Aleksandr KADYKOV cv@kadykov.com

Research Engineer

Proven ability to design and execute experiments, analyse and present data, develop scientific Python software. Strong background in applied and basic research in THz photonics and magnetotransport in 2D materials.

- Data analysis & presentation
- Experimental design & execution
- Instrumentation integration & orchestration
- Scientific Python development

Multitel ASBL

Mons
Belgium

Non-profit innovation center specializing in applied photonics, AI, etc.

Research Engineer in THz Spectroscopy and Imaging

Jul. 2021
Aug. 2024

- Developed a THz time-domain spectroscopy (THz-TDS) data pipeline with an improved signal-to-noise ratio by utilizing sensitivity profile-shaped filtering.
- Developed a computationally cheap THz-TDS data processing method for refractive index and thickness extraction in low-absorption materials.
- Streamlined refractive index profile reconstruction from THz-TDS data by offloading calculations to a GPU and utilizing backpropagation-based optimization algorithms.
- Automated laboratory workflows by implementing Python tools for measurement orchestration, data management, analysis, and result presentation.
- Ensured best software development practices by implementing unit testing, CI/CD pipelines, and documentation.

Laboratoire National de Métrologie et d'Essais (LNE)

Trappes
France

French National Laboratory of Metrology and Testing

Research Engineer in Quantum Hall Effect Metrology

Sep. 2018
Sep. 2020

- Led low-noise cryogenic magnetotransport measurements on graphene, exploring its potential as a resistance standard.
- Designed a flexible Python software package, optimizing scientific equipment orchestration.
- Participated in the nanofabrication of hBN-encapsulated graphene stacks.
- Improved performance of a helium gas recuperation system.

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Institute for Physics of Microstructures (IPM RAS)

Nizhny Novgorod
Russia

State-owned research institute specializing in solid state physics.

Research Engineer in Photonics of 2D Narrow-Gap Heterostructures

May 2017
Sep. 2018

- Led photoluminescence and photoconductivity FTIR cryogenic measurements of HgTe/HgCdTe quantum wells.
- Achieved laser emission in HgCdTe heterostructures at a record wavelength.

Laboratoire Charles Coulomb (L2C) & IPM RAS

Montpellier, France
Nizhny Novgorod, Russia

I2S Doctorlal School at the University of Montpellier

Ph.D. in Solid State Physics

Sep. 2014
Dec. 2017

- Thesis: Physical properties of HgCdTe-based heterostructures: towards terahertz emission and detection
- Implemented a double-modulation technique, enabling the extraction of critical magnetic fields in a topological insulator.
- First to observe a temperature-driven phase transition in a HgTe/CdHgTe topological insulator using magnetotransport.

Data analysis & presentation: Python, NumPy, Pandas, Xarray, SciPy, Matplotlib, hvPlot, Plotly, Bokeh, Panel, Intake,

Instrumentation integration & orchestration: PyMeasure, Bluesky, yaq, LabVIEW

Reporting: Quarto, Jupyter, Typst, LaTeX, RevealJS

Programming: VSCode, Git, Linux, Docker, PyTest, Pre-Commit, GitLab CI/CD, GitHub Actions, TDD, Devcontainers

- **English** (upper-intermediate)
- **French** (upper-intermediate)
- **Russian** (native)

Selected publications

1. Kadykov, A.M., Krishtopenko, S.S., Jouault, B. et al., *Temperature-Induced Topological Phase Transition in HgTe Quantum Wells*, **Physical Review Letters**, 120(8), *086401*, 2018
2. Kadykov, A.M., Torres, J., Krishtopenko, S.S. et al., *Terahertz imaging of Landau levels in HgTe-based topological insulators*, **Applied Physics Letters**, 108(26), *262102*, 2016
3. Teppe, F., Marcinkiewicz, M., Krishtopenko, S.S. et al., *Temperature-driven massless Kane fermions in HgCdTe crystals*, **Nature Communications**, 7, *12576*, 2016
4. Kadykov, A.M., Teppe, F., Consejo, C. et al., *Terahertz detection of magnetic field-driven topological phase transition in HgTe-based transistors*, **Applied Physics Letters**, 107(15), *152101*, 2015