



Oguz Umut SALMAN

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PROFESSIONAL EXPERIENCE



CNRS, Chargé de recherche

01.2015 – PRESENT

Researcher - Centre National Research Scientifique (CNRS) in Mechanics, FRANCE Lecturer - Université Sorbonne Paris Nord, FRANCE .



CNR-ieni , Scientific researcher

09.2013 – 09.2015

Post-Doctoral Fellow - CNR-ieni Milano, ITALY Advanced Grant of the European Research Council: Size Effects in Fracture and Plasticity .



BOSPHORUS UNIVERSITY, Post-doc

10.2011 – 10.2012

Post-Doctoral Fellow - The Physics Department under the supervision of M. Mungan.



HARVARD UNIVERSITY, Post-doc

10.2012 – 09.2013

Post-Doctoral Fellow - The Aisenberg Biomineralization and Biomimetic Laboratory, Harvard University, USA.



ECOLE POLYTECHNIQUE, Post-doc

06.2009 – 10.2011

Post-Doctoral Fellow - Solid Mechanics Laboratory (LMS), Ecole Polytechnique, FRANCE

Education



PHD. IN PHYSICS

09.2005 – 06.2009

Université Pierre et Marie Curie, Paris, FRANCE (High Honour Mention).



MSC. IN MATERIALS SCIENCE AND NANO-OBJECTS

09.2004 – 09.2005

Ecole Polytechnique, Palaiseau, FRANCE (High Honour Mention).



B.S. IN PHYSICS

09.2000 – 06.2004

Istanbul Technical University, Physics Department, Istanbul, TURKEY (Honour List).

Skills & Interests



Native Speaker



Fluent



Fluent

PROGRAMMING: C, C++, Fortran, Mathematica, Matlab, Parallel coding (OpenMP-MPI), ABAQUS , FreeFem++, GPU Programming

Publications 2018-2025¹

Pre-prints

- J. Smiri, J. Paux, O.U. Salman, I.R. Ionescu, "Large plastic deformation of voids in crystals", arXiv preprint arXiv:2504.03565, accepted in International Journal of Solids and Structures, (2025)
- J. Smiri, O.U. Salman, I.R. Ionescu, "Orientation attractors in velocity gradient driven processes for large plastic deformations of crystals", arXiv preprint arXiv:2504.13714, (2025)

¹ I contributed to all aspects of these publications: research design, implementation, analysis, code development, and manuscript writing, primarily using my custom code libraries.

- J. Smiri, O.U. Salman, I.R. Ionescu, "*Dislocation-density based crystal plasticity: stability and attractors in slip rate driven processes*", arXiv preprint arXiv:2504.02413, (2025)

2025

- O.U. Salman, A. Finel, L. Truskinovsky, "*Inertia-induced power law scaling in martensites*", Mathematics and Mechanics of Solids, 1-39, doi:10.1177/10812865251361074 (2025)
- M.M. Terzi, O.U. Salman, D. Faurie, A.A. Baldelli, "*Navigating local minima and bifurcations in brittle thin film systems with irreversible damage*", Computer Methods in Applied Mechanics and Engineering 445, 118201, (2025)
- K. Ghosh, O.U. Salman, S. Queyreau, L. Truskinovsky, "*Slip-dominated structural transitions*", Physical Review Materials 9 (7), 073604, Editors' Choice, (2025)

2024

- M. Lamari, P. Kerfriden, O.U. Salman, V. Yastrebov, K. Ammar, S. Forest, "*A time-discontinuous elasto-plasticity formalism to simulate instantaneous plastic flow bursts*", International Journal of Solids and Structures 309, 11317, (2024)
- J. Smiri, O.U. Salman, M. Ghidelli, and I.R. Ionescu, "*Accounting for localized deformation: a simple computation of true stress in micropillar compression experiments*", Experimental Mechanics 64 (9), 1435-1442, arXiv:2310.06476, (2024)

