OLEXIY**DVORNIKOV**

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ABOUT

A PhD candidate at the University of Hawai'i researching terrestrial and extraterrestrial neutrinos and dark matter with wired and pixelated liquid argon time projection chambers (LArTPCs). Splitting time between software and hardware; experiment and theory. Interested in future neutrino and dark matter observatories.

EDUCATION

2023 **PhD · Physics**
University of Hawai'i at Mānoa
Advisor: Jelena Maričić
Dissertation: *Low energy physics in liquid argon time projection chambers*

2017 **MS · Physics**
San Diego State University
Advisor: Chad Kishimoto
Thesis: *Quantum Kinetics and the Zeno Ansatz: Sterile Neutrino Dark Matter in the Early Universe*

2014 **BS · Astrohysics**
University of California, San Diego
Advisor: Avi Yagil
Topic: *Top quark decays*

LANGUAGES

Computer	Python (including scikit & TensorFlow), C/C++, Mathematica, ROOT, Bash, SSH, Slurm, HTML, Git, LaTeX
Human	English, Ukrainian, Russian German, French

COMPUTATIONAL SKILLS

- Data & Image Analysis (of particles traversing Time Projection Chambers)
- Geant4 (Simulation of particles passing through and interacting with matter)
- NuWro (Monte Carlo Neutrino Event Generator)
- LArSoft (Simulation & Reconstruction Software for Liquid Argon Time Projection Chambers)
- Pandora (Pattern Recognition Software)

SCHOOLS ATTENDED

2022 October **AEPSHEP**
Asia-Europe-Pacific School of High Energy Physics
Pyeongchang, South Korea

2019 August **SSI**
Stanford Linear Accelerator Center Summer Institute
Menlo Park, California

SELECTED PUBLICATIONS

[1] **O. Dvornikov** et al., *Searching for solar KDAR with DUNE*, JCAP10(2021)065 (2021), arXiv:2107.09109 [hep-ex].

[2] C. Kishimoto, H. Hodlin, **O. Dvornikov**, *Quantum Kinetic Equilibrium*, arXiv:2011.11237 [hep-ph].

COLLABORATIONS

DUNE | Deep Underground Neutrino Experiment

RESEARCH HIGHLIGHTS

- Led an analysis that set limits on KDAR (kaon decay-at-rest) neutrino and dark matter sensitivities in DUNE.
- Developed an original algorithm to calibrate LArTPCs to the energies relevant for solar and supernova neutrinos. The algorithm identified and used low-energy electrons (delta-rays) for MeV level calibrations.
- Wrote a stand-alone simulation to optimize a photoelectron laser calibration system for the DUNE Near Detector.
- Participated in the fabrication, commissioning, and testing of a 7m dynamic temperature profiler in ProtoDUNE-SP.

SNOWMASS PUBLICATIONS

[1] D. Caratelli et al. (*incl.* **O. Dvornikov**), *Low-Energy Physics in Neutrino LArTPCs*, arXiv:2203.00740 [physics.ins-det].

[2] A. Ankowski et al. (*incl.* **O. Dvornikov**), *Electron Scattering and Neutrino Physics*, arXiv:2203.06853 [hep-ex].

[3] A. Abed Abud et al. (*incl.* **O. Dvornikov**), *A Gaseous Argon-Based Near Detector to Enhance the Physics Capabilities of DUNE*, arXiv:2203.06281 [hep-ex].

[4] DUNE Collaboration (*incl.* **O. Dvornikov**), *Snowmass Neutrino Frontier: DUNE Physics Summary*, arXiv (2021), arXiv:2203.06100 [hep-ex].

DUNE COLLABORATION PUBLICATIONS

[1] *Identification and reconstruction of low-energy electrons in the ProtoDUNE-SP detector*, Submitted to PRD, arXiv:2211.01166 [hep-ex].

[2] *DUNE Offline Computing Conceptual Design Report*, arXiv:2210.15665 [physics.data-an].

[3] *Separation of track and shower like energy deposits in ProtoDUNE-SP using a convolutional neural network*, Eur. Phys. J. C **82**, 903 (2022), arXiv:2203.17053 [physics.ins-det].

