Wroclaw, December 17, 2024

Dr. Lukasz A. Sterczewski
Wroclaw University of Science and Technology,
Faculty of Electronics, Photonics, and Microsystems
Wybrzeze Wyspianskiego 27,
50-370, Wroclaw, Poland

Attachment 4

to the application dated December 17, 2024
for the conferment of the post-doctoral degree of doctor habilitated in the field of Engineering and Technology in Automation, Electronics, Electrical Engineering, and Space Technologies.

List of scientific achievements that represent a major contribution to the development of a scientific discipline

Table of contents

List of scientific achievements that represent a major contribution to the development of a scientific discipline

I. INFORMATION ON SCIENTIFIC OR ARTISTIC ACHIEVEMENTS SET OUT IN ART. 291 PARA 1. POINT 2 OF THE ACT,

1. Research monograph, as set out in art. 219 para 1 point 2a of the Act; or

—

2. Series of publications (articles related thematically), as set out in art. 219 para 1 point 2b of the Act

Achievement I – series of publications

„Optical frequency combs produced by semiconductor and fiber lasers: spectral and temporal properties"

Peer-reviewed publications constituting the scientific achievement (reverse chronology)

[HA1] J. Boguslawski, L. A. Sterczewski, D. Stachowiak, and G. Sobon, "Intracavity filtering in SESAM mode-locked fiber lasers: soliton effects and noise performance," *Optics Express* **31**, 27667-27676 (2023), IF = 3.80, Ministry of Science and Higher Education (MSHE) Points = 140 (200 max.). Simulation code available under: https://dx.doi.org/10.6084/m9.figshare.25055657

[HA2] L. A. Sterczewski, M. Fradet, C. Frez, S. Forouhar, and M. Bagheri, "Battery-operated mid-infrared diode laser frequency combs," *Laser & Photonics Reviews* **16**, 2200224 (2022), IF = 10.95, MSHE = 200.

[HA3] M. Kowalczyk, L. A. Sterczewski, X. Zhang, V. Petrov, and J. Sotor, "Dual-dispersion-regime dual-comb mode-locked laser," *Optics Letters* **47**, 1762–1765 (2022), IF = 3.78, MSHE Points = 140. Code is publicly available in an open repository: https://dx.doi.org/10.6084/m9.figshare.25055684

[HA4] L. A. Sterczewski, M. Bagheri, C. Frez, C. L. Canedy, I. Vurgaftman, M. Kim, C. S. Kim, C. D. Merritt, W. W. Bewley, and J. R. Meyer, "Interband cascade laser frequency combs (invited review)," *Journal of Physics Photonics* **3**, 042003 (2021), IF = 3.88, MSHE = 20.

[HA5] L. A. Sterczewski, C. Frez, S. Forouhar, D. Burghoff, and M. Bagheri, "Frequency-modulated diode laser frequency combs at 2 μm wavelength," *APL Photonics* **5**, 076111 (2020) [Paper featured by AIP Scilight], [Journal cover paper], IF = 4.86, MSHE Points = 100.

[HA6] L. A. Sterczewski, M. Bagheri, C. Frez, C. L. Canedy, I. Vurgaftman, and J. R. Meyer, "Mid-infrared dual-comb spectroscopy with room-temperature bi-functional interband cascade lasers and detectors," *Applied Physics Letters* **116**, 141102 (2020) [Editor's pick], [Paper featured by AIP Scilight media outlet], IF = 3.60, MSHE = 100.

[HA7] L. A. Sterczewski, M. Bagheri, C. Frez, C. L. Canedy, I. Vurgaftman, M. Kim, C. S. Kim, C. D. Merritt, W. W. Bewley, and J. R. Meyer, "Near-infrared frequency comb generation in mid-infrared interband cascade lasers," *Optics Letters* **44**, 5828-5831 (2019) IF = 3.71, MSHE = 140.

2.1. Applicant's contribution to Achievement I [HA1–HA7]:

[HA1]	My contribution to paper [HA1] was developing a numerical Kramers-Kronig model that calculates the phase response of an optical filter for a given (measured or simulated) spectral transmission shape. I also prepared a numerical tool to calculate the integrated phase noise given a power spectral density. I co-edited the text and prepared the resultant dispersion and phase noise curves to produce the manuscript figures. I independently generated Figures S4–S6. With my analysis methods, we determined the effect of the presence of arbitrary optical filters on the shape of the optical spectrum of soliton lasers, which are treated as unstabilized optical frequency combs. My scientific work in [HA1] was funded by a Marie Sklodowska-Curie project I acquired
[HA2]	My contribution to paper [HA2] includes obtaining funding under a NASA Postdoctoral Program (NPP) fellowship, formulating the research hypothesis to initiate a new research direction, preparing the samples (soldering, wire-bonding), assembling the entire experimental setup, optical and electrical measurements, analyzing the data, editing the publication text, producing all the figures, and implementing the lifetime model of the carriers in the quantum well laser structure. In the work, I am the corresponding and lead author.
[HA3]	My contribution to paper [HA3] consisted of co-editing the main text and preparing the *supplementary document,* which characterized the differences in noise between operation in the same and different dispersion regimes. I wrote a computer program (script) for calculating the noise properties (phase as a function of time) of a dual-cavity laser, which has been made publicly available in an open repository. For my work, I obtained funding from the Marie Skłodowska-Curie project.
[HA4]	My contribution to paper [HA4] was the preparation of an extensive literature review of semiconductor frequency combs in the 3–5 μm range. I wrote the text, prepared all the figures, obtained the necessary permissions to reproduce the drawings, and prepared spectroscopic simulations from the HITRAN database. Although the work is a review, I included many new, unpublished measurements for which I set up the experimental setup and collected the data. I am the lead author of the paper. The work is carried out as part of a postdoctoral fellowship for which I obtained funding through an international competition.
[HA5]	My contribution to the paper [HA5] consisted of obtaining funding under a NASA Postdoctoral Program (NPP) fellowship, formulating the research hypothesis and initiating a new research direction (antimonide-based quantum well lasers as self-modulating optical frequency combs), sample preparation (soldering, wire-bonding), assembling the experimental setup, optical and electrical measurements, data analysis, HITRAN spectroscopic simulation and writing the publication text. In the work, I am the lead and corresponding author.