2023

- R. Baggio, O.U. Salman, L. Truskinovsky, "*Nucleation of dislocations by pattern formation*", European Journal of Mechanics-A/Solids 99, 104897, (2023)
- R. Baggio, O.U. Salman, L. Truskinovsky, "*Inelastic rotations and pseudoturbulent plastic avalanches in crystals*", Phys. Rev. E 107, 025004 – Published 24 February (2023)

2022

- C. Baruffi, A. Finel, Y. Le Bouar, B. Bacroix, O.U. Salman, "*Atomistic simulations of temperature-driven microstructure formation in pure Titanium*", Computational Materials Science 203, 111057, Editor's choice, (2022)

2021

- O.U. Salman, I.R. Ionescu, "*Tempering the mechanical response of FCC micro-pillars: an Eulerian plasticity approach*", Mechanics Research Communications, Volume 114, June, (2021)
- O.U. Salman, L. Truskinovsky, "*Delocalizing fracture*", Journal of the Mechanics and Physics of Solids 154, 104517, (2021)
- O.U. Salman, R. Baggio, B. Bacroix, G. Zanzotto, N. Gorbushin, "*Discontinuous yielding of pristine micro-crystals*", Comptes Rendus. Physique 22 (S3), 1-48, (2021)
- P. Zhang, O.U. Salman, J. Weiss, L. Truskinovsky, "*Fluctuations in crystalline plasticity*", Comptes Rendus. Physique 22 (S3), 1-3707, (2021)

2020

- P. Zhang, O.U. Salman, J. Weiss, L. Truskinovsky, "*Variety of scaling behaviors in nanocrystalline plasticity*", Phys. Rev. E, 102, 023006, arXiv:2004.08579, hal-02644607, (2020)
- Edited by I.R. Ionescu, S. Queyreau, C. R. Picu, O.U. Salman, "*Mechanics and Physics of Solids at Micro- and Nano-Scales*", ISBN: 978-1-786-30531-2 February (2020)

2019

- O.U. Salman, R. Baggio, "*Homogeneous Dislocation Nucleation in Landau Theory of Crystal Plasticity*", appeared in the book *Mechanics and Physics of Solids at Micro- and Nano-Scales*, (2019)
- R. Baggio, E. Arbib, P. Biscari, S. Conti, L. Truskinovsky, G. Zanzotto, and O.U. Salman, "*Landau-Type Theory of Planar Crystal Plasticity*", Phys. Rev. Lett. 123, 205501, (2019)
- O.U. Salman, G. Vitale, L. Truskinovsky, "*Continuum theory of bending-to-stretching transition*", Phys. Rev. E 100, 051001(R), Rapid Communication (2019)
- O.U. Salman, B. Muite, A. Finel, "*Origin of stabilisation of macrotwin boundaries in martensites*", The European Physical Journal B 92 (1), 20, (2019)
- C. Baruffi, A. Finel, Y. Le Bouar, B. Bacroix, O.U. Salman, "*Overdamped Langevin Dynamics simulations of grain boundary motion*", Materials Theory, 3,4 (2019)
- P. Franciosi, M. Spagnuolo, O.U. Salman, "*Mean Green operators of deformable fiber networks embedded in a compliant matrix and property estimates*", Continuum Mechanics and Thermodynamics, Volume 31, Issue 1, pp 101–132, (2019)

2018

- A. Ask, S. Forest, B. Appolaire, K. Ammar, O.U. Salman, "*A Cosserat crystal plasticity and phase field theory for grain boundary migration*", Journal of the Mechanics and Physics of Solids 115, 167-194, (2018)
- P. Zhang, O.U. Salman, J.-Y. Zhang, G. Liu, J. Weiss, L. Truskinovsky and J. Sun, "*Taming intermittent plasticity at small scales*", Acta Mater, 128, 351-364, (2018)

Earlier Publications (2005-2016)

