theoretical Physics, E.-M.-Arndt University Greifswald, March 2005
(*magna cum laude*)
Advisor: Prof. M. Schlanges
Thesis: Equilibrium Properties of Dense Plasmas
- Diploma in Physics, E.-M.-Arndt University Greifswald, December 2001 (*with distinction*)
Advisor: Prof. M. Schlanges
Thesis: Thermodynamics of Dense Plasmas
- Schools: September 1983 – June 1995 in Neustrelitz
June 1995: Abitur (high school degree) (*with distinction*)

Military Service

- basic service (required): July 1995 – March 1996

Talks at International Conferences and Workshops

- Kinetic Ions and Burn Physics Modelling Workshop, London (UK), 2010
Stopping Power and Electron-Ion Equilibration
- 30th International Workshop on Physics of High Energy Density in Matter, Hirschegg (Austria), 2010
Nonideal Temperature Relaxation
- Burning Plasmas Workshop, Livermore (USA), 2010
Stopping Power and Equilibration in Inertial Confinement Fusion
- Progress in Nonequilibrium Green's Functions IV, Glasgow (UK), 2009
Energy Transfer Rates & Relaxation in Dense Two-Temperature Plasmas
- 29th International Workshop on Physics of High Energy Density in Matter, Hirschegg (Austria), 2009
Hydrogen-Helium Equation of State and its Implication for Giant Gas Planets
- European Conference on Laser Interaction with Matter, Darmstadt (Germany), 2008
Theory and ab initio Simulations for X-Ray Scattering in Warm Dense Matter
- Strongly Coupled Coulomb Systems Conference, Camerino (Italy), 2008
Probing the Structure of Warm Dense Matter
- High Energy Density in Matter Workshop, Hirschegg (Austria), 2008
Simulations for Thomson Scattering Diagnostics
- EPS Meeting on Plasma Physics, Warsaw (Poland), 2007
Properties of Dense Fluid Hydrogen and Helium and Implications for Giant as Planets
- March Meeting of the American Physical Society 2007, Denver (USA), 2007
Melting of Sodium under Pressure

- International Workshop on the Physics of Nonideal Plasmas (PNP) 12, Darmstadt (Germany), 2006
Properties of Dense Fluid Hydrogen and Helium in Giant Gas Planets
- American Geophysical Union Joint Assembly, Baltimore MD (USA), 2006
Equation of State Calculations for Hydrogen and Helium under Giant Gas Planet Conditions
- March Meeting of the American Physical Society, Baltimore MD (USA), 2006
Hydrogen-Helium Mixtures under Giant Gas Planet Conditions
- Spring Meeting of the German Physical Society, Kiel (Germany), 2004
Thermodynamic Properties of Dense Hydrogen Plasmas
- Spring Meeting of the German Physical Society, Bochum (Germany), 2002
Equation of State of Dense Degenerate Quantum Plasmas

Seminars

- Seminar at the Centre for Scientific Computing, University of Warwick, Coventry (UK), 2010
Structural Properties of Warm Dense Matter for Fusion Applications
- Seminar at the Institut für Physik, Universität Rostock, Rostock (Germany), 2009
Theorie und Experiment von Materie unter extremen Bedingungen
- Seminar at the Institut für Physik, Universität Rostock, Rostock (Germany), 2008
Theory and ab initio Simulations for Experiments in Warm Dense Matter
- Seminar at the Centre for Scientific Computing, University of Warwick, Coventry (UK), 2008
Dense Strongly Coupled Plasmas in Experiment and Theory
- Seminar at the Centre for Fusion, Space & Astrophysics, University of Warwick, Coventry (UK), 2007
On Equilibrium Properties of Dense Hydrogen
- Seminar at the Institute of Physics, University of Warwick, Coventry (UK), 2006
Equilibrium Properties of Dense Hydrogen and Helium Mixtures
- High Pressure Group Seminar at the Geophysical Laboratory of the Carnegie Institution of Washington, Washington D.C. (USA), 2007
Melting of Sodium under Pressure & Hydrogen-Xenon Mixtures