[HA6]	My contribution to paper [HA6] was obtaining funding under the NASA Postdoctoral Program (NPP) postdoctoral fellowship, formulating the research hypothesis and initiating a new research direction (room temperature ICL dual-comb spectroscopy without a dedicated photodetector), sample preparation (soldering, wire-bonding), assembling the experimental setup, performing optical and electrical measurements, analyzing data, simulating molecular spectra using the HITRAN spectroscopic database, and writing the publication text. In the work, I am the lead and corresponding author.
[HA7]	My contribution to paper [HA7] was obtaining funding under a NASA Postdoctoral Program (NPP) fellowship, formulating the research hypothesis and initiating a new research direction (nonlinear optics in ICL lasers), preparing the samples (soldering, wire-bonding), assembling the experimental setup for characterization of spectral properties, performing optical and electrical measurements, analyzing data, and writing the publication text. In the work, I am the lead author.

Achievement II – series of publications

„New spectroscopy and imaging techniques using free-running optical frequency combs"

[HB1] L. A. Sterczewski, and M. Bagheri, "Sub-nominal resolution Fourier transform spectrometry with chip-based combs," *Laser & Photonics Reviews* **18**, 2300724 (2024), IF = 11.00, MSHE Points = 200.

[HB2] L. A. Sterczewski, and J. Sotor, "Two-photon imaging of soliton dynamics," *Nature Communications* **14**, 3339 (2023), IF = 17.69, MSHE Points = 200.

[HB3] L. A. Sterczewski, A. Przewloka, W. Kaszub, and J. Sotor, "Computational Doppler-limited dual-comb spectroscopy with a free-running all-fiber laser," *APL Photonics*, **4**, 116102 (2019) [Editor's pick], IF = 4.86, MSHE Points = 100.

[HB4] L. A. Sterczewski*, T.-L. Chen*, D. C. Ober, C. R. Markus, C. L. Canedy, I. Vurgaftman, C. Frez, J. R. Meyer, M. Okumura, and M. Bagheri, "Cavity-enhanced Vernier spectroscopy with a chip-scale mid-infrared frequency comb," *ACS Photonics* **9**, 994–1001 (2022), [Journal cover paper], IF = 7.53, MSHE Points = 140.

[HB5] M. Kowalczyk, L. A. Sterczewski, X. Zhang, V. Petrov, Z. Wang, and J. Sotor, "Dual-comb femtosecond solid-state laser with inherent polarization-multiplexing," *Laser & Photonics Reviews* **15**, 2000441 (2021), [Journal cover paper], IF = 13,14, MSHE Points = 200.

[HB6] L. A. Sterczewski and M. Bagheri, "Subsampling dual-comb spectroscopy," *Optics Letters* **45**, 4895-4898 (2020), IF = 3,71, MSHE Points = 140.

[HB7] L. A. Sterczewski*, J. Westberg*, Y. Yang, D. Burghoff, J. Reno, Q. Hu, and G. Wysocki, "Terahertz spectroscopy of gas mixtures with dual quantum cascade laser frequency combs," *ACS Photonics* **7**, 1082-1087 (2020), IF = 6.86, MSHE Points = 140.

[HB8] L. A. Sterczewski, J. Westberg, Y. Yang, D. Burghoff, J. Reno, Q. Hu, and G. Wysocki, "Terahertz hyperspectral imaging with dual chip-scale combs," *Optica*, **6**, 766-771 (2019). [Paper featured by ScienceDaily and Photonics Online], IF = 9.78, MSHE Points = 200.

2.2. Applicant's contribution to Achievement II [HB1–HB8]:

[HB1]	My contribution to paper [HB1] was the development of a computational Fourier spectroscopy technique using miniature optical frequency combs. As part of the publication, I selected suitable laser samples, designed a precision power supply and laser current control system, and programmed the interferometric experiment. I then developed and implemented a mathematical model for the digital estimation of comb parameters from the interferogram. A series of calculated spectra were compared by me with simulations from the HITRAN molecular database. My scientific work in [HB1] was funded by a Marie Sklodowska-Curie European project I acquired, and a NASA postdoctoral fellowship, both obtained through competition.

[HB2]	My contribution to paper [HB2] relied on assembling an experimental setup using intentionally designed quasi-stable fiber lasers provided by Prof. J. Sotor. I carried out numerous experiments using the dual-comb technique with different operating regimes and different semiconductor lasers as two-photon photodetectors (which, by the way, I characterized for this unusual mode of operation). I programmed the entire experiment to collect extensive measurement data from multiple devices simultaneously. I wrote software to analyze the data, produced drawings, and edited the text (with comments from Prof. Sotor). I also developed a mathematical model explaining the ability of the intensity cross-correlation technique to work above the classical Nyquist frequency limit. In the work, I am a corresponding and lead author. For my work, I obtained funding from the Marie Skłodowska-Curie European Project. I am also the co-editor of the NCN Opus competition proposal (DuCT-LaserProbe project – "Dual-cavity technique as a tool for studying the dynamics of laser pulse generation"), under which the research was conducted.
[HB3]	My contribution to paper [HB3] was the construction of a polarization-multiplexed dual-comb fiber laser (with the help of Prof. Sotor) using a graphene saturable absorber. I then subjected such a laser to stability analysis using proprietary digital signal processing techniques. I developed and implemented a pioneering method of digital phase correction of the spectroscopic signal for measurements of gaseous molecules in the low-pressure regime (10 Torr, when typical molecular lines are Doppler broadened to hundreds of MHz of linewidth). My method, characterized by high flexibility, was used for unstabilized dual-comb spectroscopy in Prof. Minoshima's laboratory in Tokyo [NP3, NP4]. The experiments reported in [HB3], I performed myself. I simulated the molecular spectra according to astrophysical databases for the HCN molecule, prepared the figures, and edited the publication text with input from Prof. Jaroslaw Sotor. In the work, I am the lead and correspondence author
[HB4]	My contribution to paper [HB4] was aligning the optical system with an optical cavity provided and designed by Dr. Tzu-Ling Chen (Caltech). I authored the idea of using the optical cavity for Vernier spectroscopy with selective mode filtering. I prepared the ICL laser for the experiment (mounting, collimation, power supply, and stabilization). I programmed the experiment and collected measurement data, which I then processed with a proprietary script to remove the impact of unstabilized ICL comb operation. I edited the paper (with all drawings created by my software) according to comments from the other co-authors. The work was carried out as part of a NASA postdoctoral fellowship for which I obtained funding.