- M. Jedrychowski, B. Bacroix, O.U. Salman, J. Tarasiuk, S. Wronski, "*Investigation of SIBM driven recrystallization in alpha Zirconium based on EBSD data and Monte Carlo modeling*", Materials Science and Engineering 89, 012029, (2016)
- A. Taloni, O.U. Salman, S. Zapperi, "*Volume Changes During Active Shape Fluctuations in Cells*", Phys. Rev. Lett. 114, 208101, (2015) - (Highlighted in Nature Physics and APS Physics Journals)
- O. Schylgo, O.U. Salman, A. Finel, "*Martensitic phase transformations in Ni-Ti base shape memory alloys: Landau Theory*", Acta Materialia 60, 6784-6792, (2012)
- O.U. Salman, A. Finel, R. Delville, D. Schryvers, "*The role of phase compatibility in martensite*", J. Appl. Phys. 111, 103511, (2012)
- O.U. Salman, L. Truskinovsky, "*On the critical nature of the plastic flow: one and two dimensional models*", International Journal of Engineering Science, 59:219-254, (2012)
- O.U. Salman, L. Truskinovsky "*Minimal discrete automaton behind crystal plasticity*", Phys. Rev. Lett. 106, 175503, (2011)
- A. Finel, O.U. Salman, "*Phase Field Methods: microstructures, mechanical properties and complexity*", Comptes Rendus Physique, Vol. 11, Issues 3-4, p. 245-256, (2010)
- O.U. Salman, "*Criticality in martensite*", Mathematisches Forschungsinstitut Oberwolfach, DOI: 10.4171/OWR/2009 (2009)
- R. Delville R. D. James, O.U. Salman, A. Finel and D. Schryvers "*Transmission electron microscopy study of low-hysteresis shape memory alloys*", DOI:10.1051/esomat/200902005, ESOMAT 2009, 02005 (2009)
- B. Muite, O.U. Salman, "*Computations of geometrically linear and nonlinear Ginzburg-Landau models for martensitic pattern formation*", in ESOMAT 2009 edited by E. Sciences, P. Sittner, V. Paidar, L. Heller, H. Seiner, 587 p. 03008, (2009)
- S. Ugur, O.U. Salman, G. Tepehan, F. Tepehan, O. Pekcan, "*Fluorescence study on Al_2O_3 polystyrene latex composite film formation*", Polymer composites 26 (3), 352-360, (2005)

Conferences

- International Conference on Computational Plasticity, Complas 2023, Sep 4- Sep 7 2023, 2 Talks, Barcelona, Spain

- Flagship Workshop: Mesoscale modelling of driven disordered materials: from glasses to active matter, May 24, 2023 - May 26, 2023, Invited speaker, Lausanne, Switzerland
- International Conference on processing and manufacturing of advanced materials, Invited speaker, July 2 - 7, 2023, Vienna, Austria
- "Plastic Turbulence", Invited speaker, Université Pierre et Marie Curie, Institut d'Alembert, 18 May (2022)
- "Mécanique des Matériaux Architecturés", Invited speaker, Aussois, 17-21 January (2022)
- "Landau theory of crystal plasticity: Application to nano-pillar plasticity", Invited speaker, Lund University, Mechanics Department, 15 October (2021)
- "Avalanche dynamics and precursors of catastrophic events", 3-8th of February, Les Houches, France, (2019)
- "11th US-France Mechanics and physics of solids", Speaker/Organiser, Paris, France, (2018)
- "Phase Transformations and Plasticity in Crystals: Atomistic to Continuum Models", Invited Speaker, Politecnico di Milano (<https://www.fisi.polimi.it/it/home/news/57090>), Milano, September 3-4, (2018)
- "Mesoscopic model of dislocational plasticity accounting for crystal symmetry", ECCM - ECFD 2018 6th European Conference on Computational Mechanics (Solids, Structures and Coupled Problems), Glasgow, UK, (2018)
- "Mesoscopic model of dislocational plasticity accounting for crystal symmetry", The 13th World Congress in Computational Mechanics, NY, USA, (2018)
- "The Landau theory of crystal plasticity", Mechanics and physics of solids at micro- and nano-scales, 11th US-France Symposium, Paris, (2018)

Highlights

I have been invited to present a interdisciplinary proposal to CNRS-MITI80 prime funding, which is fully funded in 2023 that includes a Ph.D grant + 25000 Euros.



