

## EXTRAIT DE DELIBERATION N° 7

**CR  
DU 20 OCTOBRE 2022**

- Nombre de membres en exercice : 19
- Nombre de membres présents : 11
- Nombre de membres représentés : 5
- Quorum : 10

### Classement chercheurs invités 2023

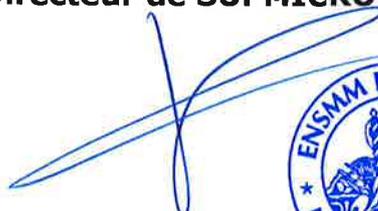
Les membres de la Commission Recherche approuvent la demande concernant Monsieur Krzysztof Karol DUDEK, qui va se voir proposer le financement de son séjour pour une durée de deux mois (*cf. annexe n°3*).

#### ↳ VOTE :

- **Non-participation au vote** : 0
- **Abstentions** : 0
- **Suffrages exprimés** : 16
- **Pour** : 16
- **Contre** : 0

*Fait à Besançon, le 20 octobre 2022*

**Professeur Pascal VAIRAC**  
Directeur de SUPMICROTECH-ENSMM



## Krzysztof Karol Dudek

Address: ul. Kielpin 8G, Zielona Góra 66-006, Poland  
Email: k.dudek@if.uz.zgora.pl  
Phone number: +48 880 713 137  
Date of birth: 31/07/1992



---

## CURRICULUM VITAE

---

### Education

- Bachelor's degree

Duration: 2011-2014  
Field: Physics (major in: Computer Physics)  
Institution: University of Zielona Góra, Department of Physics  
Title of the thesis: Mechanical properties of stents  
Supervised by: Prof. Jarosław Piskorski  
Final grade: Outstanding  
Language of instruction: Polish

- Master's degree

Duration: 2014-2016  
Field: Physics (major in: Computer Physics)  
Institution: University of Zielona Góra, Department of Physics  
Title of the thesis: The kinetic Monte Carlo simulation of the proton conductivity in a one-dimensional chain of tetrahedral molecules  
Supervised by: Dr Tomasz Masłowski  
Final grade: Outstanding  
Language of instruction: Polish

- Doctoral degree

Duration: 2014-2018  
Field: Metamaterials  
Institution: University of Malta, Faculty of Science  
Title of the thesis: Properties of mechanical metamaterials with the focus on magnetic inclusions  
Supervised by: Prof. Joseph N. Grima  
Co-supervised by: Prof. Krzysztof W. Wojciechowski  
Language of instruction: English

---

## Best publication:

**K. K. Dudek**, J. A. Iglesias Martínez, G. Ulliac, M. Kadic, Micro-Scale Auxetic Hierarchical Mechanical Metamaterials for Shape Morphing, *Advanced Materials* **34**, 2110115 (2022)

