CURRICULUM VITAE

TOMORR HAXHIMALI
PHYSICIST
Physical and Life Sciences Directorate
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Professional Preparation

2007-2010 Postdoctoral appointment	Northwestern University, Evanston, Illinois
2007-2010 Postdoctoral appointment	University of California, Davis, California
2007, Ph.D. in Physics	Northeastern University, Boston, MA
1999, Diploma in Condensed Matter Physics	International Center for Theoretical Physics, Trieste, ITALY

Appointments

- **Lawrence Livermore National Lab.**
  - **General interest:** Non-Equilibrium Statistical Mechanics with application in plasmas and material under extreme conditions.
  - **Specifically:** A Theoretical and Molecular Dynamic Study of transport in mixed plasma in Warm and Hot Dense Matter regime. Kinetics effects at shock fronts. Shock induced phase transition. Theoretical Study and numerical simulation of strongly non-equilibrium phenomena during rapid solidification of alloys associated with processes like Additive Manufacturing or dTEM experiments. Microstructure formation under rapid phase transitions. Formation, interaction and dynamics of the ejecta at the free surface of metals under different shock loading conditions. (2010 – present).
- **Northwestern University & UC Davis.** Investigating the Nanowire growth mechanism, the effect of the nanowire size on solid-liquid interface mobilities and their different growth morphologies through Molecular Dynamic simulation, phase-field and continuum calculation. (2006 - 2010).

Academic Records

- **Research Staff Physicist**
  Lawrence Livermore National Laboratory
  Physical and Life Sciences Directorate,
  Material Science Division
  Livermore, CA **2010 - present**

- **Postdoctoral Staff Position**
  Lawrence Livermore National Laboratory
  Physical and Life Sciences Directorate,
  Condensed Matter and Materials Division
  Livermore, CA **2010 – 2014**

- **Postdoctoral Position**
  Material Science & Engineering Department
  Northwestern University, Evanston IL
  Joint position with
  Computational Science & Engineering
  UC Davis **2007 – 2010.**

- **Ph. D. in Theoretical Physics**
  Northeastern University,
  Boston MA **2000 -- 2007.**
  GPA: 3.9/4.0 (Ranked First)
  Thesis: *"Phase-Field Simulation Study of Dendritic Crystal Growth Morphologies for Cubic and Hexagonal Symmetries "*
  Advisor: Prof. Alain Karma.
- **Diploma in Theoretical Condensed Matter Physics**
  International Center for Theoretical Physics (ICTP),
  Trieste, ITALY 1998 - 1999.
  GPA: 3.8/4.0
  Thesis: *"Numerical Study of Aging Phenomenon in Ising Spin Glasses"*
  Advisor: Prof. Silvio Franz.
- **B.Sc. in Physics**
  Faculty of Natural Sciences, University of Tirana,
  Tirana, ALBANIA 1991 - 1996.
  GPA: 9.7/10 (Graduated with first class Honors)
  Thesis: "The Modeling of Fluid Flow into an Elastic Tube: Flow in Blood Vessels "
  Advisor: Dr. Thoma Kareco.

Employment Experience

- **Research**
  i. **Lawrence Livermore National Lab.** A Theoretical and Molecular Dynamic Study of transport in mixed plasma in Warm and Hot Dense Matter regime. Kinetics effects at shock fronts. Shock induced phase transition. Theoretical Study and numerical simulation of strongly non-equilibrium phenomena during rapid solidification of alloys associated with processes like Additive Manufacturing or dTEM experiments. Microstructure formation under rapid phase transitions. Formation, interaction and dynamics of the ejecta at the free surface of metals under different shock loading conditions. (2010 – present).
  ii. **Northwestern University & UC Davis.** Investigating the Nanowire growth mechanism, the effect of the nanowire size on solid-liquid interface mobilities and their different growth morphologies through Molecular Dynamic simulation, phase-field and continuum calculation. (2006 - 2010).
  iii. **Northeastern University,** Boston, MA: Conducting Independent Thesis Research "Phase-Field Simulation Study of Dendritic Crystal Growth Morphologies for Cubic and Hexagonal Symmetries", using Phase-Field Method to simulate different Equiaxed Dendritic Growth Morphologies and

various analytical methods, e.g. Singular Perturbation Theory, Solvability, Extremal Principles, Dimensional Analysis. (2002 - 2006).

iv. **International Center for Theoretical Physics (ICTP),** Trieste, ITALY: Used Monte-Carlo Simulations to study the Aging Phenomenon in Ising Spin Glasses and showed that the phase space that the metastable states span is Ultrametric. (1998-1999).

v. **University of Tirana,** Tirana, ALBANIA: Used numerical methods to solve Navier-Stokes Equations when studying the fluid flow in elastic tubes (1996).