[HB5]	My contribution to paper [HB5] consisted of adapting the methodology for spectroscopic data analysis, co-editing the text (with Dr. Maciej Kowalczyk), analyzing the noise properties and mutual coherence of the sources for comb spectroscopy and temporal stability. In this work, I prepared Figs 3, 4, 5, 6, and 7. I extended my methodology to the analysis of dispersive data (Fig. 7b). I was also responsible (design and coordination) for the cover of the *Laser & Photonics Reviews* journal, which promoted the paper.
[HB6]	My contribution to paper [HB6] consisted of obtaining funding under a NASA Postdoctoral Program (NPP) fellowship and developing a mathematical model for subsampling in dual-comb spectroscopy. I prepared the laser for the experiment (soldering, wire bonding), assembled the experimental setup, performed optical and electrical measurements, and analyzed the data. I wrote a computer program made available to the public to simulate the subsampled spectra. I am the lead author of the paper.
[HB7]	My contribution to paper [HB7] was funding acquisition under a Kosciuszko Foundation Scholarship program for research in the US at Princeton University. I also set up and conducted the experiment together with Dr. Jonas Westberg. I analyzed the time-resolved data using my own software. I edited the text of the paper equally with all co-authors. I produced all the figures in the publication. I am the lead author in the paper equally with Dr. Westberg.
[HB8]	My contribution to paper [HB8] was funding acquisition under a Kosciuszko Foundation Scholarship program for research in the US at Princeton University. I set up the experiment together with Dr. Jonas Westberg, proposed the substances for the study, and prepared the multicomponent sample for imaging. I collected the experimental data with Dr. Westberg's software and analyzed it with my own software for contrast enhancement of hyperspectral data. I edited the paper equally with Dr. Westberg with comments from all co-authors. I made a leading contribution in the supplementary material and in Fig. 1(a) (3D schematic of the layout) and Fig. 4 in the main paper. I am the lead author in the paper equally with Dr. Westberg.

3. **List of completed original project, engineering and design, technological or artistic achievements, pursuant to art. 219 para 1. point 2c of the Act.**

—

II. LIST OF SCIENTIFIC OR ART-RELATED ACTIVITY

1. List of published scientific monographs (including the monographs not mentioned in section I.1).

—

2. List of published chapters in scientific monographs.

BEFORE OBTAINING A DOCTORAL DEGREE

—

AFTER RECEIVING A DOCTORAL DEGREE

G. Wysocki, J. Westberg, and L. A. Sterczewski, "Multi-Heterodyne Spectroscopic Sensing and Applications of Mid-Infrared and Terahertz Quantum Cascade Lasers", in Mid-Infrared and Terahertz Quantum Cascade Lasers, book edited by D. Botez and M. A. Belkin (Cambridge University Press, Cambridge, 2023).

3. Information about membership in editorial boards preparing scientific monographs for publication.

—

4. List of articles published in scientific journals (including the articles not mentioned in section I.2).

PERIOD BEFORE RECEIVING A DOCTORAL DEGREE – PAPERS NOT LISTED IN POINT I.2

[N1] J. Westberg*, L. A. Sterczewski*, F. Kapsalidis, Y. Bidaux, J. M. Wolf, M. Beck, J. Faist, and G. Wysocki, "Dual-comb spectroscopy using plasmon-enhanced-waveguide dispersion-compensated quantum cascade lasers," *Optics Letters* **43**, 4522-4525 (2018), IF = 3.86.

[N2] M. Bagheri, C. Frez, L. A. Sterczewski, I. Gruidin, M. Fradet, I. Vurgaftman, C. L. Canedy, W. W. Bewley, C. D. Merritt, C. S. Kim, M. Kim, and J. R. Meyer, "Passively mode-locked interband cascade optical frequency combs," *Scientific Reports* **8**, 3322 (2018), IF = 4.01.

[N3] L. A. Sterczewski, K. Nowak, B. Szlachetko, M. P. Grzelczak, B. S-. Siega., S. Plinska, W. Malinka, and E. F. Plinski, "Chemometric Evaluation of THz Spectral Similarity for the Selection of Early Drug Candidates," *Scientific Reports* **7**, 14583 (2017), IF = 4.01.

[N4] L. A. Sterczewski*, J. Westberg*, C. L. Patrick, C. S. Kim, M. Kim, C. L. Canedy, W. W. Bewley, C. D. Merritt, I. Vurgaftman, J. R. Meyer, and G. Wysocki, "Multiheterodyne spectroscopy using interband cascade lasers," *Optical Engineering* **57**, 011014 (2018), IF = 1.28.

[N5] J. Westberg*, L. A. Sterczewski*, and G. Wysocki, "Mid-infrared multiheterodyne spectroscopy with phase-locked quantum cascade lasers," *Applied Physics Letters* **110**, 141108 (2017), IF = 3.50.

[N6] L. A. Sterczewski*, J. Westberg*, and G. Wysocki, "Molecular dispersion spectroscopy based on Fabry-Pérot quantum cascade lasers," *Optics Letters* **42**, 243-246 (2017), IF = 2.99.

[N7] L. A. Sterczewski, M. P. Grzelczak, K. Nowak, B. Szlachetko, and E. F. Plinski, "Bayesian separation algorithm of THz spectral sources applied to D-glucose monohydrate dehydration kinetics," *Chemical Physics Letters* **644**, 45–50 (2016), IF = 1.82.

[N8] L. A. Sterczewski, J. Westberg, and G. Wysocki, "Tuning properties of mid-infrared Fabry-Pérot quantum cascade lasers for multiheterodyne spectroscopy," *Photonics Letters of Poland* **8**, 113–115 (2016), IF = 0.38.

[N9] L. A. Sterczewski, M. P. Grzelczak, and E. F. Plinski, "Heating system of pellet samples integrated with terahertz spectrometer," *Review of Scientific Instruments* **87**, 13106 (2016), IF = 1.63.

[N10] L. A. Sterczewski, M. P. Grzelczak, and E. F. Plinski, "Terahertz antenna electronic chopper," *Review of Scientific Instruments* **87**, 14702 (2016), IF = 1.63.

[N11] L. A. Sterczewski, M. P. Grzelczak, K. Nowak, and E. F. Plinski, "Cast terahertz lenses made of caramelized sucrose," *Optical Engineering* **55**, 90505 (2016), IF = 1.08.

[N12] K. Nowak, E. F. Plinski, B. Karolewicz, P. P. Jarzab, S. Plinska, B. Fuglewicz, M. J. Walczakowski, L. Augustyn, L. A. Sterczewski, M. P. Grzelczak, M. Hruszowiec, G. Beziuk, M. Mikulic, N. Palka, and M. Szustakowski, "Selected aspects of terahertz spectroscopy in pharmaceutical sciences," *Acta Poloniae Pharmaceutica* **72**, 851—866 (2015), IF = 0.88.

PERIOD AFTER RECEIVING A DOCTORAL DEGREE – PAPERS LISTED IN POINT I.2

[HA1] J. Boguslawski, L. A. Sterczewski, D. Stachowiak, and G. Sobon, "Intracavity filtering in SESAM mode-locked fiber lasers: soliton effects and noise performance," *Optics Express* **31**, 27667-27676 (2023), IF = 3.80.