## List of peer-reviewed publications:

1. R. Gatt, R. Caruana-Gauci, D. Attard, A. R. Casha, W. Wolak, **K. Dudek**, L. Mizzi, J. N. Grima, On the properties of real finite-sized planar and tubular stent-like structures, *Phys. Status Solidi B* **251**, 321-327 (2014)
2. A. R. Casha, A. Manche, R. Gatt, W. Wolak, **K. Dudek**, M. Gauci, P. Schembri-Wismayer, M.-T. Camilleri-Podesta, J. N. Grima, Is there a biomechanical cause for spontaneous pneumothorax? *Eur. J. Cardiothorac. Surg.* **45**, 1011-1016 (2014)
3. A. R. Casha, L. Camilleri, A. Manche, R. Gatt, D. Attard, W. Wolak, **K. Dudek**, M. Gauci, C. Giordimaina, J. N. Grima, A hypothesis for reactivation of pulmonary tuberculosis: how thoracic wall shape affects the epidemiology of tuberculosis, *Clin. Anat.* **28**, 614-620 (2015)
4. J. N. Grima, M. Bajada, S. Scerri, D. Attard, **K. K. Dudek**, R. Gatt, Maximising thermal expansion via rigid unit modes: a geometry-based approach, *Proc. R. Soc. A* **471**, 20150188 (2015)
5. M. R. Dudek, K. W. Wojciechowski, J. N. Grima, R. Caruana-Gauci, **K. K. Dudek**, Colossal magnetocaloric effect in magneto-auxetic systems, *Smart Mater. Struct.* **24**, 085027 (2015)
6. **K. K. Dudek**, D. Attard, R. Caruana-Gauci, K. W. Wojciechowski, J. N. Grima, Unimode metamaterials exhibiting negative linear compressibility and negative thermal expansions, *Smart Mater. Struct.* **25**, 025009 (2016)
7. A. R. Casha, A. Manche, L. Camilleri, R. Gatt, **K. Dudek**, M. Pace-Bardon, M. Gauci, J. N. Grima, A biomechanical cause for the pathophysiology of apical lung disease, *Med. Hypotheses* **92**, 88-93 (2016)
8. **K. K. Dudek**, R. Gatt, L. Mizzi, M. R. Dudek, D. Attard, K. E. Evans, J. N. Grima, On the dynamics and control of mechanical properties of hierarchical rotating rigid unit auxetics, *Sci. Rep.* **7**, 46529 (2017)
9. T. Maslowski, **K. K. Dudek**, The Dependence of the Proton Conductivity on Concentration for Networks with Different Symmetry of Molecules, *Acta Phys. Pol. A* **132**, 129-131 (2017)

10. **K. K. Dudek**, W. Wolak, M. R. Dudek, R. Caruana-Gauci, R. Gatt, K. W. Wojciechowski, J. N. Grima, Programmable magnetic domain evolution in magnetic auxetic systems, *Phys. Status Solidi RRL* **11**, 1700122 (2017)
11. **K. K. Dudek**, R. Gatt, L. Mizzi, M. R. Dudek, D. Attard, J. N. Grima, Global rotation of mechanical metamaterials induced by their internal deformation, *AIP Adv.* **7**, 095121 (2017)
12. **K. K. Dudek**, K. W. Wojciechowski, M. R. Dudek, R. Gatt, L. Mizzi, J. N. Grima, Potential of mechanical metamaterials to induce their own global rotational motion, *Smart Mater. Struct.* **27**, 055007 (2018)
13. A. R. Casha, L. Bertolaccini, L. Camilleri, A. Manche, M. Gauci, G. Melikyan, R. Gatt, **K. Dudek**, P. Solli, J. N. Grima, Pathophysiological mechanism of post-lobeotomy air leaks, *Journal of thoracic disease* **10**, 3689 (2018)
14. **K. K. Dudek**, R. Gatt, M. R. Dudek, J. N. Grima, Negative and positive stiffness in auxetic magneto-mechanical metamaterials, *Proc. R. Soc. A* **474**, 20180003 (2018)
15. **K. K. Dudek**, W. Wolak, R. Gatt, J. N. Grima, Impact resistance of composite magnetic metamaterials, *Sci. Rep.* **9**, 3963 (2019)
16. M. R. Dudek, **K. K. Dudek**, W. Wolak, K. W. Wojciechowski, J. N. Grima, Magnetocaloric materials with ultra-small magnetic nanoparticles working at room temperature, *Sci. Rep.* **9**, 17607 (2019)
17. **K. K. Dudek**, D. Attard, R. Gatt, J. N. Grima-Cornish, J. N. Grima, The multidirectional auxeticity and negative linear compressibility of a 3D mechanical metamaterial, *Materials* **13**, 2193 (2020)
18. **K. K. Dudek**, R. Gatt, J. N. Grima, 3D composite metamaterial with magnetic inclusions exhibiting negative stiffness and auxetic behaviour, *Mater. Des.* **187**, 108403 (2020)
19. **K. K. Dudek**, R. Gatt, K. W. Wojciechowski, J. N. Grima, Self-induced global rotation of chiral and other mechanical metamaterials, *Int. J. Solids Struct.* **191-192**, 212-219 (2020)
20. **K. K. Dudek**, New type of rotation of chiral mechanical metamaterials, *Smart Mater. Struct.* **29**, 115027 (2020)
21. **K. K. Dudek**, R. Gatt, M. R. Dudek, J. N. Grima, Controllable Hierarchical Mechanical Metamaterials Guided by the Hinge Design, *Materials* **14**, 758 (2021)