[4] *Scintillation light detection in the 6m drift-length ProtoDUNE Dual Phase liquid argon TPC*, Eur. Phys. J. C **82**, 618 (2022), arXiv:2203.16134 [physics.ins-det].

[5] *Reconstruction of interactions in the ProtoDUNE-SP detector with Pandora*, Submitted to EPJC (2022), arXiv:2206.14521 [hep-ex].

[6] *Low exposure long-baseline neutrino oscillation sensitivity of the DUNE experiment*, Phys. Rev. D 105, 072006 (2022), arXiv:2109.01304 [hep-ex].

[7] *Design, construction and operation of the ProtoDUNE-SP Liquid Argon TPC*, JINST **17** P01005 (2021), arXiv:2108.01902 [physics.ins-det].

[8] *Supernova neutrino burst detection with the Deep Underground Neutrino Experiment*, Eur. Phys. J. C **81**, 423 (2021), arXiv:2008.06647 [hep-ex].

[9] *Prospects for beyond the Standard Model physics searches at the Deep Underground Neutrino Experiment*, Eur. Phys. J. C **81**, 322 (2021), arXiv:2008.12769 [hep-ex].

[10] *Deep Underground Neutrino Experiment (DUNE) Near Detector Conceptual Design Report*, Instruments 5, no. **4**: 31 (2021), arXiv:2103.13910 [physics.ins-det].

[11] *Experiment Simulation Configurations Approximating DUNE TDR*, arXiv:2103.04797 [hep-ex].

[12] *First results on ProtoDUNE-SP liquid argon time projection chamber performance from a beam test at the CERN Neutrino Platform*, JINST **15** P12004 (2020), arXiv:2007.06722 [physics.ins-det].

[13] *Neutrino interaction classification with a convolutional neural network in the DUNE far detector*, Phys. Rev. D **102**, 092003 (2020), arXiv:2006.15052 [physics.ins-det].

[14] *Deep Underground Neutrino Experiment (DUNE), Far Detector Technical Design Report, Volume I*, JINST 15 T08008 (2020), arXiv:2002.02967 [physics.ins-det].

[15] *Deep Underground Neutrino Experiment (DUNE), Far Detector Technical Design Report, Volume II*, arXiv:2002.03005 [hep-ex].

[16] *Deep Underground Neutrino Experiment (DUNE), Far Detector Technical Design Report, Volume III*, JINST 15 T08009 (2020), arXiv:2002.03008 [physics.ins-det].

[17] *Deep Underground Neutrino Experiment (DUNE), Far Detector Technical Design Report, Volume IV*, JINST 15 T08010 (2020), arXiv:2002.03010 [physics.ins-det].

TALKS

2022 September	**DUNE CM** Deep Underground Neutrino Experiment Collaboration Meeting *Manchester, England*
2021 August	**SUSY** Conference on Supersymmetry and Unification of Fundamental Interactions *Virtual*
2021 May	**DUNE CM** *Virtual*
2021 April	**APS** American Physical Society *Virtual*
2021 February	**NuTel** Neutrino Telescopes Workshop *Virtual*
2020 September	**DUNE CM** *Virtual*
2020 January	**DUNE CM** *CERN, Switzerland*
2019 August	**SSI** Stanford Linear Accelerator Center Summer Institute *Menlo Park, California*

REFERENCES

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OUTREACH

2018-Now	**University of Hawai'i** Physics Olympics *Organizer of high school physics competitions*
2018-Now	**Open House** University of Hawai'i *Organizer of physics & astronomy exhibits for of all ages*
2022 October	**ASC Conference** Applied Superconductivity Conference Honolulu, Hawai'i *Outreach volunteer*
2020 January	**AAS Conference** American Astronomical Society Honolulu, Hawai'i *Outreach volunteer*

TEACHING

2021	**Instructor** · E & M and Optics
2018-Now	**Substitute lecturer** · Quantum Mechanics · QM, Relativity, Optics
2014-2018	**Teaching assistant** · E & M, Optics, Atoms labs · Mechanics labs
2017-2018	**Tutor** · University physics & math · K-12 math/reading/writing