Figure 1: (left) The paper *Landau-Type Theory of Planar Crystal Plasticity*, published in the journal Physical Review Letters and based on the Ph.D. work of R. Baggio, whom I co-supervised, is featured on the journal cover. The same work is also highlighted on the INSIS website: <https://insis.cnrs.fr/fr/cnrsinfo/un-nouveau-modele-pour-etudier-la-plasticite-des-cristaux>. (right) The paper presenting the initial results of our Ph.D. student J. Smiri, who defended his thesis in December 2024, is featured on the cover of the journal Experimental Mechanics.

The paper *De-localisation of brittle fracture*, published in JMPS is highlighted on the website of INSIS: <https://www.insis.cnrs.fr/fr/cnrsinfo/eviter-la-rupture-dun-materiau-en-redistribuant-la-deformation>

- Received funding from Lund University's Mechanics Department for a five-year Ph.D. position (2024).
- Received funding from Lund University's Mechanics Department for a two-month research stay to collaborate with A. Ahadi (2021).
- Received funding from Bonn University for a two-week research stay to collaborate with S. Conti and M. Mungan (2019).
- The paper *Cosserat crystal plasticity and phase field theory for grain boundary migration*, published in JMPS based on the post-doc work of A. Ask that I co-supervised is highlighted on the website of INSIS: <http://www.cnrs.fr/grains-metal.htm>

Teaching

- **Visiting Professor** — Lund University Mechanical Department, Sweden
 - Advanced Mechanics Master lecture (32h), 2024
 - Modeling of plasticity at small-scales, 2022, 2023
- **Invited Professor** — Romanian-French Summer School in Applied Mathematics, Sinaia, Romania (2018)
- **Lecturer** — Université Sorbonne Paris Nord, France (2015 - Present)
 - Modelling of Functional Materials Master 2 Course (21h): Statistical mechanics, Theory of elasticity, Finite Element theory
 - ABAQUS Modelling Master 2 Course (21h)

Research Funding

Active Grants

ANR-FWF Super-Glasses (2024-2028) — Principal Investigator

Nanoengineering metallic glasses through chemical and structural heterogeneities

- Total: €350,000 (LSPM: €50,000 + 2 PhD + 2 postdoc positions; Austrian partner: €300,000)
- Partners: M. Ghidelli, P. Djemia (LSPM), C. Gammer (ESI Leoben, Austria)

CNRS-MITI 80PRIME BE-ST (2023-2026) — Principal Investigator

Physical nature of bending-to-stretching phase transition in semiflexible fiber networks

- €25,000 + 1 PhD position
- Partner: V. Lecomte (LIPhy)

ANR MESOCRYSP (2021-2025) — Co-Investigator, LSPM Team Leader

Discrete Mesoscale Plasticity

- €450,000 for LSPM
- Partners: PMMH, Centre des Matériaux

Completed Grants

ANR-JCJC ALIS (2020-2024) — Principal Investigator

Modeling of reconstructive phase transformations through Atomistically informed Landau theory

- €160,000

ANR-FWF NANOFILM (2021-2024) — Co-Investigator

Nanoarchitected films for unbreakable flexible electronics

- Total: €572,000 (LSPM: €142,000)
- Led phase-field modeling of thin film fracture

ANR-PRCI SUMMIT (2018-2021) — Co-Investigator

- €29,500 for LSPM (Total: €265,500)
- Partner: Xi'an Jiaotong University, China

Additional Funding

- **ANR-I2T2M** (2019-2022): €3,000
- **PICS Poland** (2017-2020): €15,000 — Project Manager
- **Labex Emergent Project** (2018-2019): Collaboration with M. Durant (Paris 7)
- **F2M Federation Grant** (2015-2016): €50,000 — Principal Investigator
- **Visiting Professor Grant**, Paris 13 (2017): €2,500

