**Emilian-Dragoş Tatomirescu**

***Faculty of Physics***

***West University of Timişoara***

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**Personal information**

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|---|---|---|---|
| Name, Surname: | Tatomirescu, Emilian-Dragoş | | |
| Date of birth: | 01.10.1991 | Sex: | M |
| Nationality: | Romanian | | |
| Researcher unique identifier(s) (ORCID, Researcher ID etc.): | ORCID: 0000-0003-1194-7171<br>Web of Science ResearcherID: AAS-3922-2020<br>Scopus Author ID: 57193131100<br>Google Scholar: https://scholar.google.com/citations?user=q1HnBLUAAAAJ&hl=en&oi=ao | | |
| URL for personal website (if case): | | | |

**Education**

| Year | Faculty/department - University/institution - Country |
|---|---|
| 2019 (dissertation defended) | Ph.D. in Physics<br>- Faculty of Physics - West University of Timisoara - Romania<br>- Centre Lasers Intenses et Applications (CELIA) - Université de Bordeaux – France<br>Thesis title: *"Laser-plasma acceleration at ultra high intensity –numerical modeling"* |
| 2015 | M.Sc. in Physics<br>- Faculty of Physics - West University of Timisoara – Romania<br>Thesis title: *"Target curvature influence on the laser accelerated ions from a microstructured target"* |
| 2013 | B.Sc. in Physics<br>- Faculty of Physics - West University of Timisoara – Romania<br>Thesis title: *"Obtaining and characterisation of ferroelectric ceramics of the (1-x)$BaTiO_3$-x$SmCoO_3$ type"* |

**Positions - current and previous**

| Year | Job title – Employer - Country |
|---|---|
| 2023 - | Postdoc researcher - Faculty of Physics, West University of Timisoara - Romania |
| 2014 - 2023 | Research assistant - Faculty of Physics, West University of Timisoara - Romania |

**Narrative CV**

Dragoş Tatomirescu is a researcher at West University of Timisoara, Romania with 10 years of research experience. He finished his B.Sc. studies in 2013 from the Faculty of Physics, West University of Timisoara with a thesis titled: *"Obtaining and characterisation of ferroelectric ceramics of the (1-x)$BaTiO_3$-x$SmCoO_3$ type"*. In 2015 he finished his M.Sc. in physics from the same university with the thesis titled: *"Target curvature influence on the laser accelerated ions from a microstructured target"*. In 2019 he defended his dissertation *"Laser-plasma acceleration at ultra high intensity –numerical modeling"*, receiving a double PhD in physics from West University of Timisoara (Romania) and Université de Bordeaux (France).

During his PhD studies he benefited from a French Government grant supporting joint supervision PhD studies between Romania and France (Bourse du Gouvernement Français pour la poursuite de doctorat en cotutelle franco-roumain) and a French National Research Agency (ANR) grant in the frame of "the Investments for the future" Programme IdEx Bordeaux – LAPHIA (ANR-10-IDEX-03-02). Dr. Dragos Tatomirescu has focused his PhD research activity on the acceleration of particles from the interaction of plasma targets with ultra-high intensity laser fields. He started his research activity by studying the laser ion acceleration from micro-structured solid targets. These studies are presented in Chapter 3 of his PhD thesis and their results were published in two proceedings articles, both indexed in the Web of Science Core Collection for which he was the first author and corresponding author. The study has been focused on the particularities of several types of density profiles with a proton-rich microdot: flat, curved and cone target with a concave tip. The study outlined the advantages and disadvantages of each of these target modifications (curvature, microdot and cone structure) in order to determine if a composite target featuring all attributes has the potential to produce higher quality particle beams. By comparing the cases of flat versus curved targets, the studies determined the effect the addition of a curvature to the target has, in particular how it affects beam collimation. Further increasing the target curvature has a significant positive effect on the maximum energies attainable and also on the maximum number of accelerated particles but also presents the downside of increasing the energy dispersion of the accelerated particles. He has also studied laser ion acceleration and high energy radiation generation from near-critical gas jets. The results of these studies are presented in Chapter 5 of his PhD thesis and were published in the journal Plasma Physics and Controlled Fusion, with an impact factor of 2.799 and an article influence score of 0.893 where he was the first author and corresponding author. This work focused on the effects resulted from the manipulation of the density of a gaseous Xe target in interaction with a high intensity ultrashort laser pulse in order to prepare first ultra-high intensity experiments on facilities like BELLA, CETAL, APOLLON and the ELI high power lasers. This study ascertained that the spectrum features can be controlled by changing the peak density of the gas jet when using ultra high intensity laser pulses, in correlation with the results for lower intensity pulses in the literature. In order to determine how effective the manipulation of target curvature is in determining the beam collimation and maximum ion energies further studies were performed into the target curvature influence on particle beam characteristics resulted from laser ion acceleration with microstructured enhanced targets at ultra-high intensity. This study was presented in Chapter 4 of the PhD thesis and the results were published in the journal Plasma Physics and Controlled Fusion, for which he was the first author and corresponding author. The study has shown that with the decrease in curvature radius the maximum energies of protons are increased, noting an increase from the highest curvature radius case to the lowest one, corresponding to an 8% increase in energy. Furthermore, it was observed that as the curvature radius of the foil decreased, the collimation of the protons improved, leading to low acceleration angles from the normal direction for energetic particles.

