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Ivan I. Yakovkin

BSc (2019), MSc (2021), PhD Student (since 2021)

Theoretical Physics

- Liquid Crystals
- Photonics and Plasmonics
- Solar Physics
- Solid State Physics
- Computational Physics

Software Development

- ML in Physics and Finance
- Performance Engineering
- Quant Research
- Custom Software Solutions
- Numerical Simulations

Academic Experience

Department of Theoretical Physics, Faculty of Physics, Taras Shevchenko National University of Kyiv, "Quantum computers, computing and information": Bachelor with honors (2019), Master with honors (2021), PhD Student (since 2021)

Faculty of Physics, Taras Shevchenko National University of Kyiv

- Orientational transitions in Nematic Liquid Crystals under external fields
- Effect of flexoelectric polarization, finite anchoring energy, easy axis gliding
- Tuning plasmonic resonances with Liquid Crystals

Astronomical Observatory, Taras Shevchenko National University of Kyiv

- Analysis of magnetic fields in solar flares using Stokes spectro-polarimetry
- Modeling radiation transfer in magnetic plasma
- Software solutions for automated spectrum processing, including ML

Academic Achievements

- More than 20 articles in refereed journals
- More than 25 talks in international conferences
- 2022 – Best Poster Award at the 7th International Symposium on Dielectric Materials and Applications ISyDMA'7
- 2023 – Scientific Excellence Award (Taras Shevchenko National University of Kyiv)

Software Development

Commercial experience – python [numpy, scipy, pandas, pandera, numexpr, pytorch, pyarrow, plotly, matplotlib]

- Machine Learning in Finance
 - Implementation of Variational Autoencoder models for predicting interest and swap rates
- Software Engineering in Wholesale Credit Risk
 - End-to-end implementation of Credit Loss models for CCAR stress testing and CECL provisioning
 - Implementation and maintenance of foundational models
 - Performance Engineering

Software solutions for scientific computing and visualization

- Numeric simulations of IVPs, BVPs, integral equations, Monte-Carlo, etc
 - COMSOL, python, Maple, Wolfram Mathematica, Matlab
- Data processing
 - Interpolation, extrapolation, smoothing, peak fitting, etc (C++, Delphi)
 - Detection of artifacts using CNN/ML (pytorch)
- CAS-assisted analytical derivations: Maple, Mathematica, sympy
- Visualization: pyside6, matplotlib, plotly, Delphi/RAD
- Miscellaneous
 - Setting up environments: Windows, Manjaro, wsl2, RDP, PyCharm debugging server
 - Remote development and code execution over SSH
 - Scripting for task automation: python, bash, batch

Selected products

- [Virtual Photometer](#)* – a program for precise digitalization and preprocessing of spectral data captured on photoplates (Delphi)
- [Profile Manipulator](#)* – a software for expedited processing, analysis, and visualization of spectral line profiles (Delphi)
- [StatPrism](#) – a software for statistical analysis targeting the scientists and students of Psychological and Sociological sciences. (python: pyside6, numpy, scipy, pandas, matplotlib, statsmodels)

*Incorporated into the data processing pipeline for the spectra obtained at the Horizontal Solar Telescope of the Astronomical Observatory, Taras Shevchenko National University of Kyiv

Miscellaneous

- 2017 – Japanese Language Proficiency Test (N5).
- 2019 – English for professional activities certification (Natural Sciences, C1)

Selected Publications

- Yakovkin I.N., **Yakovkin I.I.**, Petrova N.V. DFT and Monte Carlo study of the W(001) surface reconstruction. *European Physical Journal B [Q2]*, 90 (125), 2017
- **Yakovkin I.I.**, Veronig A.M., Lozitsky V.G. Magnetic field measurements in a limb solar flare by hydrogen, helium and ionized calcium lines. *Advances in Space Research [Q2]*, 68 (3), 2021
- **Yakovkin I.I.**, Lesiuk A.I., Ledney M.F., Reshetnyak V.Yu. Director orientational instability in a planar flexoelectric nematic cell with easy axis gliding. *Journal of Molecular Liquids [Q1]*, 363 (6), 2022
- **Yakovkin I.I.**, Lozitsky V.G. Signatures of superstrong magnetic fields in a limb solar flare from observations of the H α line. *Advances in Space Research [Q2]*, 69 (12), 2022
- **Yakovkin I.I.**, Lozitsky V.G. Search for superstrong magnetic fields in active processes on the Sun using spectro-polarimetry within 15 angstroms around the D3 line. *Monthly Notices of the Royal Astronomical Society [Q1]*, 523 (40), p. 5812 – 5822, 2023
- **Yakovkin I.I.**, Reshetnyak V.Yu. Liquid crystal-enabled tunability of Yagi-Uda antenna resonant properties. *Journal of Optical Microsystems [Q2]*, 3 (4), 041203, 2023
- **Yakovkin I.I.**, Reshetnyak V.Yu. Controlling plasmon resonance of gold and silver nanoparticle arrays with help of liquid crystal. *Photonics [Q2]*, 10 (10), 1088, 2023
- **Yakovkin I.I.**, Reshetnyak V.Yu., Bunning T.J., Evans D.R. Tunable THz absorbers based on LC-tuned Yagi-Uda antennas. *Liquid crystals [Q2]*, 1 – 11, 2024
- **Yakovkin I.I.**, Ledney M.F., Reshetnyak V.Yu., Pakamoryte I., Hands P.J.W. Modeling of laser generation in a Fabry-Perot-Tamm structure with a nematic liquid crystal layer. *Journal of Applied Physics [Q2]* 135 (21), 2024
- Lozitska N.I., **Yakovkin I.I.**, Lozitsky V.G. Unique spectral manifestations around the D3 line observed in the region close to the seismic source of a large solar flare. *Monthly Notices of the Royal Astronomical Society Letters [Q1]*, 528 (1), 2024
- **Yakovkin I.I.**, Lozitska N.I., Lozitsky V.G. Altitude Heterogeneity of Magnetic Fields and Doppler Velocities in the Area of Seismic Source of a Strong Solar Flare from Data in Helium, Sodium, and Nickel Lines. *Universe [Q1]*, 10(6), 2024
- Lozitsky V.G, **Yakovkin I.I.**, Lozitska N.I. Comparison of magnetic fields and Doppler velocities in an X-class solar flare as measured by D1, D2, D3, H α , and NiI 5892.9 lines. *Advances in Space Research [Q1]*, 75 (1), 2025
- **Yakovkin I.I.**, Bartenev A.O., Petrova N.V. Machine Learning in Application to Automatic Noise Processing of Solar Spectrograms. *Journal of Physical Studies [Q3]*, 29(1), 2025
- **Yakovkin I.I.**, Ledney M.F. Voltage-controlled surface plasmon in a flexoelectric nematic liquid crystal cell. *Liquid Crystals [Q2]*, 2025