[HB2] L. A. Sterczewski, and J. Sotor, "Two-photon imaging of soliton dynamics," *Nature Communications* **14**, 3339 (2023), IF = 17.69.

[HB1] L. A. Sterczewski, and M. Bagheri, "Sub-nominal resolution Fourier transform spectrometry with chip-based combs," *Laser & Photonics Reviews* **18**, 2300724 (2024), IF = 11.00.

[HA2] L. A. Sterczewski, M. Fradet, C. Frez, S. Forouhar, and M. Bagheri, "Battery-operated mid-infrared diode laser frequency combs," *Laser & Photonics Reviews* **16**, 2200224 (2022), IF = 10.95.

[HA3] M. Kowalczyk, L. A. Sterczewski, X. Zhang, V. Petrov, and J. Sotor, "Dual-dispersion-regime dual-comb mode-locked laser," *Optics Letters* **47**, 1762–1765 (2022), IF = 3.78.

[HB4] L. A. Sterczewski*, T.-L. Chen*, D. C. Ober, C. R. Markus, C. L. Canedy, I. Vurgaftman, C. Frez, J. R. Meyer, M. Okumura, and M. Bagheri, "Cavity-enhanced Vernier spectroscopy with a chip-scale mid-infrared frequency comb," *ACS Photonics* **9**, 994–1001 (2022), [Journal cover paper], IF = 7.53.

[HA4] L. A. Sterczewski, M. Bagheri, C. Frez, C. L. Canedy, I. Vurgaftman, M. Kim, C. S. Kim, C. D. Merritt, W. W. Bewley and J. R. Meyer, "Interband cascade laser frequency combs (invited review)," *Journal of Physics Photonics* **3**, 042003 (2021).

[HA3] M. Kowalczyk, L. A. Sterczewski, X. Zhang, V. Petrov, Z. Wang, and J. Sotor, "Dual-comb femtosecond solid-state laser with inherent polarization-multiplexing," *Laser & Photonics Reviews* **15**, 2000441 (2021), [Journal cover paper], IF = 13.14.

[HB6] L. A. Sterczewski and M. Bagheri, "Subsampling dual-comb spectroscopy," *Optics Letters* **45**, 4895-4898 (2020), IF = 3.71.

[HA5] L. A. Sterczewski, C. Frez, S. Forouhar, D. Burghoff, and M. Bagheri, "Frequency-modulated diode laser frequency combs at 2 μm wavelength," *APL Photonics* **5**, 076111 (2020) [Paper featured by the AIP Scilight media outlet], [Journal cover paper], IF = 4.86.

[HB7] L. A. Sterczewski*, J. Westberg*, Y. Yang, D. Burghoff, J. Reno, Q. Hu, and G. Wysocki, "Terahertz spectroscopy of gas mixtures with dual quantum cascade laser frequency combs," *ACS Photonics* **7**, 1082-1087 (2020), IF = 6.86.

[HA6] L. A. Sterczewski, M. Bagheri, C. Frez, C. L. Canedy, I. Vurgaftman, and J. R. Meyer, "Mid-infrared dual-comb spectroscopy with room-temperature bi-functional interband cascade lasers and detectors," *Applied Physics Letters* **116**, 141102 (2020) [Editor's pick], [Paper featured by AIP Scilight media outlet], IF = 3.60.

[HA7] L. A. Sterczewski, M. Bagheri, C. Frez, C. L. Canedy, I. Vurgaftman, M. Kim, C. S. Kim, C. D. Merritt, W. W. Bewley, and J. R. Meyer, "Near-infrared frequency comb generation in mid-infrared interband cascade lasers," *Optics Letters* **44**, 5828-5831 (2019) IF = 3.71.

[HB3] L. A. Sterczewski, A. Przewloka, W. Kaszub, and J. Sotor, "Computational Doppler-limited dual-comb spectroscopy with a free-running all-fiber laser," *APL Photonics*, **4**, 116102 (2019) [Editor's pick], IF = 4.86.

[HB5] M. Kowalczyk, L. A. Sterczewski, X. Zhang, V. Petrov, Z. Wang, and J. Sotor, "Dual-comb femtosecond solid-state laser with inherent polarization-multiplexing," *Laser & Photonics Reviews* **15**, 2000441 (2021), [Journal cover paper], IF = 13.14.

PERIOD AFTER RECEIVING A DOCTORAL DEGREE – PAPERS NOT LISTED IN POINT I.2

[NP1] J. Hayden, M. Geiser, M. Gianella, R. Horvath, A. Hugi1, L. Sterczewski, M. Mangold, "Mid-Infrared Dual-Comb Spectroscopy with Quantum Cascade Lasers", *APL Photonics*, **9**, 031101 (2024), IF = 6.38.

[NP2] J. Ciazela, J. Bakala, M. Kowalinski, B. Pieterek, M. Steslicki, M. Ciazela, G. Paslawski, N. Zalewska, L. Sterczewski, Z. Szaforz, M. Jozefowicz, D. Marciniak, M. Fitt, A. Sniadkowski, M. Rataj, and T. Mrozek, "Lunar ore geology and feasibility of ore mineral detection using a far-IR spectrometer," *Frontiers in Earth Science* **11**, 1190825 (2023), IF = 1.8.

[NP3] H. Tian, R. Li, T. Endo, T. Kato, A. Asahara, L. A. Sterczewski, K. Minoshima, "Dual-comb spectroscopy using free-running mechanical sharing dual-comb fiber lasers," *Applied Physics Letters* **121**, *211104,* (2022), IF = 4.0.

[NP4] H. Tian, R. Li, L. A. Sterczewski, T. Kato, A. Asahara, K. Minoshima, "Quasi-real-time dual-comb spectroscopy with 750-MHz Yb:fiber combs," *Optics Express* **30**, 28427–28437 (2022), IF = 3.89.

[NP5] I. Vurgaftman, C. D. Merritt, C. L. Canedy, C. S. Kim, M. Kim, W. W. Bewley, L. A. Sterczewski, M. Bagheri, C. Frez, and J. R. Meyer, "Toward Robust and Practical

Interband Cascade Laser Frequency Combs: A Perspective," *Applied Physics Letters* **119**, 230503 (2021), IF = 3.79.

[NP6] L. A. Sterczewski, J. Westberg, M. Bagheri, C. Frez, I. Vurgaftman, C. L. Canedy, W. W. Bewley, C. D. Merritt, C. S. Kim, M. Kim, J. R. Meyer, and G. Wysocki, "Mid-infrared dual-comb spectroscopy with interband cascade lasers," *Optics Letters* **44**, 2113-2116 (2019), IF = 3.71.