- **Teaching**
  1. **Northeastern University,** Boston, MA: (Teaching Assistant) Taught undergrad courses and conducted recitation classes (Fall 2000 – Fall 2002)
  2. **Polytechnic University of Tirana,** Tirana, ALBANIA: Taught General Physics and Numerical Methods to Engineering Undergrad Students: (1996 - 1998)
- **System Administrator**
  1. **Northeastern University** (2003 - 2006)
     System Co-Administrator for AMD64 Computational Cluster in Alain Karma's Lab (8 nodes installed with SUSE Linux Enterprise Server), DEC Alpha workstation.

Publications

- **T. Haxhimali**, M. Echeverria, F. Najjar, P. Tzeferacos, S. J. Ali, H-S. Park, J. Eggert, C. Huntington, B. Morgan, Y. Ping, H. G. Rinderknecht, and A. M. Saunders, "Hydrodynamics and Atomistic Studies in Support of High Power Laser Experiments for Metal Ejecta Recollection and Interactions", AIP Conference Proceedings **2272,** 120006 (2020)
- **T. Haxhimali,** J.N. Glosli, and R.E. Rudd, "Mixing at high Z/low Z plasma interface from atomistic calculations" to be submitted PRL (2021).
- A. M. Saunders, S. J. Ali, H-S. Park, J. Eggert, F. Najjar, C. Huntington, **T. Haxhimali**, B. Morgan, Y. Ping, and H. G. Rinderknecht, "Development of High Power Laser Platforms to Study Metal Ejecta Interactions", AIP Conference Proceedings **2272**, 120025 (2020).
- K.K. Mackay, F.M. Najjar, S.J. Ali, J.H. Eggert, **T. Haxhimali**, B. Morgan, H-S. Park, Y. Ping, H.G. Rinderknecht, C.V. Stan, and A.M. Saunders, "Hydrodynamics Computations of High-Power Laser Drives Generating Metal Ejecta Jets from Surface Grooves" to appear in JAP (2020)
- Grabowski et al. "Review of the first charged-particle transport coefficient comparison workshop" to appear HEDP (2020).
- **T. Haxhimali** and A. Karma "Prediction of Dendrite Growth Directions for Cubic Crystalline Anisotropy" to be submitted in Acta Materialia. (2019).
- J. D. Roehling, A. Perron, JL Fattebert, **T. Haxhimali**, G. Guss, T. Li, D. Bober, A.W. Stokes, A. J. Clarke, P. Turchi, M.J. Matthews, and J.T. McKeown, "Rapid solidification in Bulk Ti-Nb Alloys by single-Track Laser Melting", JOM (2018)

