

Nils Albin Nilsson

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Profile

Highly analytical early-career researcher in physics with teaching experience. My main research interests are phenomenology of new physics in gravity and cosmology, in particular bridging theory and observations, along with early Universe physics and General Relativity.

Education & Academic Positions

- **CNES Postdoctoral Fellow** Paris, France
SYRTE, Observatoire de Paris December 2022 - Present
- **Postdoctoral Researcher** Seoul, Korea
Centre for Quantum Spacetime (CQUeST), Sogang University August 2021 - October 2022
– Remote part-time November 2020 - August 2021
- **Ph.D. in Physics** Warsaw, Poland
National Centre for Nuclear Research September 14, 2020
– Title of thesis: *Aspects of Lorentz and CPT Violation in Cosmology*
– Supervisor: Mariusz P. Dąbrowski
- **MSc. Engineering physics** Lund, Sweden
Lund Institute of Technology June 15, 2015
– Title of thesis: *Astrophysical Probes of Models of Quantum Gravity*
– Supervisor: John Ellis

Publications

Refereed Journal Articles

- **N.A. Nilsson**, Eleonora Di Valentino, Mu-In Park
A new test of dynamical dark energy models and cosmic tensions in Hořava gravity
Mon.Not.Roy.Astron.Soc. 519 (2023) 4, 5043-5058, arXiv:2212.07683, Citations: 1
- **N.A. Nilsson**
Explicit Spacetime-Symmetry Breaking and the Dynamics of Primordial Fields
Phys.Rev.D 106 (2022) 10, 104036, arXiv:2205.00496, Citations: 8
- **N.A. Nilsson**, Mu-In Park
Tests of Standard Cosmology in Hořava Gravity
Eur.Phys.J. C, 82, 873 (2022), arXiv:2108.07986, Citations: 8
- K.O'Neil Ault, Q.B.Bailey, **N.A. Nilsson**,
3+1 Formulation of the Standard-Model Extension Gravity Sector
Phys.Rev.D 103 (2021) 4, 044010, I.F 4.83, Citations: 24

- **N.A. Nilsson**
Preferred-frame Effects, the H_0 tension, and Probes of Hořava-Lifshitz Gravity,
Eur.Phys.J.Plus 135 (2020) 4, 361, I.F 2.612, Citations: 3
- **N.A.Nilsson**, E.Czuchry
Hořava-Lifshitz Cosmology in Light of New Data
Phys.Dark Univ. C23 (2019) 100253, I.F 6.509, Citations: 17
- **N.A.Nilsson**, M.Dąbrowski
Energy Scale of Lorentz Violation in Rainbow Gravity
Phys.Dark Univ. 18 (2017) 115-122 , I.F 5.425, Citations: 7
- M.Fairbairn, **N.A.Nilsson**, J.Ellis, J.Hinton, R.White
The CTA Sensitivity to Lorentz-Violating Effects on the Gamma-Ray Horizon
JCAP 1406 (2014) 005, I.F 5.81, Citations: 40

Articles in Preparation

- Hocheol Lee, Bum-Hoon Lee, Wonwoo, **N.A.Nilsson**, Somyapid Thakur
On the Dynamical Generation and Decay of Cosmological Anisotropies
arXiv:2209.15225
- **N.A.Nilsson**, Christophe Le-Poncin Lafitte
Spacetime-symmetry Breaking and the Generation of Gravitational Waves

Conference Proceedings

- **N.A.Nilsson**
SME Gravity in the Early Universe
arXiv:2206.07925
- **N.A.Nilsson**, K.O'Neil Ault, Q.B.Bailey
A 3+1 Decomposition of the Minimal Standard-Model Extension Gravitational Sector
CPT and Lorentz Symmetry, pp. 198-200 (2020), Citations: 4

Other Publications

- B. Jones, G. Burns, H.V. Cavanagh, D. Findlay, S. Karbassi, **N.A. Nilsson**, G. Skoro, P.N.M Wright, 2021
Unexpected ^{13}N concentrations in ISIS synchrotron room air
Applied Radiation and Isotopes 182 (2022) 110139, IF 1.513
- N.A. Nilsson
Incentives, Rewards, and Recognition - What Really Motivates a Researcher?
First prize essay published for the MDPI essay contest Judging Research - How Should Research and Researchers Be Evaluated and Rewarded?
ISBN 978-3-03928-314-9
- N.A. Nilsson
Commodity or Public Property?
Essay published for the MDPI essay contest The Global Benefits of Open Research
ISBN 978-3-03897-009-5

Awards and Honours

- 2019: Winner of the MDPI English Writing Competition for the essay "*Incentives, Rewards and Recognition - What Really Motivates a Researcher?*", 460 EUR

- 2019: NCBJ Award for Outstanding Achievements for PhD Students, 600 EUR
- 2018: NCBJ Award for Outstanding Achievements for PhD Students, 600 EUR

Grants and Fellowships

- 2022: CNES Postdoctoral Fellowship (France), 2 years (accepted)
- 2022: JSPS Postdoctoral Fellowship (Japan), 3 years (declined)
- 2022: FONDECYT Postdoctoral Fellowship (Chile), 3 years (declined)
- 2018: PI and sole applicant for NCBJ Young Scientist Grant MNiSW 212737/E-78/M/2018, Title: Tensor Lorentz Violation in Cosmology with Antisymmetric Tensor Fields, 3300 EUR