[NP7] L. A. Sterczewski, J. Westberg, and G. Wysocki, "Computational coherent averaging for free-running dual-comb spectroscopy," *Optics Express* **27**, 23875-23893 (2019), IF = 3.67.

5. List of project, engineering and design as well as technological achievements (including the achievements not mentioned in section I.3).

—

6. List of public realizations of works of art (including the works not mentioned in section I.3).

—

7. Information on presentations given at national or international scientific or arts conferences, including a list of lectures delivered upon invitation and plenary lectures.

Invited talks at national and international conferences:

BEFORE RECEIVING A DOCTORAL DEGREE

—

AFTER RECEIVING A DOCTORAL DEGREE

1. L. A. Sterczewski, et al., "Broadband high-dynamic-range THz spectroscopy with organic nonlinear crystals (*invited*)", International Conference on Electronics, Photonics and Terahertz Technology (Optica InCEPTT 2024), New Delhi, India, December 1–4 (2024).
2. L. A. Sterczewski, "Broadband THz spectroscopy: from oscillator diagnostics to discovery of nonlinear crystals (invited)", Advanced Fiber Lasers (AFL 2024), Changsha, China, November 8–11 (2024). *Young Scientist Award.*
3. L. A. Sterczewski, and H. Tian, "Phase Noise in Free-running Dual-comb Spectroscopy" (invited)", Conference on Lasers and Electro-Optics (CLEO 2024), Charlotte, NC, USA, May 5-10 (2024).
4. L. A. Sterczewski, "Organic nonlinear crystals for long-wave infrared and terahertz spectroscopy pumped at telecommunication wavelengths (invited)", SPIE Photonics Europe, Strasburg, France, April 9 (2024).
5. L. A. Sterczewski, and M. Bagheri, "Broadband high-resolution Fourier spectrometry with chip-scale combs (invited)", IEEE RAPID (Research and Applications of Photonics in Defense) 2023, Miramar Beach, FL, USA, September 11–13 (2023), awarded Travel Grant ($2500).
6. L. A. Sterczewski, "Laser spectroscopy using semiconductor laser frequency combs (Spektroskopia laserowa wykorzystująca półprzewodnikowe grzebienie częstotliwości optycznej)", 48 Zjazd Fizyków Polskich, Gdansk, Poland, September 1–7 (2023).

7. L. A. Sterczewski et al., "Chip-scale mid-infrared spectroscopy using electrically-pumped frequency comb sources (invited)", 11th Advanced Lasers and Photon Sources Conference (ALPS2022), Yokohama, Japan, April 18–21 (2022).
8. L. A. Sterczewski, "Poszukiwanie życia w kosmosie" Gdynia Explory Week, Warsaw, October 20 (2021).
9. L. A. Sterczewski, "Frequency comb spectroscopy – making it compact and power efficient (invited)", 2021 OSA Imaging & Sensing Congresses (online), July 19–23 (2021).
10. L. A. Sterczewski et al., "Chip-scale electrically-pumped optical frequency combs (invited)", Center for Quantum Research and Technology, The University of Oklahoma, Norman, OK (online), February 23 (2021).
11. L. A. Sterczewski et al., "Interband Cascade Laser Frequency Combs", 6th International WORKshop on Infrared Technologies, Princeton, NJ, USA, October 29–30 (2019).

Regular conference presentations:

BEFORE RECEIVING A DOCTORAL DEGREE

1. L. A. Sterczewski, J. Westberg et al., "Terahertz multiheterodyne spectroscopy with quantum cascade lasers – a feasibility study," 42nd International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz), Cancun, Mexico, August 27 – September 1 (2017). (pdf)
2. L. A. Sterczewski, "Resolving terahertz spectral mixtures using the blind source separation approach – a method to study the dehydration kinetics," 2nd International Conference and Expo on Separation Techniques, Valencia, Spain, September 26–28 (2016). (pdf)
3. J. Westberg, L. A. Sterczewski, and G. Wysocki, "Mid-infrared quantum cascade laser-based multi heterodyne spectroscopy of small and large molecules in gas-phase," in FLAIR 2016 - Field Laser Applications in Industry and Research, 5th Edition of International Conference, Aix-les-Bains, France, September 12–16 (2016). (pdf)
4. L. A. Sterczewski, J. Westberg, and G. Wysocki, "Self-heterodyne Characterization of a Fabry-Pérot Quantum Cascade Laser for Multi-heterodyne Spectroscopic Sensing," Mid-Infrared Coherence Sources (OSA MICS), Long Beach, CA, USA, March 20–22 (2016). (pdf)
5. L. A. Sterczewski, and M.P. Grzelczak, "Terahertz lollipops," 10th Anniversary International SPIE Student Chapter Meeting – OPTO2015 Conference, Wroclaw, Poland, May 27–30 (2015). (3rd place in best speech contest)
6. L. A. Sterczewski and M. P. Grzelczak, "Bayesian separation algorithm of THz spectral sources applied to D-glucose monohydrate dehydration kinetics," 8th THz Days, Arêches-Beaufort, France, March 31 – April 2 (2015). (pdf)
7. L. A. Sterczewski, "Advanced SCADA system applied to terahertz time-domain spectrometer," in 12th Students' Science Conference, Bogoszow-Gorce, Poland, September 18–21 (2014). (Distinction award) (pdf)

AFTER RECEIVING A DOCTORAL DEGREE

1. L. A. Sterczewski, "Chip-based frequency combs for spectroscopic sensing at long wavelengths", 17th International Conference on Optical and Electronic Sensors COE 2024, Wroclaw, Poland, June 24 - 26 (2024). [*Best presentation award*]. (pdf)

