



Valentin ALLARD

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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.