Research fields:
The main research results of Dragoş Tatomirescu were in the field of numerical modeling of physical phenomena, namely:

- modeling the laser-plasma interaction using the Particle-In-Cell (PIC) code PICLS, an open-source Fortran based collisional particle-in-cell code which self-consistently solves the radiation transport. Simulations on the interaction of high power laser pulses with targets ranging from thin solid foils, micro-structured composite solid targets to gas jet targets (both under-dense jets and over-dense jets);
- modeling the crystal growth processes using specialized software for local 3D simulations (STHAMAS3D - time dependent convective heat and mass transport in simple geometries like the subsystem melt-crystal in Czochralski and VGF configurations based on the Finite Volume method) and global and local 2D simulations (CrysVUn - simulation of crystal growth in complex furnaces with axial or translational symmetry, based on the Finite Volume method and an unstructured grid).

**Research projects**

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| 2014 - 2016 | E13/30.06.2014 „High energy radiations effects on some fluorite and semiconducting crystals" (ELICRYS) financed by a subventionfrom the Romanian National Authority for Scientific Research in the frame of the RO-CERN program, ELI-NP domain;<br>Position: Research assistant |
| 2016 - 2019 | 32-ELI/01.09.2016 „Physical and numerical experiments for studying the laser accelerated particles and their interaction with crystalline materials" (ELICRYS-2) financed by a subvention from the Romanian National Authority for Scientific Research in the frame of the RO-CERN program, ELI-NP domain;<br>Position: Research assistant |
| 2018 - 2020 | PN-III-P1-1.1-TE-2016-0416, UEFISCDI / „Numerical modeling of transport phenomena in a Czochralski growth of Silicon crystals for photovoltaic applications" (SILTIM);<br>Position: Research assistant |
| 2023 - | PNRR-III-C9-2022 – I8, 136/15.11.2022, "Enhanced Single Crystal Applications and Research in the Growth of new Optical rare earth-based compounds for sustainable and efficient Technologies" (ESCARGOT);<br>Position: Postdoc researcher |

**Research grants**

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|---|---|
| 2017 - 2018 | French Government grant supporting joint supervision PhD studies between Romania and France (Bourse du Gouvernement Français pour la poursuite de doctorat en cotutelle franco-roumain); |
| 2018 – 2019 | French National Research Agency (ANR) grant in the frame of "the Investments for the future" Programme IdEx Bordeaux – LAPHIA (ANR-10-IDEX-03-02). |

**Conferences and seminars**

***TIM14 Physics Conference***, 20-22 November 2014, Timisoara, Romania

- **D. Tatomirescu**, G. Pascu, A. Popescu and D. Vizman – PIC method in numerical simulation of laser-plasma interaction

***The 8th International Conference On Advanced Materials***, 7-10 July 2015, ROCAM 2015, Bucharest, Romania

- **D. Tatomirescu**, A. Popescu, G. Pascu and D. Vizman - The PIC method for laser-plasma acceleration numerical modeling with possible applications in materials evaluation

***"On the prospects of laser driven hadron therapy"*** held by S. V. Bulanov at ELI-NP and IFIN-HH, 30 July 2015, Bucharest – Magurele, Romania

***TIM15-16 Physics Conference***, 26-28 May 2016, Timisoara, Romania

- **D. Tatomirescu**, A. Popescu, E. d'Humieres and D. Vizman – Numerical simulation of laser ion acceleration at ultra high intensity

***TIM17 Physics Conference***, Timisoara (Romania) 22-28/05/2017

- **D. Tatomirescu**, E. d'Humières and D. Vizman - Improving the Particle Beam Characteristics Resulted from Laser Ion Acceleration at Ultra High Intensity through Target Manipulation – Numerical Modeling

***EPS 2017 Conference***, Belfast (Northern Ireland) 26-30/06/2017

- **D. Tatomirescu**, D. Vizman and E. d'Humières - Target curvature influence on particle focusing and maximum energy in laser-plasma acceleration at ultra high intensity

