Valentin ALLARD

75 Ulica Koszykowa, 00-662 Warsaw (Poland)

Phone Number: +48 789 598 536
Email adresses: valentin.allard@pw.edu.pl
Website: v-allard.github.io/

Academic background

- **2024—Present: Assistant professor**

  Warsaw University of Technology (Faculty of Physics) – Warsaw (Poland)
  Research project: *Pairing dynamics in nuclear collisions*
  Principal Investigator: Piotr Magierski

  Study of the impact of pairing dynamics on nuclear collisions, using the time-dependent nuclear energy-density functional theory. Simulations of nuclear collisions on the LUMI supercomputer, using LISE package.

- **2020–2024: PhD candidate**

  Université Libre de Bruxelles (ULB) – Brussels (Belgium)
  Dissertation: *Superfluid dynamics in neutron stars*
  Supervisor: Nicolas Chamel
  Jury: Michel Tytgat, Wouter Ryssens, Anthea Francesca Fantina, Piotr Magierski
  Grant: 4-year grant from F. R. S. – FNRS, Research project (PdR T.004320)
  Graduation: May 21, 2024

  PhD thesis mainly focused on effects of temperature and currents in hot neutron-proton superfluid mixtures studied within the framework of nuclear energy-density functional theory. The impact of superfluid dynamics on the crust cooling of transiently accreting neutron stars is also investigated.

- **2019–2020: Teaching qualification for upper secondary education - Physics**

  Université Libre de Bruxelles (ULB) – Brussels (Belgium)
  Magna cum laude (average grade 15.25/20)

- **2017–2019: Master's degree in Physics**

  Université Libre de Bruxelles (ULB) – Brussels (Belgium)
  Master thesis : *Entrainment effects in neutron stars cores* (mark : 17.50/20)
  Advisor: Nicolas Chamel
  Summa cum laude (average grade 16.96/20)

- **2014–2017: Bachelor's degree in Physics**

  Université de Namur – Namur (Belgium)
  Magna cum laude

Publications

Statistics (source: Google Scholar, June 2025)

- **Citations:** 79
- **h-index:** 6
- **i10-index:** 4

Publications in peer-reviewed international journals

- *Evidence of Gapless Superfluidity in MXB 1659-29 With and Without Late Time Cooling*, V. Allard and N. Chamel. Published in Universe 2025, 11(5), 140 (2025)
- *Gapless neutron superfluidity in the crust of the accreting neutron stars KS 1731−260 and MXB 1659−29*, V. Allard and N. Chamel. Published in Eur. Phys. J. A 60 116 (2024)
- *Gapless Neutron Superfluidity Can Explain the Late Time Cooling of Transiently Accreting Neutron Stars*, V. Allard and N. Chamel. Published in Phys. Rev. Lett. 132, 181001 (2024)
- *Gapless superfluidity in neutron stars – Normal fluid fraction*, V. Allard and N. Chamel. Published in Phys. Rev. C 108, 045801 (2023)
- *Gapless superfluidity in neutron stars - Thermal properties*, V. Allard and N. Chamel. Published in Phys. Rev. C 108 015801 (2023)
- *$^1S_0$ Pairing Gaps, Chemical Potentials and Entrainment Matrix in Superfluid Neutron-Star Cores for the Brussels–Montreal Functionals*, V. Allard and N. Chamel. Published in Universe 7, 470 (2022)
- *Entrainment effects in neutron-proton mixtures within the nuclear energy-density functional theory. II. Finite temperatures and arbitrary currents*, V. Allard and N. Chamel. Published in Phys. Rev. C 103, 025804 (2021)

- *Entrainment effects in neutron-proton mixtures within the nuclear energy-density functional theory: Low-temperature limit*, N. Chamel and V. Allard. Published in Phys. Rev. C 100, 065801 (2019)

Conference Proceedings

- *Gapless superfluidity and Neutron Star cooling*, V. Allard and N. Chamel. Published in Phys. Sci. Forum 2023, 7(1)

Activities

Talks

- **ECT*, Nonequilibrium phenomena in superfluid systems: atomic nuclei, liquid helium, ultracold gases, and neutron stars**
  12–16 May 2025 (*ECT*, Trento, Italy*)
  Talk: Superfluid hydrodynamics in neutron stars

- **EOS Manaslu Workshop**
  3–4 July 2023 (*KU Leuven, Belgium*)
  Talk: Gapless superfluidity in neutron stars

- **Nonequilibrium Phenomena in Superfluid Systems**
  27–29 March 2023 (*Warsaw University of Technology, Poland*)
  Talk: Gapless superfluidity in neutron stars

- **Conference on Quantum-Many-Body Correlations in Memory of Peter Schuck (QMBC 2023)**
  21–23 March 2023 (*IJCLab, Orsay, France*)
  Talk: Superfluid dynamics in neutron stars

- **56th Karpacz Winter School**
  24–28 February 2020 (*Karpacz, Poland*)
  Talk: Entrainment effects in neutron-proton superfluid mixtures within the nuclear energy-density functional theory

Posters

- **XMM-NEWTON 2024 Workshop - "*The X-Ray Mysteries Of Neutron Stars And White Dwarfs*"**
  5–7 June 2024 (*ESAC, Madrid, Spain*)
  Poster: Evidence of gapless neutron superfluidity from the late time cooling of transiently accreting neutron stars

- **Doctoral School Joliot-Curie – "*Nuclear Matter Under Pressure*"**
  4–9 September 2022 (*Saint-Pierre d'Oléron, France*)
  Poster: Gapless superfluidity and neutron star cooling

- **PHAROS Conference 2022 – "The multi-messenger physics and astrophysics of neutron stars"**
  16–19 May 2022 (*Sapienza – University of Rome, Italy*)
  Poster: 1S0 pairing gap and entrainment for BSk functionals in neutron star cores

- **Royal Astronomical Society Early Career Poster Exhibition**
  14–28 September 2020 (*online*)
  Poster: Entrainment effects in neutron-proton mixtures in neutron star cores

Research visits

- Visit to Piotr Magierski, Daniel Pęcak and Gabriel Wlazłowski
  January 18 to February 8, 2023 (*Warsaw University of Technology, Poland*)

Teaching experience

- **2019–2023:** tutorial classes for first-year bachelor students, course PHYS-F-103 –Physique, Université Libre de Bruxelles, 5 ECTS, 24h per academic year.
- **2021–2023:** tutorial classes for second-year bachelor students, course PHYS-F-205 –Physique 2, Université Libre de Bruxelles, 5 ECTS, 24h per academic year.