VITALII KHODNEVYCH

PhD in physics

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WORK EXPERIENCE

System engineer in optics

IRT Saint Exupéry

2020 - now, CDI Biot, France

Activities are dedicated to the development, validation, and test of a static Fourier spectro-imager for the detection and quantification of anthropogenic gases in the Earth's atmosphere from space that includes:

- Radiometric and first-order optical analysis. Preliminary optical components and system design with Zemax.
- Mock-up architecture trade-off and accommodation study. Preliminary mechanical design.
- Stray light model development, analysis (FRED, MatLab), and characterization. Stray light correction algorithms development.
- Interferometers, detectors, and coatings design trade-offs. Definition of optical components and coating specifications for detailed optical design and manufacturing, including RFQ and purchasing.
- Technical specification definition for L1 processing. Analytical and numerical models development: forward (optical) and inverse models corresponding to L1-L2 processing.
- Performance model development: budget assessment with an inverse model. Sensitivity analysis and optimization assessment based on the L2 inverse model. Assessment of L4 instrument performance (minimum detectable and quantifiable flux).
- Definition of the project objectives reachable with AI technology. Model trade-off and development of partially sampled interferogram calibration scheme with AI.
- Definition of the instrument's characterization plan and associated algorithms development. Characterization (spectral, OPD, stray light, radiometric) and laboratory validation tests (TRL4) of the instrument.
- Technical assistance in two patent description preparation and 4 papers. Technical assistance in CGI VA and CGI VA 2 proposal preparation and contractual documentation delivery. Conducting milestone meetings with a client (ESA).

PhD student

Observatoire de la Côte d'Azur, ARTEMIS lab

2017 - 2020 Nice, France

PhD was dedicated to studying the impact of coherent scattering on the interferometric measurements of the future gravitational observatory LISA.

- During my PhD I built two state-of-the-art interferometric instruments (at $1.06\ \mu m$ and $1.55\ \mu m$) for backscattering measurements (including free space component design and signal processing routines), resulting in a poster at ICSO2018 and a talk at Optro2020 conferences.
- Beside this I published a paper on how to calculate stray light caused by micrometeoroids impact., generalize Harvey-Shack's theory for the case of coherent scattering and develop a new contamination control system for a clean room, which has been used in Observatory Cote d'Azur since the summer of 2019.

EDUCATION

Master 2 Grands Instruments
(Major de promotion)

Université Paris-Saclay

2016 - 2017 Paris, France

Bachelor and Master in Nuclear and High Energy Physics

Taras Shevchenko National University of Kyiv

2010 - 2016 Kyiv, Ukraine

TRAININGS

- FRED introductory course (2022)
- International School on Space Optics, 2019 (Rome, Italy)
- Laser security training at CERLA, 2019 (Lille, France)
- Gathering of the Federation of Plasma and Fusion Sciences Training, 2017 (Bordeaux, France)

AWARDS

- Master scholarship 2016: Bourses du Gouvernement Français and Université Paris-Sud
- Doctoral scholarship 2017: Thales Alenia Space and PACA region
- Finalist of Pierre Laffitte prize in 2019.

PUBLICATIONS

- *Stray light estimates due to micrometeoroid damage in space optics, application to the LISA telescope*, SPIE JATIS, 2020 DOI
- Full list

SKILLS

FRED | Zemax | MATLAB | Python | C/C++ | SolidWorks

LANGUAGES

Ukrainian | English (C1) | French (B1)