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Dr. Tina Ebert

Education

2017 – 2021 **Technische Universität Darmstadt**, Darmstadt, Germany.
Ph.D. in Physics, summa cum laude (with honors)
Thesis title: Enhancing laser-induced x-ray emission and ion acceleration with microstructured targets.

2014 – 2017 **Technische Universität Darmstadt**, Darmstadt, Germany.
M.Sc. in Physics. Graduation with honors
Thesis title: Homogeneous Surface Structuring of Silicon with Ultrashort Laser Pulses.

2014 – 2015 **University of California, Berkeley**, Berkeley, CA, USA.
Graduate exchange program. 2 semesters at the Department of Physics

2011 – 2014 **Technische Universität Darmstadt**, Darmstadt, Germany.
B.Sc. in Physics
Thesis title: Spectroscopy of Cryogenic Hydrogen Targets with Alpha Particles.

2008 – 2011 **Abitur**, Internatsschule Schloss Hansenberg, Geisenheim, *Note: 1.2*

Professional Experience

03/2025 – present **Lawrence Livermore National Laboratory**, Livermore, CA, USA,
Research Scientist, X-ray Measurement and Diagnostic Science Group

08/2022 – 02/2025 **Lawrence Livermore National Laboratory**, Livermore, CA, USA,
Postdoctoral Research Associate, X-ray Measurement and Diagnostic Science Group

- Developing and supporting the usage of a narrowband crystal imager for x-ray radiography of high energy density objects
- Designing, implementing, analyzing and modeling laser-driven x-ray sources
- Investigating inertial confinement fusion implosions and high energy density states at the National Ignition Facility using x-ray radiography

01/2022 – 06/2022 **Technische Universität Darmstadt**, Darmstadt, Germany,
Postdoctoral Research Associate, Group for Laser- and Plasma Physics of Prof. Markus Roth

- Analyzed X-ray data measured during high energy laser matter campaigns
- Academic advisement of Ph.D. students with varying topics, including hemispherical targets for proton focusing, robotics in target fabrication and debris detection

2017 – 2021 **Technische Universität Darmstadt**, Darmstadt, Germany,
Research Associate, Group for Laser- and Plasma Physics. Advisor: Prof. Markus Roth

- Fabricated and characterized targets with a focus on microstructured targets
- Investigated microstructured targets in experimental campaigns at high intensity laser facilities
- Analyzed data recorded with ion (RCF, Thomson parabola) and X-ray (crystal) spectrometers
- Modeled the interaction of high intensity lasers with microstructured targets using PIC codes

2016 – 2017 **Technische Universität Darmstadt**, Darmstadt, Germany,
M.Sc. Thesis (12 months), Group for Laser- and Plasma Physics.
Advisors: Dr. Nico W. Neumann & Prof. Markus Roth
- Upgraded ultrashort pulse laser processing setup to facilitate liquid and gaseous processing media
- Optimized processing routine for homogeneous surface structuring of silicon
- Conducted extensive parameter studies to readily control the shapes and sizes of the microstructures

2014 **Technische Universität Darmstadt**, Darmstadt, Germany,
B.Sc. Thesis (3 months), Group for Laser- and Plasma Physics.
Advisors: Dr. Alexandra Tebartz & Prof. Markus Roth
- Developed setup to measure thickness of cryogenic hydrogen targets with alpha particles
- Characterized alpha particle spectrum of an ^{241}Am source
- Programmed LabView application for recording and analyzing energy spectra of alpha particles

2011 – 2017 **Fraunhofer Institute for Computer Graphics Research IGD**, Darmstadt, Germany,
Research Assistant, Department of Biometry and Identification
- Implemented image processing and computer vision routines based on machine learning
- Programmed components for biometric systems, e.g. smile detection and handwriting identification
- Developed databases for training biometric algorithms

Scholarships, Fellowships and Awards

12/2024 **Lawrence Livermore National Laboratory Physics Division Poster Award**
Excellent poster presentation at the 2024 PLS Postdoc Poster Symposium.