22. D. Gambin, **K. K. Dudek**, M. R. Dudek, J. N. Grima, R. Gatt, The mechanical properties of ice X with particular emphasis on its auxetic potential, *J. Phys. Chem. Solids* **150**, 109717 (2021)
23. L. Mizzi, D. Attard, R. Gatt, **K. K. Dudek**, B. Ellul, J. N. Grima, Implementation of periodic boundary conditions for loading of mechanical metamaterials and other complex geometric microstructures using finite element analysis, *Engineering with Computers* **37**, 1765-1779 (2021)
24. **K. K. Dudek**, A. Drzewiński, M. Kadic, Self-rotating 3D chiral mechanical metamaterials, *Proc. R. Soc. A* **477**, 20200825 (2021)
25. **K. K. Dudek**, M. Marć, W. Wolak, A. Drzewiński, M. R. Dudek, Theoretical Concept Describing a Use of Magnetic Nanoparticles in a Thin Elastic Film for the Detection of Mechanical Deformation, *Phys. Status Solidi B* **258**, 2100162 (2021)
26. R. Galea, **K. K. Dudek**, P.-S. Farrugia, L. Zammit Mangion, J. N. Grima, R. Gatt, Reconfigurable magneto-mechanical metamaterials guided by magnetic fields, *Compos. Struct.* **280**, 114921 (2022)
27. **K. K. Dudek**, J. A. Iglesias Martínez, G. Ulliac, M. Kadic, Micro-Scale Auxetic Hierarchical Mechanical Metamaterials for Shape Morphing, *Adv. Mater.* **34**, 2110115 (2022)
- under review -----
28. R. Galea, P.-S. Farrugia, **K. K. Dudek**, D. Attard, J. N. Grima, R. Gatt, Perforated 3D Rotating Auxetic Metamaterials, *Mater. Des.* (under review)
29. **K. K. Dudek**, L. Mizzi, J. A. Iglesias Martínez, A. Spaggiari, G. Ulliac, R. Gatt, J. N. Grima, V. Laude, M. Kadic Micro-scale Multi-substructure Composite Mechanical Metamaterials Exhibiting Versatile Poisson's Ratio, *Additive Manufacturing* (under review)
30. **K. K. Dudek**, J. A. Iglesias Martínez, M. Kadic, Tunable Dual Auxeticity of the Hierarchical Mechanical Metamaterial composed of Re-entrant Structural Motifs, *Phys. Status Solidi B* (under review)
31. R. Galea, P.-S. Farrugia, **K. K. Dudek**, L. Zammit Mangion, J. N. Grima, R. Gatt, An investigation of reconfigurable magneto-mechanical metamaterials, *Phys. Status Solidi B* (under review)
32. D. Gambin, **K. K. Dudek**, M. R. Dudek, J. N. Grima, R. Gatt, On the mechanical properties of CO<sub>2</sub>-II with particular emphasis on its auxetic potential, *Phys. Status Solidi B* (under review)

## Citations

**Total number:**  
(source Google Scholar accessed on 2.09.2022) 503

(source Scopus accessed on 2.09.2022) 405

**h-index:**  
(source Google Scholar accessed on 2.09.2022) 14

(source Scopus accessed on 2.09.2022) 12

---

## Academic employment

2018 - NOW                      Lecturer in the Physics Department at the Univeristy of Zielona Góra

---

## Internships

1.07.2012 - 30.09.2012                      Traineeship at the University of Malta (Metamaterials Unit) as a part of the ERASMUS programme under the supervision of Prof. Joseph N. Grima

academic year 2012/2013  
(first semester)                      Studies at the University of Malta (Physics Department) as a part of the ERASMUS programme

