RESEARCH STATEMENT

1 Title

Dr. habil. Dmitry Zhuridov

2 Scientific degrees

- **Habilitation** (2023)
  Institution: Department of Physics and Astronomy, University of Wrocław
  Title: *Neutrinos in Heaven and on Earth: from Baryogenesis to Monte Carlo Generation.*

- **Ph. D.** (2006)
  Institution: Faculty of Physics, Lomonosov MSU
  Title: *Majorana neutrinos and processes with non-conservation of lepton number.*

- **MS degree** (2003)
  Institution: Faculty of Physics, Lomonosov MSU
  Title: *Heavy Majorana neutrinos in dilepton production at electron-proton colliders.*

3 Information on employment in research positions

2019–2021 Assistant Professor, University of Wrocław

2015–2017 Assistant Professor, University of Silesia, Katowice, Poland

2012–2014 Postdoctoral Researcher, Wayne State University, Detroit, USA

2010–2012 Postdoctoral Researcher, Scuola Normale Superiore, Pisa, Italy

2007–2009 Postdoctoral Researcher, National Tsing Hua University, Hsinchu, Taiwan

Participacion in the international research programs:

2009/02–2009/03 Visiting Researcher, KEK, Tsukuba, Japan
2007/02–2007/03 Visiting Researcher, DESY, Hamburg, Germany

FELLOWSHIPS AND GRANTS

During my post-doctoral research career (2007-2021) I was supported in part by:

- Polish National Science Center: NCN Opus Grant 2016/21/B/ST2/01092;
- Polish National Science Center, Grant No. DEC-2012/07/B/ST2/03867;

- U.S. Department of Energy under the contract DE-SC0007983;
- U.S. Department of Energy under contract DE-FG02-12ER41825;
- US National Science Foundation under Grant No. NSF PHY11-25915;
- EU ITN "Unification in the LHC Era", contract PITN-GA-2009-237920 (UNILHC);
- Italian Ministry of Education, University and Research (MIUR) under contract 2006022501;
- Boost Program of NTHU (Hsinchu, Taiwan) and National Science Council of R.O.C. under Grant Nos: NSC-97-2112-M-006-001-MY3 and NSC-95-2112-M-007-059-MY3;
- Deutsches Electronen-Synchrotron (DESY) in Hamburg, which Theoretical Physics Group invited me for a research visit from 15-02-2007 to 29-03-2007.

4 Other information about professional career

I have presented at dozens of international workshops and conferences on high-energy physics.

My teaching experience before obtaining the Ph. D. in May 2006 was as follows

- **2004/09–Ph. D.** Lecturer, Chair of General Physics, Moscow Institute of Electronics and Math
- **2005/09–2006/03** Physics Teacher, Moscow Center of Education #1840
- **2003/08–2004/08** Physics, Math and IT Teacher, International School of Tomorrow
- **Fall 2003** *"Physics–2"* course of seminars on Quantum Mechanics for the master students (5th year) of the Faculty of Mechanics and Mathematics of Lomonosov Moscow State University.

EDITING/TRANSLATION EXPERIENCE

- **2016–2020** Scientific Editor at the Journal of Physics G: Nuclear and Particle Physics
- **2007/01–2007/08** Scientific Translator and Editor at the Publishing House IDT Group

MEMBERSHIP, HONORS AND AWARDS

- **2016–Present** Polish Physical Society, Fellow
- **2013–2015** American Physical Society, Member
- **2011/09** BLV-2011 Workshop, Gatlinburg, TN, USA

  Award: best poster of the Workshop

ORGANIZATIONAL SKILLS

I have participated in organizing the international conferences and seminars, in particular, the Thirteenth Lomonosov Conference on Elementary Particle Physics (August, 2007)

5 Course of scientific activities

During my Ph. D. studies I was working mainly on the effects of Majorana neutrinos at colliders. After the Ph. D. award on 15/05/2006 till the Fall 2007 I was working on the neutrinoless double-beta decay that resulted in the publications [1, 2, 3], in which my contribution was leading. My co-author, Ahmed Ali, proposed the direction of researches 'neutrinoless double-beta decay', suggested investigation of its angular correlations for different decaying nuclei, made partucular checks and participated in the final text writing. My mentor and co-author, A. V. Borisov, contributed a lot with useful discussions, partial checks of the calculations, and text writing. Our collaborative work continued sporadically until 2010 [4, 5].