Posters at Conferences and Workshops

- Inertial Fusion Science and Applications, San Francisco (USA), 2009
Theory of Warm Dense Matter Applied to X-Ray Scattering
- Institute of Physics Conference on Plasma Physics, Coventry (UK), 2009
X-ray Scattering in Multicomponent Warm Dense Matter
- Heavy Ion Fusion Conference, Tokyo (Japan), 2008
Modelling the Scattering of X-Rays in Warm Dense Matter

- Strongly Coupled Coulomb Systems Conference, Camerino (Italy), 2008
Equation of State of Strongly Coupled Hydrogen
Theory and Simulations for X-Ray Scattering in Warm Dense Matter
Ionic structure in Warm Dense Matter: ab initio Simulations versus HNC
Coupled Mode Effects on Temperature Relaxation
Dynamic Compression of Hydrogen: Probing the High-Pressure Melting Line
- Institute of Physics Conference, London (UK), 2008
Energy Relaxation Rates for Warm Dense Matter
Probing of the Hydrogen Melting Line at High Pressure: Dynamical Compression
- Spring Meeting of the German Physical Society, Darmstadt (Germany), 2008
Zustandsgleichung für dichte, stark gekoppelte Plasmen
- High Energy Density in Matter Workshop, Hirschegg (Austria), 2008
Equation of State for Plasmas with Strongly Coupled Ions
- International Conference on Inertial Fusion Sciences and Applications, Kobe (Japan), 2007
Probing Fusion Plasmas by X-Ray Thomson Scattering
- European Physical Society Meeting on Plasma Physics, Warsaw (Poland), 2007
Electron-Ion Equilibration Rates for Dense Two-Temperature Plasmas
- SSAP, Washington D.C. (USA) 2007
Dense Fluid Hydrogen & Helium in the Interior of Giant Planets
- Strongly Coupled Plasma Physics SCCS2005, Moskau (Russia), 2005
Equation of State of High Density Plasmas
- Spring Meeting of the German Physical Society, Berlin (Germany), 2005
Quantum Statistical Approach to Dense Weakly Coupled Plasmas,
Collective Modes and Relaxation in 2-Temperature-Plasmas
- Equation of State and Phase Transition Issues in Models of Ordinary Astrophysical Matter, Leiden (Netherlands), 2004
Quantum Statistical Approach to Dense Weakly Coupled Plasmas
- International Conference on Phenomena in Ionized Gases (ICPIG) XXVI, Greifswald (Germany), 2003
Thermodynamics and Distribution Functions of Dense Plasmas
- International Workshop on the Physics of Nonideal Plasmas (PNP) 11, Valencia (Spain), 2003
Thermodynamics and Distribution Functions of Dense Plasmas
- Progress in Nonequilibrium Green's Functions II, Dresden (Germany), 2002
Thermodynamic Functions of Dense Quantum Plasmas
- Hirschegg Meeting, Hirschegg (Austria), 2002
Equation of State of Highly Degenerate Quantum Plasmas
- Hirschegg Meeting, Hirschegg (Austria), 2001
Thermodynamics of Degenerate Plasma, Analytics vs. Numerics

Teaching, Mentoring and University Administration

University of Warwick, Coventry (UK)

- Lecturer Midlands Physics Alliance Graduate School (2009)
topic: *Quantum Many Body Physics I*
- supervisor summer student (2008)
topic: *Simulations and Phase Transitions*

Geophysical Laboratory, Washington D.C. (USA)

- co-supervisor of a summer intern (2006)
topic: *A Genetic Algorithm to Predict the High Pressure Phases of Ice*

University Greifswald, Greifswald (Germany)

- one semester exercises for the lecture „Theoretical Mechanics“(Grader)
- one semester of physics laboratories for pharmacy students (Grader)
- student member of the committee for the election of a new professor (1999)
- student member of a transition committee (1997)

Awards, Fellowships and Grants

- Postdoctoral Fellow at Geophysical Laboratory of Carnegie Institution of Washington (2005)
- Fellow of the International Max Planck Research School on Bounded Plasmas (2005)
- Staff member of the Special Research Program “Kinetic of Partially Ionized Plasmas” sponsored by the German Research Foundation (2002 – 2004)
- Sponsored Heraeus Summer School Attendee (1999)