- K.K. Mackay, W.H. Cabot, **T. Haxhimali**, J.N. Glosli, H.D. Whitley, and R.E. Rudd, "Species Separation and other Kinetic Effects at Shock Wave Fronts in Plasma Mixtures Assessed using Molecular Dynamics", submitted (2017).
- **T. Haxhimali** "A Field Theory Description of the Structure and Dynamics of Out-of-Equilibrium Interfaces" LLNL inner publication, LLNL-JRNL-737913 (2017).
- L. A. Zepeda-Ruiz, B. Sadigh, A.A. Chernov, **T. Haxhimali**, A. Samanta, T. Oppelstrup, S. Hamel, L. X. Benedict, and J. Belof "Extraction of effective solid-liquid interfacial free energies for full 3D solid crystallites from equilibrium MD simulations**"** J. Chem. Phys. **147**, 194704 (2017)
- **T. Haxhimali**, J. Belof, and L. Benedict, "Time-Dependent Ginzburg-Landau Multi-Phase Field for the description of shock-induced Phase Transition" AIP Conference Proceedings **1793**, 130003 (2017)
- **T. Haxhimali**, R. E. Rudd, W. H. Cabot, and F. R. Graziani, "Shear viscosity for dense plasmas by equilibrium molecular dynamics in asymmetric Yukawa ionic mixtures", Phys. Rev. E **92,** 053110 (2015).
- **T. Haxhimali**, R. E. Rudd, W. H. Cabot, and F. R. Graziani, "Diffusivity in asymmetric Yukawa ionic mixtures in dense plasmas," Phys. Rev. E **90,** 023104 (2014).
- **T. Haxhimali** and R. E. Rudd, "Diffusivity of Mixtures in Warm Dense Matter Regime," in Frontiers and Challenges in Warm Dense Matter, F. Graziani, M. P. Desjarlais, R. Redmer, and S. B. Trickey, eds. (Springer, New York, 2014), pp. 235-263.
- **T. Haxhimali**, D. Buta, J.J. Hoyt, P. W. Voorhees and M.Asta "Size-Dependent Nucleation Kinetics at Non-planar Solid-Liquid Interfaces in Nanowire Growth" *Rapid Communication* PRE **80** 050601 2009.
  This letter was also illustrated at the Virtual Journal of Nanoscience &Technologies, Vol. 20 December 7, 2009.
- **T. Haxhimali**, A. Karma, F. Gonzales and M. Rappaz "Orientation Selection in Dendritic Evolution" **Nature Mater. 5, 660-664 (2006)**. This article was featured on the cover of **Nature Material** (Aug. 2006 issue 5)
- **T. Haxhimali**, "Phase-Field Simulation Study of Dendritic Crystal Growth Morphologies for Cubic and Hexagonal Symmetries" PhD Thesis, Northeastern University, Boston (Aug-2006).
- D. Y. Sun, M. I. Mendelev, C. A. Becker, K. Kudin, **T. Haxhimali**, M. Asta, J. J. Hoyt, A. Karma and D. J. Srolovitz , "Crystal-Melt Interfacial Free Energies in HCP Metals: A Molecular Dynamics Study of Mg", Phys. Rev. B **73**, 024116 (2006) .
- J. J. Hoyt, M. Asta, **T. Haxhimali**, A. Karma, R. E. Napolitano, R. Trivedi, B. B. Laird and J. R. Morris "Crystal-Melt Interfaces and Solidification Morphologies in Metals and Alloys", Mater. Res. Bull. **29** , 935-940 (2004).
- **T. Haxhimali** and S. Franz, "Numerical Study of Aging Phenomenon in Ising Spin Glasses", Diploma Thesis, ICTP, Trieste, Italy (1999).
- **T. Haxhimali** and T. Kareco, "The Modeling of Fluid Flow into an Elastic Tube: Flow in Blood Vessels" (in albanian), B.Sc. Thesis, University of Tirana, Tirana, Albania (1996).

Presentations

1) “Modelling of diffusive interface broadening between materials at warm dense conditions in support of XFEL experiments” contributed talk APS-DPP, Virtual Meeting, Memphis, TN (November 2020)
2) “Hydrodynamics Studies in Support of High Power Laser Experiments for Metal Ejecta Recollection and Interactions” contributed talk APS-SCCM, Portland, OR (June 2019)
3) “An Atomistic study of transport and mixing in high energy density plasmas”, Invited talk Seminar at the National Center for Theoretical Sciences and Physics Division, in Physics Department of National Tsing Hua University, Hsinchu City, Taiwan (September 2017)
4) “A mean-field thermodynamic description for the kinetics of overdriven interfaces” contributed talk APS-SCCM, St. Louis, MO (July 2017)
5) “Atomistic study of high Z/ low Z interfaces at warm dense matter conditions” contributed talk APS-DPP, San Jose, CA (October 2016)
6) “Study of shear viscosity for dense plasmas by equilibrium molecular dynamics in asymmetric Yukawa ionic mixtures” contributed talk APS-DPP, Savannah, GA (November 2015)
7) “Time-dependent Ginzburg-Landau type Multiphase Field for description of shock-induced Phase Transition” contributed talk APS-SCCM, Tahoe, FL (June 2015)
8) “Diffusion in Ionic Mixtures at the Warm Dense Matter Regime”, Invited talk at the *Computational Challenges in High Energy Density Plasmas* Conference, organized by Institute of Pure and Applied Mathematics, Lake Arrowhead UCLA, CA (December 2013)
9) “A Molecular Dynamics Study of Diffusivity of Mixtures in Warm Dense Matter Regime” Poster presentation at APS-DPP 2013, Denver, CO (2013)
10) “Calculation of Species Diffusivity in Dense Plasma Mixtures modeled with the Yukawa interionic Potential” oral presentation APS-DPP 2012, Providence, RI (2012)
11) “Calculation of Diffusivity and Viscosity of Al-Cu Molten Mixtures using Molecular Dynamics” APS March Meeting 2012, Boston MA (2012)
12) “Calculation of Transport coefficients in Binary Yukawa Mixtures” APS March Meeting 2012, Boston MA (2012)
13) “Calculation of Transport coefficients in Dense Plasma Mixtures” Invited talk at Material Science Department, UC Berkeley, CA (2012)
14) “Calculation of Transport coefficients in Dense Plasma Mixtures” APS-DPP 2011, Salt Lake City, UT (2011)
15) “Growth Kinetics of nano-scale faceted solid-liquid interfaces” APS 2010 Spring Meeting, Portland, OR (2010)
16) “Structure in Liquid-Alloys Investigated by First Principles Molecular Dynamics Simulations” TMS 2010 Meeting and Exhibition, Seattle, WA (2010)
17) "Size-Dependent Nucleation Kinetics at Non-planar Nanowire Growth Interfaces", Oral Presentation, Materials Research Society 2009, Fall Meeting, Boston, MA (2009).
18) “ Molecular Dynamics Investigations of Faceted Growth at the Nanoscale”, Oral Presentation, TMS 2009 Meeting and Exhibition, San Francisco, CA (2009)
19) "Molecular Dynamics Investigations of Atomistic Processes at the Solid-Liquid Interface in VLS Nanowire Growth", Oral Presentation, Materials Research Society 2008, Fall Meeting, Boston, MA (2008).
20) "Atomistic Simulations of Faceted Solidification in Bulk and Nanowire Geometries", Oral Presentation, Materials Research Society 2008 Spring Meeting, San Francisco, CA (2008).