06/2024 **University of California President's Lindau Nobel Meetings Fellow 2024**
Participation in the 73rd Lindau Nobel Laureate Meeting (2024).

05/2023 **Lawrence Livermore National Laboratory PLS Poster Symposium Award**
Best poster presentation in the category "Physics".

05/2022 **Vereinigung von Freunden der TU Darmstadt e.V.**, Award for outstanding dissertation
One award per department per year, endowed with 2,500 €.

2017 – 2020 **Darmstadt Graduate School of Energy Science and Engineering**, Ph.D. Fellowship
Fellowship program including internal retreats and seminars + 18,000 € per year.

2016 – 2017 **Femtec**, Career-Building Fellowship
3 weeks of soft skill seminars on career development, innovation and co-creation.

2011 – 2017 **Friedrich-Ebert-Stiftung**, Academic Scholarship
Scholarship program + avg. 7,000 € per year.

Research Experience - Experimental Campaigns

09/2023 to present **Lawrence Livermore National Laboratory**, *National Ignition Facility*, Livermore, CA, USA
Responsible Individual for various experiments studying inertial confinement fusion, high resolution turbulence and x-ray diagnostic and backlighter development.

04/2024 **Lawrence Livermore National Laboratory**, *Jupyter Laser Facility*, Livermore, CA, USA
X-ray diagnostic development for zone plates.
Team member. 3 weeks.

07/2021 **GSI Helmholtzzentrum für Schwerionenforschung**, *PHELIX laser*, Darmstadt, Germany
Ion acceleration with enhanced PHELIX frontend.
Team member. 2 weeks.

12/2019 **Centro de Láseres Pulsados**, *VEGA PW laser*, Salamanca, Spain
Initial experiment using the new PW laser system with a liquid jet target, collaboration with Prof. Luca Volpe (CLPU, Spain).
Team member. 1 week.

10/2019, 09/2020 **Laboratory for Laser Energetics**, *Omega EP laser*, Rochester, NY, USA
Silicon He_α X-ray backlighter development, collaboration with Dr. Christian Stoeckl and Dr. Sean P. Regan (LLE, NY, USA).
Co-PI (planning, targetry, experimental decisions). 1 shot day each.

02/2019 **GSI Helmholtzzentrum für Schwerionenforschung**, *PHELIX laser*, Darmstadt, Germany
Layered targets with microstructured front surfaces for ion acceleration and Cu X-ray backlighter development, collaboration with Dr. Katerina Falk (HZDR, Germany).
Co-PI (designing, proposal writing, targetry, shot-to-shot preparations, experimental decisions). 2 weeks.

01/2017 **Rutherford Appleton Laboratory**, *VULCAN PW laser*, Didcot, UK
Influence of target front surface structures on electron and ion acceleration, reflected laser light and X-ray generation, collaboration with Prof. Paul McKenna (University of Strathclyde, UK), Prof. David Neely (University of Strathclyde, UK) and Prof. Nigel Woolsey (University of York, UK).
Team member. 5 weeks.

Teaching and Student Advisement

2024 **Y. Yevgeniy, LLNL Summer Scholar**
Beam-Splitting Optics for The National Ignition Facility's Crystal Backlighter Imager.

2023 **A. Baluja, LLNL Summer Scholar**
Influence of measurement uncertainties on Crystal Backlighter Imager radiograph analysis.

2018 – 2020 **Supervision and development of advanced lab courses**
Weekly instruction of undergraduate students, teaching scientific writing, developing and implementing a new lab experiment. Topics: lifetime of positrons in matter and scanning electron microscopy.

2021 **M. Brönner, M.Sc. Thesis**
Hydrodynamic simulation of preplasma formation by lasers with finite ASE contrast using FLASH.

2020 **S. Grimm, B.Sc. Thesis**
Modeling target front structures for enhanced laser-particle acceleration.