2. L. A. Sterczewski, et al., "Multi-Octave THz Generation and Detection at MHz Repetition Rates using the Organic Nonlinear Crystal PNPA", Conference on Lasers and Electro-Optics (CLEO 2024), Charlotte, NC, USA, May 5-10 (2024). (pdf)
3. L. A. Sterczewski, and M. Bagheri, "Beyond the Linear Sweep of Frequency-Modulated Combs – Multi-Pulse Generation in Single-Section Diode Lasers ", Conference on Lasers and Electro-Optics (CLEO 2024), Charlotte, NC, USA, May 5-10 (2024). (pdf)
4. L. A. Sterczewski, "Organic nonlinear crystals for long-wave infrared and terahertz spectroscopy pumped at telecommunication wavelengths (*invited*)", SPIE Photonics Europe, Strasburg, France, April 9 (2024). (pdf)
5. L. A. Sterczewski, "Battery-operated mid-infrared frequency combs", Closing Conference of the National Laboratory for Photonics and Quantum Technologies (NLPQT) Project, Warsaw, Poland, October 19–20 (2023). (pdf)
6. L. A. Sterczewski, "THz radiation – generation, detection, and applications" (*invited tutorial*), National Laboratory for Photonics and Quantum Technologies (NLPQT) Workshop, Wroclaw, Poland, September 25 (2023). (pdf)
7. L. A. Sterczewski, J. Mnich, and J. Sotor, "Multi-Octave THz Wave Generation in PNPA crystal at MHz Repetition Rates", 16th International Conference on Mid-Infrared Optoelectronics: Materials and Devices (MIOMD 2023), Norman, Oklahoma, USA, August 6–10 (2023). (pdf)
8. L. A. Sterczewski, and M. Bagheri, "MHz-Resolution Fourier Transform Spectroscopy with Millimeter-Scale Optical Path Differences", Optica Sensing Congress (2023), Munich, Germany, July 30–August 3 (2023). (pdf)
9. L. A. Sterczewski, "Terahercowe grzebienie czestotliwosci optycznych" [in Polish], Polish Optical Conference (PKO), Torun, Poland, July 4 (2023).
10. L. A. Sterczewski, and M. Bagheri, "Breaking the Delay-Resolution Limit of Fourier Transform Spectrometers Using Chip-Scale Combs", Conference on Lasers and Electro-Optics (CLEO 2023), San Jose, CA, USA, May 7–12 (2023). (pdf)
11. L. A. Sterczewski, and J. Sotor, "Wavelength-Agile Dual-Comb Diagnostics of Pulsed Lasers", Conference on Lasers and Electro-Optics (CLEO 2023), San Jose, CA, USA, May 7–12 (2023). (pdf)
12. L. A. Sterczewski et al., "Modal leakage in interband cascade lasers diagnosed using far-field optical profilometry", 9th Workshop on Physics and Technology of Semiconductor Lasers, Krakow, Poland, October 2-6 (2022). (pdf)
13. L. A. Sterczewski et al., "Korelacja wzajemna intensywności jako nowa metoda diagnostyki laserów impulsowych" (*in Polish*), XIII Sympozjum Techniki Laserowej STL 2022, Karpacz, Poland, September 19–23 (2022). (pdf)
14. L. A. Sterczewski et al., "Szerokopasmowa spektroskopia strat we wnęce optycznej z efektem Verniera wykorzystująca międzypasmowe lasery kaskadowe" (*in Polish*), XIII Sympozjum Techniki Laserowej STL 2022, Karpacz, Poland, September 19–23 (2022). (pdf)
15. L. A. Sterczewski et al., "Chip-Based Mid-Infrared Vernier Spectroscopy (*invited*)", 2022 Optical Sensors and Sensing Congress, Vancouver, Canada, July 11–14 (2022).
16. L. A. Sterczewski et al., "Frequency modulated comb generation in quantum well laser diodes", 5th International Workshop on Opportunities and Challenges in Mid-infrared Laser-Based Gas Sensing (Mir5ens), Wroclaw, Poland, July 4–6 (2022). (pdf)
17. L. A. Sterczewski et al., "Dual-comb generation in a single laser cavity for sensing applications", Integrated Optics - Sensors, Sensing Structures and Methods (IOS'2022), Szczyrk, Poland, February 28 – March 4 (2022). (pdf)

18. L. A. Sterczewski et al., "Lateral far-field characteristics of interband cascade laser frequency combs", 27th International Semiconductor Laser Conference (ISLC), Potsdam, Germany, October 10–14 (2021). (pdf)
19. L. A. Sterczewski, "Frequency comb spectroscopy – making it compact and power efficient (*invited*)", 2021 OSA Imaging & Sensing Congresses (online), July 19–23 (2021).
20. L. A. Sterczewski et al., "Mode-resolved Cavity-enhanced Vernier Spectroscopy Using an Interband Cascade Laser Frequency Comb", Conference on Lasers and Electro-Optics (CLEO 2021), San Jose, CA, USA, May 9–14 (2021). (pdf)
21. L. A. Sterczewski et al., "Waveguiding and dispersion properties of interband cascade laser frequency combs", SPIE Photonics West (OPTO) 2021, San Francisco, CA (online), March 6–11 (2021). (pdf) (video)
22. L. A. Sterczewski et al., "Dual-Comb Spectroscopy in the 2 μm Region Using Quantum Well Diode Lasers", 14th Pacific Rim Conference on Lasers and Electro-Optics (CLEO PR 2020), Sydney, Australia (online), August 3–5 (2020). (pdf)
23. L. A. Sterczewski et al., "Quantum well laser diode frequency comb in the 2 μm region", Conference on Lasers and Electro-Optics (CLEO 2020), San Jose, CA, USA, May 11–15 (2020). (pdf)
24. L. A. Sterczewski et al., "Interband cascade laser frequency combs for spectroscopic sensing", SPIE Defense + Commercial Sensing Digital Forum, USA | 27 April – 1 May 2020. (video)
25. L. A. Sterczewski et al., "Injection locking of interband cascade laser frequency combs," Infrared Terahertz Quantum Workshop, Ojai, CA, USA, September 15–20 (2019). (pdf)
26. L. A. Sterczewski, A. Przewloka, W. Kaszub, and J. Sotor, "High-resolution dual-comb spectroscopy with a free-running all-fiber laser," Conference on Lasers and Electro-Optics (CLEO 2019), San Jose, CA, USA, May 6–10 (2019). (pdf)
27. L. A. Sterczewski, J. Westberg et al., "Dual-comb spectroscopy with passively mode-locked interband cascade laser frequency combs," Conference on Lasers and Electro-Optics (CLEO 2018), San Jose, CA, USA, May 13–18 (2018). (pdf)
28. J. Westberg, L. A. Sterczewski et al., "Terahertz dual-comb spectroscopy using quantum cascade laser frequency combs," Conference on Lasers and Electro-Optics (CLEO 2018), San Jose, CA, USA, May 13–18 (2018). (pdf)

8. Information on participation in organizational and scientific committees at national or international conferences, including the applicant's function

1. Member of the Scientific and Program Committee, 16th International Conference on Mid-Infrared Optoelectronics: Materials and Devices (MIOMD 2023) Norman, Oklahoma, USA, August 6 – 10 2023. Invitation for the 2025 edition.
2. Member of the Program Committee, Optica Sensing Congress (2023), Munich, Germany, July 30 – August 3, 2023. Invitation for the 2025 edition.

9. Information on participation in joint research projects financed through national and international competitions, including completed projects and projects in progress, and information on the function performed on the team.