Invited Talks

- **“Spacetime-Symmetry Breaking in Gravitational-Wave Generation”** Bloomington, USA
Gravitational Aspects of Lorentz Violation March 14, 2023
- **“Aspects of Explicit Spacetime-Symmetry Breaking”** Szczecin, Poland
Szczecin University Cosmology Group Seminar December 17, 2021
- **“Testing General Relativity with Spacetime Symmetries”** Pohang, Korea
The 63rd Workshop on Gravity and Cosmology November 16, 2021
- **“Aspects of Lorentz Violation in Gravity & Cosmology”** Paris, France
Paris Observatory October 17, 2019
- **“Successes and Problems of the Λ CDM Model”** Prescott, USA
Embry-Riddle Aeronautical University April 4, 2019
- **“Quantum Gravity, Lorentz Violation, and Rainbows”** Szczecin, Poland
University of Szczecin December 9, 2016

Physics Meetings

Oral Contribution

- **“SME Gravity in the Early Universe”** Bloomington, USA
Ninth Meeting on CPT and Lorentz Symmetry May 19, 2022
- **“Spacetime Symmetries in the Early Universe”** Waseda, Japan
The 30th Workshop on General Relativity and Gravitation in Japan December 7, 2021
- **“Degrees of Freedom for Explicit Symmetry Breaking”** Pohang, Korea
AAPPS-DACG Workshop 2021 October 5, 2021
- **“Ongoing Efforts in Testing Spacetime Symmetries”** Gangneung, Korea
CQeST Workshop 2021 September 25, 2021
- **“ADM Spacetime Splitting of the Gravitational SME”** Bloomington, USA
Workshop on Gravitational Aspects of Lorentz Violation March 14, 2021
- **“Ongoing Efforts to Constrain Lorentz Violation in Gravity”** Krakow, Poland
Spring Workshop on Gravity and Cosmology May 26, 2020

- **“Antisymmetric Tensors in Friedmann Cosmology”**
6th Conference of the Polish Society of Relativity
Szczecin, Poland
September 23, 2019
- **“A 3+1 Decomposition of the SME Gravity Sector”**
Eighth Meeting on CPT and Lorentz Symmetry
Bloomington, USA
May 12, 2019
- **“Hořava-Lifshitz Gravity in Light of New Data”**
Testing Gravity 2019
Vancouver, Canada
January 23, 2019
- **“Cosmological Evolution in Lorentz Breaking Gravity”**
IUCSS Summer School on the Lorentz and CPT violating SME
Bloomington, USA
June 15, 2018
- **“Toward Quantum Gravity Phenomenology”**
Singularities in General Relativity and their Quantum Fate
Warsaw, Poland
May 21, 2018
- **“Probing Hořava-Lifshitz Cosmology”**
SpringCosmo18
Zeuten, Germany
May 19, 2018
- **“Searching for Lorentz Invariance Violation in Theories with Modified Dispersion Relations”**
3rd Azores School on Observational Cosmology
Azores, Portugal
August 27, 2017
- **Theories with Modified Dispersion Relations**
“SpringCosmofun 17”
Międzyzdroje, Poland
May 19, 2017

Meetings Organised

- **Sixth Conference of the Polish Society of Relativity**
Szczecin, Poland
September 23-26, 2019
- **Singularities in General Relativity and their Quantum Fate**
Warsaw, Poland
May 21-25, 2018

Research Visits

- **Embry-Riddle Aeronautical University**
Visiting Professor Quentin G. Bailey
Prescott, USA
January 25-31, 2020
- **Lagrange Institute**
Visiting Professor Patrick Peter
Paris, France
October 21-25, 2019
- **Embry-Riddle Aeronautical University**
Visiting Professor Quentin G. Bailey
Prescott, USA
April 3-18, 2019

Teaching and Supervising Experience

- **Co-supervisor** - MSc. level summer student,
– Project title: *“Two-body problem in relativistic field theory”*
SYRTE, Paris, France
Summer 2022
- **Teaching Assistant** - Electrodynamics (PhD course)
NCBJ, Warsaw, Poland
Autumn 2019
- **Student project supervisor** - Supervised a group of high-school students building a 3D printer.
Pimlico, London, UK
2015-2016

Academic Service

- **Member of GWECS Career Opportunities Office** Present
 - Organised the GWECS Job Fair 2022
- Involved in the outreach program “Her Teach Future” at Lund Institute of Technology. 2013

Non-Academic Experience

- **ISIS Duty Technician** Harwell, United Kingdom
 Rutherford Appleton Laboratory 2020 - 2021
- **Physics Science Technician** London, United Kingdom
 Pimlico Academy 2015-2016
- **Research Engineer - Radiation Safety** Lund, Sweden
 MAX IV Laboratory 2014-2015
- **Summer Student** Harwell, United Kingdom
 Diamond Light Source June-September 2013
- **Tutor in Mathematics** Helsingborg, Sweden
January-June 2013

Language & IT

- Computers/IT
 - Windows, Ubuntu Linux & Debian Linux
 - MS Word & Excel
 - L^AT_EX
 - Mathematica: xAct, Markov-Chain Monte Carlo cluster computations
 - Python: numpy, scipy, matplotlib, pandas, seaborn, scikit-learn, image processing
- Languages
 - **Native level:** Swedish, English. **Average:** French. **Beginner:** Polish level A1+