2019 **R. Heber, M.Sc. Thesis**
Target fabrication for laser ion acceleration by micro molding.

2018 **C. Bläser, M.Sc. Thesis**
Development of a robotic pick and place system for target fabrication.

Conferences and Talks

10/2024 **66th Annual Meeting of the APS Division of Plasma Physics**, *Atlanta, GA, USA*
Talk: Development of a high resolution x-ray radiography platform to study hydrodynamic instabilities in high energy density conditions

8/2024 **LLNL PLS Postdoc Poster Symposium**, *Livermore, CA, USA*
Poster: Development of a high-resolution x-ray radiography platform for NIF

04/2024 **25th Topical Conference on High Temperature Plasma Diagnostics**, *Asheville, NC, USA*
Poster: Modeling of measurement uncertainties for x-ray radiograph analysis

08/2023 **Optica Imaging Congress - Radiographic Imaging and Tomography 2023**, *Boston, MA, USA*
Invited Talk: Monochromatic, high resolution x-ray imaging using laser driven backlighters at the National Ignition Facility

05/2023 **LLNL Postdoc Poster Symposium**, *Livermore, CA, USA*
Poster: X-ray backlighter development for the Crystal Backlighter Imager at NIF

01/2022 **Group seminar HEDP division, Massachusetts Institute of Technology**, *Virtual*
Invited Talk: Enhancing high energy laser matter interaction with microstructured targets

02/2021 **41st Workshop on High-Energy-Density Physics with Laser and Ion beams**, *Virtual*
Talk: Target front side modifications for enhanced laser-induced X-ray sources

10/2018 **35th European Conference on Laser Interaction with Matter (ECLIM)**, *Crete, Greece*
Talk: Microstructured silicon targets for enhanced light absorption in laser-driven particle acceleration exp.

09/2018 **7th Target Fabrication Workshop (TFW)**, *Darmstadt, Germany*
Organization Committee and Talk: Microstructured silicon targets by ultrashort laser pulse processing

08/2017 **High Energy Density Science Summer School (HEDSSS)**, *San Diego, CA, USA*
Poster: Microstructured silicon targets processed in different ambient media

05/2017 **6th Target Fabrication Workshop (TFW)**, *London, UK*
Talk: Topographic characterization of microstructured silicon targets processed in different ambient media

List of Peer-Reviewed Publications and Patents

A. Baluja*, **T. Ebert***, G. N. Hall, *Modeling measurement uncertainties for x-ray radiograph analysis using gradient descent with PEREGRINE*, in preparation to be submitted to Computer Physics Communications, **shared 1st co-authorship*

T. Ebert, G. N. Hall, A. Do, et al., *Development and characterization of a laser-gated, high resolution toroidal x-ray radiography platform for high energy density experiments*, submitted to Review of Scientific Instruments Dec 6, 2024

T. Ebert, S. Sander, C. Stoeckl, et al., *Silicon x-ray backlighter improvement by targets with spike-like microstructures*, AIP Advances, vol. 14, p. 035221, 2024 (doi: 10.1063/5.0164471)

G. N. Hall, C. R. Weber, ..., **T. Ebert**, et al., *Measurement of mix at the fuel-ablator interface in indirectly-driven capsule implosions on the National Ignition Facility*, Physics of Plasmas, vol. 31, p. 022702, 2024 (doi: 10.1063/5.0171617).

X. Pan, M. Šmíd, ..., **T. Ebert**, et al., *Investigation on laser absorption and x-ray radiation in microstructured titanium targets heated by short-pulse relativistic laser pulses*, Physical Review Research, vol. 6, p. 013025, 2024 (doi: 10.1103/PhysRevResearch.6.013025) .

M. Zimmer, S. Scheuren, ..., **T. Ebert**, et al., *Demonstration of non-destructive and isotope-sensitive material analysis using a short-pulsed laser-driven epi-thermal neutron source*, Nature Communications, vol. 13, p. 1173, 2022 (doi: 10.1038/s41467-022-28756-0).