10.2017 - 7.2018                      Traineeship at the Polish Academy of Sciences in Poznan (Institute of Molecular Physics) as a part of the ERASMUS+ programme under the supervision of Prof. Krzysztof W. Wojciechowski

30.08.2021 – 9.10.2021                      Internship at the FEMTO-ST Institute (CNRS) funded by the MINIATURA 4 grant (2020/04/X/ST5/00663) awarded by the Polish National Science Centre (NCN)

1.02.2022 - 31.07.2022                      Post-Doc Internship at the FEMTO-ST Institute (CNRS) funded by the SONATINA 5 grant ( 2021/40/C/ST5/00007) awarded by the Polish National Science Centre (NCN)

---

## Teaching experience

2018 - 2021                      Lecturer in the Physics Department at the University of Zielona Góra

---

## Awards / Grants

Academic year 2014-2015      Scholarship awarded by the Polish minister of Education to the best students in Poland (field: Physics)

2014                                  Article entitled “Is there a biomechanical cause for spontaneous pneumothorax?” was selected by the editorial office of the European Journal of Cardio-Thoracic Surgery as one of the “Editor’s choice” articles

2015                                  Article entitled “On the properties of real finite-sized planar and tubular stent-like auxetic structures” was chosen by the editorial office as one of the three best papers published in 2014 in the journal *Physica Status Solidi B*

2015                                  Award for the best poster at the 6<sup>th</sup> International Conference Auxetics and other materials and models with “negative” characteristics

Academic year 2015-2016      Scholarship awarded by the Polish minister of Education to the best students in Poland (field: Physics)

2019                                  Scholarship “START” for the best young scientists in Poland awarded by the Foundation for Polish Science.

2020                                  Grant “MINIATURA 4” awarded by the Polish National Science Centre (NCN). Grant number: 2020/04/X/ST5/00663. Funding amount: 25 000 PLN.

2021                                  Award of the Rector of the University of Zielona Góra for one of the best publishing researchers in the year 2020

2021                                  Grant “SONATINA 5” awarded by the Polish National Science Centre (NCN). Grant number: 2021/40/C/ST5/00007. Funding amount: 396 181 PLN.

---

## Conferences

Malta 14-18.09.2015              6<sup>th</sup> International Conference Auxetics and other materials and models with “negative” characteristics

Poland (Szymbark)                7<sup>th</sup> International Conference Auxetics and other materials and

---

---

12-16.09.2016	models with “negative” characteristics and 12 <sup>th</sup> International Workshop Auxetics and related systems
Czech Republic (Telc) 6-8.08.2019	17 <sup>th</sup> Youth Symposium on Experimental Solid Mechanics
Poland (Będlewo) 2-6.09.2019	10 <sup>th</sup> International Conference Auxetics and other materials and models with “negative” characteristics and 15 <sup>th</sup> International Workshop Auxetics and related systems (Invited Speaker)
Poland (Zielona Góra) 14-17.10.2019	12 <sup>th</sup> Workshop on Current Problems in Physics 2019 (WCPP’19) – I was a member of the organizing committee in the role of the secretary of the conference
Poland (Zielona Góra) 16.12.2019	XXIV Symposium of Statistical Physics
Poland (Zielona Góra) 17-19.10.2021	13th Symposium on Integrable Systems
France (Besançon) 4-8.07.2022	ETOPIM 12, 12th International Conference on Elastic, Electrical, Transport, and Optical Properties of Inhomogeneous Media

---

## Languages

Polish	Native speaker
English	Advanced (in possession of the ESOL certificate: City & Guilds Expert Level – C1). English was the only language of instruction during my PhD studies at the University of Malta.

---

## Skills

- Operating systems: Linux, Windows
- Programming languages: python
- Data visualisation: Matplotlib (python library), gnuplot, povray
- Computer simulations:
  - Molecular Dynamics simulations
  - Finite Element Method simulations (COMSOL, Ansys)
  - Monte Carlo simulations
  - Kinetic Monte Carlo simulations
- Experience with the scientific use of 3D printers