The NTHU Theory Group (Hsinchu, Taiwan), where I have got my first postdoctoral research position, focused my researches on Extended Higgs models versus heavy neutrinos at colliders [6, 7], observed Cosmic Ray Anomalies [8, 9] as well as Leptogenesis, Neutrino Mass Models and Dark Matter in the Universe [10, 8]. My research advisor in this projects, Chao-Qiang Geng, contributed with many discussions, some checks and text writing; my other collaborators, Chuan-Hung Chen and Chian-Shu Chen, contributed with their expertise in R-parity violating supersymmetry and doubly-charged Higgs, respectively.

On my next position at the SNS (Pisa, Italy), first I joined the project on Minimal Flavour Violation with hierarchical squarks governed by Riccardo Barbieri, in which I performed independent check of the majority of calculations [11]. Then I switched back to the topic of Leptogenesis and discovered new resonant scenario 'Freed Leptogenesis' [12, 13].

On my third postdoctoral position at the WSU (Detroit, USA) the particle theory group leader Alexey Petrov involved me in the project on Lepton Flavour Violation in the Effective Theory [14]. Then in collaboration with Kristopher Healey we wrote an article on Transition Magnetic Moments of non-standard interacting neutrinos [15].

On my personal initiative I was developing a new model concerning democratically mixed neutrinos in 2013-2014. However, due to the lack of free time and absence of funding this ended up only with two brief publications [16, 17] and a couple of arXiv submissions [18, 19].

From 2015 I was working in the research group of Henryk Czyż at the University of Silesia in Katowice, where I was updating the PHOKHARA code for the electron-positron scattering simulations. This ended up in a collaborative paper on radiative corrections related to the muon $g-2$ anomaly in the Standard Model [20]. In parallel I introduced a couple of smaller projects [21, 22] and continued to work on model building for the Baryogenesis [23, 24].

In the Fall of 2019 I moved to the University of Wrocław for an Assistant Professor (Adiunkt) position with teaching and research responsibilities. I joined the development of NuWro Monte Carlo event simulator in the Neutrino Group of Jan Sobczyk, and added a new dynamics of neutrino-charged lepton scattering to this code.

From October 2021 I work on a Senior Lecturer position at the University of Wrocław with 360 teaching hours per year that has slown down my research. Nevertheless, I have obtained a habilitation degree, submitted patent and grant applications and a manuscript to the Applied Optics [25]. I should add that my current position is on substitution and can not be extended after January 2024.

References

[1] A. Ali, A. V. Borisov, and D. V. Zhuridov. "Angular distribution of electrons in neutrinoless double-beta decay and new physics". In: *Phys. Atom. Nucl.* 70 (2007), pp. 1264–1269. DOI: 10.1134/S1063778807070198.

[2] A. Ali, A. V. Borisov, and D. V. Zhuridov. "Probing new physics in the neutrinoless double beta decay using electron angular correlation". In: *Phys. Rev. D* 76 (2007). [Erratum: Phys. Rev. D 105, 099902(E) (2022)], p. 093009. DOI: 10.1103/PhysRevD.76.093009. arXiv: 0706.4165 [hep-ph].

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[6] Chian-Shu Chen, Chao-Qiang Geng, and Dmitry V. Zhuridov. "Same-sign single dilepton productions at the LHC". In: *Phys. Lett. B* 666 (2008), pp. 340–343. DOI: 10.1016/j.physletb.2008.07.088. arXiv: 0801.2011 [hep-ph].

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