Other Professional Activities

- Referee for APS physics journals (PRL, PRE, ...), Journal of Physics, Science, Contributions to Plasma Physics
- Member of the organizing committee, IOP conference on Plasma Physics, Warwick (UK), 2009
- Member of the organizing committee, International Workshop on the Physics of Nonideal Plasmas, Greifswald (Germany), 2000
- Member of the American Physical Society (since 2006)
- Member of the German Physical Society (since 2001)

External Collaborations

- Rutherford Appleton Laboratory, Oxford (UK), 2007 - today

- University of Oxford, Oxford (UK), 2007 - today
 - Lawrence Livermore National Laboratory, Livermore (CA) (USA), 2007 - today
 - Departments of Earth and Planetary Science and of Astronomy, University of California, Berkeley (CA) (USA), 2007 - today
 - Geophysical Laboratory, Carnegie Institution of Washington, Washington D.C. (USA), 2005 - 2008
 - Department of Physics, Dalhousie University, Halifax (Canada), 2005 - 2008
 - Institute of Physics, Greifswald University, Greifswald (Germany), 2000 - today
 - Institute of Physics, Rostock University, Rostock (Germany), 2000 - today
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Publications

Reviewed Journal Articles

- A. Pelka, G. Gregori, D.O. Gericke, J. Vorberger, S.H. Glenzer, M. Günther, K. Harres, R. Heatcote, A.L. Kritcher, N.L. Klugland, B. Li, M. Makita, J. Mithen, D. Neely, C. Niemann, A. Otten, D. Riley, G. Schaumann, M. Schollmeier, A. Tauschwitz, M. Roth
Ultra-fast Melting of Carbon induced by Intense Proton Beams
(submitted to Phys. Rev. Lett.)
- K. Wünsch, J. Vorberger, G. Gregori, D.O. Gericke
X-ray Scattering as a Probe for Warm Dense Mixtures and High-Pressure Miscibility
(submitted to Phys. Rev. Lett.)
- D.O. Gericke, J. Vorberger, K. Wünsch, G. Gregori
Screening of Ionic Cores in Partially Ionized Plasmas within Linear Response
Phys. Rev. E **81**, 065401 (2010).
- J. Vorberger, D.O. Gericke, Th. Bornath, M. Schlanges
Energy Relaxation in Dense Strongly Coupled Two-Temperature Plasmas
Phys. Rev. E **81**, 046404 (2010).
- M. Schlanges, Th. Bornath, J. Vorberger, D.O. Gericke
Energy Relaxation Study for Warm Dense Matter Experiments
Contrib. Plasma Physics **50**, 64 (2010).
- A.L. Kritcher, P. Neumayer, C.R.D. Brown, P. Davis, T. Döppner, R.W. Falcone, D.O. Gericke, G. Gregori, B. Holst, O.L. Landen, H.J. Lee, E.C. Morse, A. Pelka, R. Redmer, M. Roth, J. Vorberger, K. Wünsch, S.H. Glenzer
Measurements of Ionic Structure in Shock Compressed Lithium Hydride from Ultrafast X-Ray Thomson Scattering
Phys. Rev. Lett. **103**, 245004 (2009).
- J. Vorberger, D.O. Gericke
Coupled Mode Effects on Energy Transfer in Weakly Coupled, Two Temperature Plasmas
Physics of Plasmas, **16**, 082702 (2009).
- B. Barbrel, M. Koenig, A. Benuzzi-Mounaix, E. Brambrink, C.R. Brown, D.O. Gericke, B. Nagler, M. Rabec le Gloahec, D. Riley, C. Spindloe, S.M. Vinko, J. Vorberger, J. Wark, K. Wünsch, and G. Gregori
Measurement of Short-Range Correlations in Shock-Compressed Plastic by Short-Pulse X-Ray Scattering
Phys. Rev. Lett. **102**, 165004 (2009).
- K. Wünsch, J. Vorberger, D.O. Gericke
Ion Structure in Warm Dense Matter: Benchmarking HNC by First Principle Simulations
Phys. Rev. E **79** 010201(R) (2009).
- J. Vorberger
Hydrogen Equation of State for Ion Beam Driven Compression Experiments
J. Phys. A **42**, 214062 (2009).