C. Stoeckl, M. J. Bonino, ..., **T. Ebert**, and S. Sander, *Optimization of a short-pulse-driven Si He_α soft x-ray backlighter*, High Energy Density Physics, vol. 41, p. 100973, 2021 (doi: 10.1016/j.hedp.2022.100973).

S. Sander, **T. Ebert**, D. Hartnagel, et al., *Microstructured layered targets for improved laser-induced x-ray backlighters*, Physical Review E, vol. 104, p. 065207, 2021 (doi: 10.1103/PhysRevE.104.065207).

M. Zimmer, S. Scheuren, **T. Ebert**, et al., *Analysis of laser-proton acceleration experiments for development of empirical scaling laws*, Physical Review E, vol. 104, p. 045210, 2021 (doi: 10.1103/PhysRevE.104.045210).

M. Hesse, **T. Ebert**, M. Zimmer, et al., *Spatially Resolved Online Particle Detector Using Scintillators for Laser-Driven Particle Sources*, Review of Scientific Instruments, vol. 92, p. 093302, 2021 (doi: 10.1063/5.0052507).

T. Ebert, R. Heber, T. Abel, et al., *Targets with cone-shaped microstructures from various materials for enhanced high-intensity laser–matter interaction*, High Power Laser Science and Engineering, vol. 9, E24, 2021 (doi: 10.1017/hpl.2021.10).

M. Zimmer, S. Scheuren, ..., **T. Ebert**, et al., *Development of a Setup for Material Identification Based on Laser-Driven Neutron Resonance Spectroscopy*, EPJ Web of Conferences. vol. 231, p. 01006, EDP Sciences, 2020 (doi: 10.1051/epjconf/202023101006).

T. Ebert, N. W. Neumann, L. N. K. Döhl, et al., *Enhanced brightness of a laser-driven x-ray and particle source by microstructured surfaces of silicon targets*, Physics of Plasmas, vol. 27.4, p. 043106, 2020 (doi: 10.1063/1.5125775).

M. Hesse, **T. Ebert**, G. Schaumann, and M. Roth., *Macropixel and macropixel-based particle and radiation detector*, WO2021005065A1 (Priority to Pat. DE102019118423A1), July 8, 2019.

J. Jarrett, M. King, R. J. Gray, ..., **T. Ebert**, et al., *Reflection of intense laser light from microstructured targets as a potential diagnostic of laser focus and plasma temperature*, High Power Laser Science and Engineering, vol. 7, E2, 2019 (doi: 10.1017/hpl.2018.63).

N. W. Neumann, **T. Ebert**, G. Schaumann et al., *A setup for micro-structured silicon targets by femtosecond laser irradiation*, In: Journal of Physics: Conference Series, vol. 1079, p. 012011, IOP Publishing, 2018 (doi: 10.1088/1742-6596/1079/1/012011).

T. Ebert, N. W. Neumann, T. Abel, et al., *Laser-induced Microstructures on Silicon for Laser-driven Acceleration Experiments*, High Power Laser Science and Engineering, vol. 5, E13, 2017 (doi: 10.1017/hpl.2017.13).

D. Siegmund, A. Wainakh, **T. Ebert**, et al., *Text localization in born-digital images of advertisements*, In: Mendoza M., Velastín S. (eds) Progress in Pattern Recognition, Image Analysis, Computer Vision, and Applications. CIARP, vol. 10657, pp. 627–634, Springer, 2017 (doi: 10.1007/978-3-319-75193-1_75).

D. Siegmund, **T. Ebert**, and N. Damer, *Combining low-level features of offline questionnaires for handwriting identification*, In: Campilho A., Karray F. (eds) Image Analysis and Recognition, ICIAR, vol. 9730, pp. 46–54, Springer, 2016 (doi: 10.1007/978-3-319-41501-7_6).