Current Ph.D. Students

- **P. Soyfer** (2024-2027)
On the physical nature of BEnding-to-STretching phase transition in semi-flexible fibers networks with applications to mechanics of cytoskeleton
Funded by CNRS-MITI défi 80 prime, co-supervisor
- **G. Tejedor** (2023-2026)
Modélisation numérique de la plasticité mésoscopique des cristaux par l'élasticité non linéaire invariante $GL(3, Z)$
Funded by ANR-MESOCRYSP, co-supervisor
- **E. Lundheim** (2023-2026)
Effect of disorder on dislocation avalanches using the $GL(2, Z)$ invariant plasticity model
Funded by ANR-MESOCRYSP, co-supervisor

Completed Ph.D. Students

- **J. Smiri** (2021-2024, defended)
Eulerian finite element modelling of ductile fracture in micro-scale crystals
Funded by Paris-Nord Sorbonne Université, co-supervisor
- **M. Aissaoui** (2021-2024, defended)
Acoustic emission study of intermittent plasticity: the role of disorder, crystal orientation and symmetry
Funded by Paris-Nord Sorbonne Université, co-supervisor
- **R. Baggio** (2016-2019, defended)
Multi-Scale Modelling of Plasticity
Funded by Paris-Nord Sorbonne Université, co-supervisor
Current position: Post-doc INRIA-Bordeaux & Université de Corse
- **M. Spagnuolo** (2016-2019, defended)
Modélisation continue des structures pantographiques
Funded by European-Inspire Scholarship, co-supervisor
- **C. Baruffi** (2015-2018, defended)
Modélisation des mécanismes de vieillissement et d'endommagement dans les alliages métalliques
Funded by ONERA Scholarship
Prix Jacques Dalla Torre 2019, Current position: ASML Netherlands
- **P. Zhang** (2017-2018, defended)
Supervision of final year, collaboration China/France
Current position: Assistant Professor, Xi'an Jiaotong University

Post-Doctoral Researchers

- **K. Ghosh** (2022-2024, 18 months)
Modelling of coupling of phase transition with crystal plasticity in Zirconium and Titanium through Landau theory
Funded by ANR-JCJC
- **M. Terzi** (2021-2023, 24 months)
Low dimensional representation of 6D metric space via machine learning for 3D Landau theory of crystal plasticity
Funded by ANR-MESOCRYSP and ANR-FWF: NANOFILM
- **M. Degeiter** (2019-2022)
Modelling of fracture in thin films through phase-field approach
Funded by Labex
- **N. Gorbushin** (2019-2021)
Landau-type modeling of marginal stability in plasticity
Funded by ANR-PRCI-SUMMIT
- **A. Ask** (2015-2016)
Modélisation de Recristallisation

Master's & Undergraduate Students

- **J. Baillard** (2024) – Stage M2, 5 months, LSPM/EPSCI
- **O. Benamor** (2020) – Stage M2, 4 months, PNUS/LSPM
- **F. Mansouri** (2016) – Stage M2, PNUS/LSPM
- **M. Dogramaci** (2024) – Stage collège, 1 week, LSPM

Other Tasks

Editorial Activities

- **Review Editor** — Interdisciplinary Physics, Frontiers in Physics (2021 - Present)
- **Peer Review** — 15 articles reviewed (2022-2024) for leading journals:
 - Physical Review Letters, Physical Review B, Physical Review E, Physical Review X, Physical Review Materials
 - Computational Materials Science, Philosophical Magazine, Mechanics of Materials

Open-Source Software

- **Crystal Plasticity Toolkit** — C++ implementation of $GL(2,Z)$ invariant crystal plasticity model
- **Thin Film Fracture Simulator** — Phase-field modeling of fracture in thin films
- Repository: <https://cnrs-oguzumut.github.io/>