- D.O. Gericke, K. Wünsch and J. Vorberger
Modelling the Scattering of X-Rays in Warm Dense Matter
Nucl. Instr. and Meth. A **606**, 142 (2009).
- K. Wünsch, J. Vorberger, G. Gregori and D.O. Gericke
Ion Structure in dense Plasmas: MSA versus HNC
J. Phys. A **42**, 214053 (2009).
- A. Grinenko, D.O. Gericke, S.H. Glenzer and J. Vorberger
Probing the hydrogen melting line at high pressures by dynamic compression,
Phys. Rev. Lett. **101**, 194801 (2008).
- B. Militzer, J. Vorberger, I. Tamblyn, S.A. Bonev. and W.B. Hubbard
Jupiter's Mantle and Core Characterized by First Principle Computer Simulations,
Astrophys. J. Lett. **L688**, 45 (2008).
- E. García Saiz, G. Gregori, D.O. Gericke, J. Vorberger, B. Barbrel, R.J. Clarke, R.R. Freeman, S.H. Glenzer, F.Y. Khattak, M. Koenig, O.L. Landen, D. Neely, P. Neumayer, M.M. Notley, A. Pelka, D. Price, M. Roth, M. Schollmeier, C. Spindloe, R.L. Weber, L. van Woerkom, K. Wünsch and D. Riley
Probing Warm Dense Lithium by Inelastic X-Ray Scattering,
Nature Phys. **4**, 940 (2008).
- J. Vorberger and D.O. Gericke,
Temperature Equilibration in Rapidly Heated Plasmas at Solid State Densities,
Journal of Physics (Conference Series) **112**, 032077 (2008).
- K.Wünsch, J. Vorberger and D.O. Gericke,
Ion Structure for X-Ray Thomson Scattering in Dense Fusion Plasmas,
Journal of Physics (Conference Series) **112**, 022084 (2008).
- J. Vorberger, I. Tamblyn, S.A. Bonev and B.Militzer,
Properties of Dense Fluid Hydrogen and Helium in Giant Gas Planets
Contrib. Plasma Phys. **47**, 267 (2007).
- W.-D. Kraeft, J.Vorberger, D.O.Gericke and M. Schlanges,
Thermodynamic Functions for Plasmas beyond Montroll Ward
Contrib. Plasma Phys. **47**, 253 (2007).
- J. Vorberger, I. Tamblyn, S.A. Bonev and B. Militzer,
Hydrogen-Helium Mixtures in the Interiors of Giant Planets
Phys. Rev. B **75**, 024206 (2007).
- J. Vorberger, M. Schlanges, D.O. Gericke and W.-D. Kraeft,
Equation of State of High Density Plasmas
J. Phys. A: Math. Gen. **39**, 4707 (2006).
- M. Schlanges, V. Bezkrovniy, J. Vorberger, D. Kremp and W.-D. Kraeft,
Thermodynamic Properties of Dense Hydrogen
Contrib. Plasma Phys. **45**, 405 (2005).

- J. Vorberger, M. Schlanges and W.-D. Kraeft,
Equation of State for Weakly Coupled Quantum Plasmas
Phys. Rev. E **69**, 046407 (2004).
- M. Schlanges, J. Vorberger, H.E. DeWitt and W.-D. Kraeft,
Equation of State and Correlation Energy of Dense Plasmas
J. Phys. A: Math. Gen. **36** (22), 5949 (2003).
- W.-D. Kraeft, M. Schlanges, J. Vorberger and H.E. DeWitt,
Kinetic and Correlation Energies and Distribution Functions of Dense Plasmas
Phys. Rev. E **66**, 046405 (2002).