21) "Orientation Selection in Dendritic Solidification of Materials with Hexagonal Symmetry", Oral Presentation in TMS 2008 Meeting and Exhibition, New Orleans, LA (2008).
22) "Molecular-Dynamics Simulations of Nanowire Growth", Oral Presentation, American Physical Society March 2008 Meeting, New Orleans, LA (2008).
23) "Nanometer-Scale Phase Separation in Epitaxial Alloy Films", Oral Presentation, Materials Research Society 2007 Fall Meeting, Boston, MA (2007).
24) " Phase-Field Simulations for Metallic Systems with Cubic Symmetry" a presentation at the Journal Club Meeting in Northeastern University, Boston, MA (2006).
25) " Growth Direction of Dendritic Crystals with Hexagonal Symmetry", 12th Computational Materials Science Network, Santa Fe, NM (2005).
26) " From gamma–*plot to dendrite morphologies",* 11th Computational Materials Science Network, Northeastern University, Boston, MA (2005).
27) " How Does a Dendrite Choose its Direction? ", Poster Presentation, Materials Research Society 2004 Fall Meeting, Boston, MA (2004).
28) " Dendrite Orientation Selection: Beyond Extremal Principles", 9th Computational Materials Science Network, ORNL, Oak Ridge, TN (2004).
29) " Dendrite Orientation Selection", 8th Computational Materials Science Network, Colorado School of Mines, Golden, CO (2003).
30) " Aging in Short-Range Ising Spin Glasses, through Parisi's Tree", Condensed Matter Physics Diploma Course, ICTP, Trieste, ITALY (September 1999).
31) " The Modeling of a Fluid Flow into an Elastic Tube", Faculty of Natural Sciences, University of Tirana, Tirana, ALBANIA (1996).

Awards and Honors

1. Teaching/Research Assistantship from Northeastern University (2000-2006).
2. Nominee for best poster award for Fall 2004 MRS meeting in Boston, MA.
3. Lawrence Award for Academic Excellence, Northeastern University (2002).
4. Lawrence Award for Academic Excellence, Northeastern University (2001).
5. Ranked First in Physics Department Ph. D. Qualifying Exam, Northeastern University (Fall 2001).
6. UNESCO/IAEA Fellowship During Diploma Course Program, ICTP, Trieste, ITALY (1998-99).
7. Teaching Assistantship from Polytechnic University of Tirana, Tirana, ALBANIA (1996-98).
8. Graduated with First Class Honor, Faculty of Natural Sciences, University of Tirana, Tirana, Albania (1996).
9. Faculty of Natural Sciences Award for scholastic excellence (1994).

Professional Affiliations

- American Physical Society (APS)
- Material Research Society (MRS)
- The Minerals, Metals & Materials Society (TMS)

Computer Proficiency

- ***Programming:*** C/C++/Fortran, MPI, Unix scripts, Python

- ***Environments:*** Linux/Unix, Windows
- ***Software:*** Numerical: Mathematica, Matlab

Languages

- **English, Italian, Albanian (**Native**) --------** Fluent
- **French** ----------Good