BEFORE OBTAINING A DOCTORAL DEGREE

1. **DARPA (Defense Advanced Research Projects Agency)**
   Title: **"Spectral Combs from UV to THz (SCOUT)"**,

Period: 30 months (2.5 years),
Research location: Princeton, NJ, USA,
Applicant's role: **investigator in the project**
Principal investigator : Prof. Qing Hu, MIT and prof. Gerard Wysocki, Princeton USA.
Project completed.

2. **The Kosciuszko Foundation Grant for the academic year 2017/18 for research in the United States**
   Title: **"Non-destructive evaluation of pharmaceuticals degradation and counterfeit using dual-comb terahertz spectroscopy"**,
   Period: 6 months (October 2017 – March 2018),
   Research location: Princeton, NJ, USA,
   Applicant's role: **grant winner, principal, and main investigator**
   Project completed.

3. **JPL Graduate Fellowship Program (international program)**
   Title: **"Electrically pumped interband cascade optical frequency combs"**
   Period: 3 months (June 2017 – August 2017).
   Research location: NASA Jet Propulsion Laboratory, Pasadena, CA, USA,
   Applicant's role: **fellowship winner, main investigator**
   Project completed.

AFTER RECEIVING A DOCTORAL DEGREE

1. **National Science Centre (Narodowe Centrum Nauki, NCN), Sonata BIS, 2014/13/D/ST7/02143**
   Title: **"Ultraszybkie lasery ciała stałego z nasycalnych absorberami na bazie nanomateriałów"**,
   Participation period: 6 months (September 2018 – February 2019),
   Research location: Wroclaw University of Science and Technology (WUST),
   Applicant's role: **investigator**, **post-doc**
   Principal investigator: Dr. Jarosław Sotor,
   Project completed.

2. **NASA Postdoctoral Program (NPP) w ramach konkursu agencji Universities Space Research Association (USRA).**
   Title: **"Interband Cascade Optical Frequency Comb Spectroscopy of C-H bonds"**,
   Period: 2 years (February 2019 – February 2021),
   Research location: NASA Jet Propulsion Laboratory, California Institute of Technology (Caltech),
   Applicant's role: **grant winner, principal investigator** (the grant did not have a supervisor, instead the NASA scientist served as a research advisor only).
   Project completed.

3. **Marie Skłodowska-Curie Actions (Individual Fellowship, Reintegration Panel) in the Horyzont 2020 Programme.**
   Title: **"Computationally enhanced molecular sensing using optical frequency combs (CEMoS-OFC)"**,
   Period: 2 years (December 2021 – November 2023),
   Research location: Wroclaw University of Science and Technology

Applicant's role: **grant winner, principal investigator,**
Project completed.

4. **National Science Centre (Narodowe Centrum Nauki, NCN), Opus 22, 2022/45/B/ST7/03316**
   Title: **"Dual-comb technique as a tool for probing laser pulse generation dynamics (DuCT-LaserProbe) (Technika dwugrzebieniowa jako narzędzie do badania dynamiki generacji impulsów laserowych)"**
   Participation period: 2 years (January 2023 – now),
   Research location: Wroclaw University of Science and Technology
   Applicant's role: **co-investigator**,
   Principal investigator: Dr. Jarosław Sotor,
   Project in progress.

5. **National Laboratory for Photonics and Quantum Technologies (NPLQT)** financed by the European Funds under the Smart Growth Operational Programme. Infrastructure grant,
   Participation period: 2.5 years (February 2021 – November 2023),
   Research location: Wroclaw University of Science and Technology
   Applicant's role: **contractor to build 2 spectrometers**
   Principal investigator at WUST: Dr. Jarosław Sotor,
   Projekt completed.

6. **European Research Council (ERC) Starting Grant,**
   Title: **"Chip-based room-temperature terahertz frequency comb spectrometers",**
   Participation period: 1 rok (grudzień 2023 – teraz),
   Research location: Wroclaw University of Science and Technology,
   Applicant's role: **grant winner, principal investigator**,
   Project in progress.

7. **11th Polish-Taiwanese Joint Research Call by the National Centre for Research and Development the National Science and Technology Council, Taiwan, Project**
   Title: **"RaVeMuSA – Radial Velocity Measurements using Synthesizable Astrocombs",**
   („Pomiary prędkości radialnej z wykorzystaniem syntezowalnych grzebieni częstotliwości do zastosowań astronomicznych"),
   Period: The project starts in January 2025, and the contract is signed.
   Research location: Mode-Locked Technology Sp. z o. o. (private company)
   Applicant's role: **grant winner (together with Dr. Tzu-Ling Chen), PI of the Polish side.**

10. Membership in international or national organizations and scientific societies, including the functions performed by the applicant.

1. **Optica (formerly Optical Society of America, OSA)** – Early Career Member, from 2018 (2015–2018 Student Member). Co-organizer of the Optica Sensing 2023 conference in Munich, reviewer of more than 20 papers for the society and ~100 abstracts for the conference.
2. **Academia Iuvenum** – Member of the young scientists society at WUST elected in a university-wide contest. Period: 2024–2026.

11. Information on internships completed in scientific or artistic institutions, also abroad, including the place, time, and duration of the internship and its character.

2015-10-01 - 2018-03-31	**Princeton University**, NJ, USA Type: visiting graduate student / visiting researcher	During my stay at Princeton University in 2015 and 2016, I was responsible for spectroscopic experiments based on quantum cascade lasers (QCLs). In the first phase of my stay, I worked on synchronizing the operation of two independent frequency combs produced by these lasers.
2017-06-05 - 2017-08-25	**NASA Jet Propulsion Laboratory, California Institute of Technology** Type: summer intern	During my summer internship at NASA JPL, I researched group velocity dispersion in interband cascade lasers. I have shown the first experimental demonstration of phase synchronization in this type of semiconductor laser.
2019-02-25 - 2021-02-24	**NASA Jet Propulsion Laboratory, California Institute of Technology,** USA through Universities Space Research Association (USRA) Type: post-doc	During my two-year postdoctoral fellowship at NASA JPL, I studied the physics of semiconductor lasers. I focused on issues with the stability of ICL combs due to highly oscillatory intracavity dispersion. I also studied nonlinear optical phenomena in ICLs leading to the generation of the second harmonic frequency (near infrared).
2021-10-01 - 2021-02-24	**Division of Chemistry and Chemical Engineering, California Institute of Technology,** Pasadena, CA, USA Type: guest researcher	During my few-month (concurrent) research stay in the Division of Chemistry and Chemical Engineering at Caltech, I worked on the application of ICL combs to cavity-enhanced molecular spectroscopy using the Vernier mode-filtering technique.