Conference Proceedings and Book Contributions

- D.O. Gericke, K.Wünsch, A. Grinenko, J. Vorberger
J. Phys. Conf. Ser. **220** 012001 (2010),
Proceedings of the Conference on Progress in Nonequilibrium Green's Functions, Glasgow
Structural Properties of Warm Dense Matter
- J. Vorberger, D.O. Gericke, Th. Bornath, M. Schlanges
J. Phys. Conf. Ser. **220** 012002 (2010),
Proceedings of the Conference on Progress in Nonequilibrium Green's Functions, Glasgow
Energy and Temperature Relaxation described by Nonequilibrium Green's Functions
- G. Gregori, J. Vorberger, D.O. Gericke,
AIP Conf. Proc. **1161** 280 (2009),
Proceedings of the 16th International Conference on Atomic Processes in Plasma,
Hybrid Simulations for the Ion Structure and Dynamics in Dense Plasmas
- J. Vorberger in GSI Annual Report 2008 *High Energy Density Physics with Intense Ion and Laser Beams* (GSI, Darmstadt, 2008, p. 36)
The Hydrogen-Helium Equation of State and its Implications for Jupiter
- A. Grinenko, D.O. Gericke, J. Vorberger, S.H. Glenzer in GSI Annual Report 2008 *High Energy Density Physics with Intense Ion and Laser Beams* (GSI, Darmstadt, 2008, p. 37)
Melting of Dense Hydrogen during Heavy Ion Beam-Driven Compression
- K. Wünsch, J. Vorberger, D.O. Gericke in GSI Annual Report 2008 *High Energy Density Physics with Intense Ion and Laser Beams* (GSI, Darmstadt, 2008, p. 38)
Effect of Core Electrons on the Ionic Structure of Warm Dense Matter
- D.O. Gericke and J. Vorberger,
High Power Laser Science, Central Laser Facility Annual Report 2006/2007 p. 19, RAL,
Oxford (2008).
Energy Transfer Rates in Dense Two-Temperature Plasmas with Degenerate Electrons
- J. Vorberger, I. Tamblyn, S.A. Bonev, B.Militzer, B.Hubbard,
EPS Conference on Plasma Physics, (2007).
Properties of Dense Fluid Hydrogen and Helium and Implications for Giant Gas Planets
- J. Vorberger and D.O. Gericke, in GSI Annual Report 2004 *High Energy Density Physics with Intense Laser and Ion Beams* (GSI, Darmstadt, 2005, p. 47)
Collective Modes and Energy Transfer Rates in Two-Temperature-Plasmas
- J. Vorberger, M. Schlanges and W.-D. Kraeft,
in *Equation of State and Phase Transition Issues in Models of Ordinary Astrophysical Matter*,
V. Celebonovic, W. Dppen, D. Gough (Eds.), AIP conference proceedings **731**, Melville (2004)
Quantum Statistical Approach to Dense, Weakly Coupled Plasmas
- J. Vorberger, M. Schlanges, W.-D. Kraeft and H.E. DeWitt in *Progress in Nonequilibrium Green's Functions II*, M. Bonitz, D. Semkat (Eds.), World Scientific, New Jersey (2003)
Thermodynamic Functions of Dense Quantum Plasmas

- J. Vorberger, M. Schlanges and W.-D. Kraeft in *ICPIG XXVI International Conference on Phenomena in Ionized Gases*, J. Meichsner, D. Loffhagen, H.-E. Wagner (Eds.), Greifswald (2003)
Thermodynamic Properties of Plasmas at High Densities
- J. Vorberger, M. Schlanges and W.-D. Kraeft in *High Energy Density in Matter with Intense Laser and Ion Beams*, GSI Annual Report (2004)
Equation of State for Weakly Coupled Quantum Plasmas
- J. Vorberger, M. Schlanges and W.-D. Kraeft in *High Energy Density in Matter Produced by Heavy Ion Beams*, GSI Annual Report (2001)
Equation of State for Dense Quantum Plasmas
- J. Vorberger, M. Schlanges, J. Riemann and W.-D. Kraeft in *High Energy Density in Matter Produced by Heavy Ion Beams*, GSI Annual Report (2000)
Thermodynamics of Degenerate Plasmas, Analytics vs. Numerics