***TIM18 Physics Conference***, Timisoara (Romania) 24-26/05/2018

- **D. Tatomirescu**, A. Popescu, D. Vizman, E. d'Humières - Near-critical gas targets peak density influence on the accelerated particles spectrum features using ultra-high laser intensity through numerical modeling

***15e congrès de la Division Plasmas de la SFP***, Bordeaux (France) 12-14/06/2018

- **D. Tatomirescu**, E. d'Humières, D. Vizman - Near-critical gas targets peak density influence on the accelerated particles spectrum features using ultra-high laser intensity through numerical modeling

***EPS 2018 Physics Conference***, Prague (Czech Republic) 02-06/07/2018

- **D. Tatomirescu**, E. d'Humières, D. Vizman - Influence of the peak density of near-critical gas targets on the spectrum features using ultra-high laser intensity through numerical modeling

***TIM19 Physics Conference***, Timisoara (Romania) 29-31/05/2019

- **D. Tatomirescu**, A. Popescu, D. Vizman, E. d'Humières - Target curvature influence on particle beam characteristics resulting from laser ion acceleration with microstructured enhanced targets at ultra-high intensity
- Popescu, **D. Tatomirescu**, M. Bellman and D. Vizman - Numerical modeling of temperature gradient and crucible rotation rate in a cz configuration for solar silicon growth
- A. Cojocaru, O. Mares, A. Popescu and **D. Tatomirescu** - The influence of marangoni convection on the temperature fluctuations in a czochralski solar silicon process

***EPS 2019 Physics Conference***, Milan (Italy) 08-12/07/2019

- **D. Tatomirescu**, A. Popescu, D. Vizman - Target curvature influence on particle beam characteristics resulting from laser ion acceleration with microstructured enhanced targets at ultra-high intensity
- O. Budrigă, L. E. Ionel, **D. Tatomirescu**, K. A. Tanaka - One order of magnitude enhancement of laser intensity with a single re-entrant micro-cone target in the pettawatt regime

***EPS 2021 Physics Conference***, Virtual Conference 21-25/06/2021

- **D. Tatomirescu**, A. Popescu, D. Vizman - Near-critical Ar gas nozzle maximum density influence on accelerated ions and gamma photons production using ultra-high laser intensity through numerical modeling

***TIM20-21 Physics Conference***, Virtual Conference 11-13/11/2021

- O. Budriga, L. E. Ionel, **D. Tatomirescu** and K. A. Tanaka - One order intensification of a focused-laser through a micro-cone in the petawatt regime
- **D. Tatomirescu**, A. Popescu - Near-critical ar gas nozzle maximum density influence on accelerated ions and gamma photons production using ultra-high laser intensity through numerical modeling

**Published papers**

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|---|---|
| 1. | **D. Tatomirescu**, A. Popescu, E. d'Humières and D. Vizman - Numerical simulation of laser ion acceleration at ultra high intensity, AIP Conference Proceedings 1796, 020013 (2017). |
| 2. | **D. Tatomirescu**, E. d'Humières and D. Vizman - Improving the particle beam characteristics resulting from laser ion acceleration at ultra high intensity through target manipulation – Numerical modeling, AIP Conference Proceedings 1916, 030002 (2017). |
| 3. | **D. Tatomirescu**, D. Vizman and E. d'Humières - Numerical modeling of laser-driven ion acceleration from near-critical gas targets, Plasma Physics and Controlled Fusion 60, 064002 (2018). |
| 4. | **D. Tatomirescu**, D. Vizman, E. d'Humieres - Influence of target curvature on the characteristics of particle beams generated by laser ion acceleration with microstructured enhanced targets at ultra high intensity, Plasma Physics And Controlled Fusion 61, 114004 (2019). |
| 5. | O. Budriga, L. E. Ionel, **D. Tatomirescu**, K. A. Tanaka - Enhancement of laser-focused intensity greater than 10 times through a re-entrant cone in the petawatt regime, Optics Letters 45, 3454-3457 (2020). |
| 6. | A. Cojocaru, O. Mares, **D. Tatomirescu**, A. Popescu - The influence of Marangoni convection and of the external temperature gradient on the temperature fluctuations in a Czochralski solar silicon process, Aip Conference Proceedings 2218, 040006 (2020). |
| 7. | O. Budriga, L. E. Ionel, **D. Tatomirescu**, K. A. Tanaka - Intensification of a focused-laser more than one order of magnitude through a micro-cone in the petawatt regime, 2021 Conference on Lasers and Electro-Optics (CLEO) (2021). |