12. Membership in editorial committees and scientific boards of journals, including the functions performed by the applicant (e.g. editor-in-chief, chairman of scientific board etc.).

—

13. Information on scientific or artistic works reviewed, in particular those published in international journals.

1. *Nature Communications*, IF = 16.60 (1 review)
2. *Light Science & Applications*, IF = 14.52, (6 reviews),
3. *Laser & Photonics Reviews*, IF = 13.18, (5 reviews),
4. *Optica*, IF = 9.78, (2 reviews),
5. *Photonics Research*, IF = 7.52, (1 review)
6. *ACS Photonics*, IF = 7.07, (4 reviews)
7. *APL Photonics*, IF = 6.38, (4 reviews),
8. *Communication Physics*, IF = 5.50, (1 review),
9. *Journal of Lightwave Technology*, IF = 4.14, (1 review),

10. *Optics Express*, IF = 3.67, (17 reviews),
11. *Applied Physics Letters*, IF = 3.59, (2 reviews),
12. *Journal of Optics and Laser Technology*, IF = 3.23, (4 reviews),
13. *Analyst*, IF = 3.86, (1 review),
14. *ACS Omega*, IF = 2.87, (2 reviews),
15. *IEEE Transactions on Terahertz Science and Technology*, IF = 3.51, (1 review),
16. *Optics Letters*, IF = 3.71, (4 reviews),
17. *Optical Materials Express*, IF = 3.07, (1 review)
18. *Journal of Infrared, Millimeter, and Terahertz Waves*, IF = 1.76, (1 review).
19. *Journal of Chemometrics*, IF = 1.79, (1 review).
20. *Photonics Technology Letters*, IF = 2.41 (1 review).
21. *Optical Fiber Technology*, IF = 2.8 (1 review)
22. *Applied Physics Letters*, IF = 3.97 (2 reviews)
23. *Scientific Reports*, IF = 4.60, (1 review)
24. *Measurement,* IF = 5.13 (1 review)
25. *Engineering Reports,* IF = 2.0 (1 review)

~60 reviews for JCR journals.

14. Information on participation in European and other international programs

List of European and international programs from item 9:

BEFORE RECEIVING A DOCTORAL DEGREE

1. Participation in the American DARPA SCOUT program,
2. Participation in the American JPL Graduate Fellowship program, **fellowship winner**

AFTER RECEIVING A DOCTORAL DEGREE

3. Participation and management in the NASA Postdoctoral Program financed by the Universities Space Research Association (USRA), **grant winner**
4. Participation and management in the European Marie Skłodowska-Curie Actions Program (Reintegration Panel, **grant winner**),
5. Participation and management in the European Research Council Starting Grant program, **grant winner**
6. Participation and management in the Polish-Taiwanese Call by the National Center for Research and Development and the National Science and Technology Council, Taiwan, **grant winner**

15. Information on participation in research teams realizing projects other than those defined in section II.9.

1. „Młoda Kadra" grant („Young staff" grant), „High-resolution laser spectroscopy using free-running femtosecond fiber lasers (Wysokorozdzielcza spektroskopia laserowa z wykorzystaniem niestabilizowanych impulsowych laserów światłowodowych)". Nr. 0402/0157/18, 31.12.2018 – 31.10.2019, Amount ~5000 USD. Role: principal and main investigator.

16. Information on membership in the teams assessing applications for financing of research projects, applications for scientific awards, applications in other competitions of scientific or didactic character.

1. Reviewer (Member of the selection committee) for the XXXI-th Adam Smoliński Competition for the best diploma thesis in optoelectronics,
2. Nominee for the 2024 Foundation for Polish Science (FNP) Prize,
3. Reviewer for the Swiss National Science Foundation, SPARK Program (4 reviews),
4. Panelist and reviewer for the NASA SIMPLEX (Small Satellite Concept) selection program for space research funding (1 review),
5. Reviewer for the European Science Foundation, Bilateral Scientific Cooperation China (NSFC) (1 review),
6. Reviewer for Agence Nationale de la Recherche (France), AAPG 2024 program (1 review).

III. INFORMATION ON COOPERATION WITH SOCIAL AND ECONOMIC ENVIRONMENT

1. Technology achievements.

—

2. Collaboration with industry.

- Joint development of a new type of pyroelectric photodetectors for light detection in the visible to far infrared range with a company: Laser Components Germany GmbH, Gewerbegebiet III, Werner-von-Siemens-Straße 15, 82140 Olching, Germany.

- Joint development and characterization of a new type of infrared ceramic emitters for Fourier spectroscopy in the mid- and far-infrared range at room temperature with Infrasolid GmbH, Gostritzer Str. 61, 01217 Dresden, Germany.

Collaboration with the above partners has resulted in two conference abstracts (Photonics West 2024 and CLEO 2024 in the US):

- J. Kunsch, S. Baliga, M. Budden, T. Gebert, L. Sterczewski, M. Schossig, T. Olsen, J. Mnich, J. Sotor, "Uncooled IR and THz detection based on thin $LiTaO_3$ pyroelectric detectors paves the way for growth in infrared spectroscopy", Paper 12893-30, SPIE Photonics West 2024. (https://dx.doi.org/10.1117/12.3000861)
- J. Mnich, M. Suster, J. Kunsch, M. Budden, T. Gebert, M. Schossig, J. Sotor, and Ł. A. Sterczewski, "Room-Temperature Fourier Transform Spectrometer Covering the Spectral Range from 2 to 30 μm and Beyond", presented as an oral talk at CLEO 2024 in Charlotte, NC, USA, paper AF3I.1.

This collaboration has resulted in a peer-reviewed journal publication, where the applicant serves as the senior author and principal investigator

1. J. Mnich, J. Kunsch, M. Budden, T. Gebert, M. Schossig, J. Sotor, and L. A. Sterczewski, "Ultra-broadband room-temperature Fourier transform spectrometer with watt-level power consumption", *Optics Express* **32**, pp. 45801-45815 (2024) https://doi.org/10.1364/OE.541395

3. Industrial and intellectual property rights including national and international patents.

Development of a digital phase correction technique for dual-comb spectroscopy:

- L. A. Sterczewski, J. Westberg, and G. Wysocki, "Fast computational phase and timing correction for multiheterodyne spectroscopy," US Patent 11,015,975 (2021), International Patent Application, WO 2018/213286 A1 (2018).
- L. A. Sterczewski, J. Westberg, and G. Wysocki, "Fast computational phase and timing correction for multiheterodyne spectroscopy," US Patent 11,499,867 (2022).

Development of a Fourier spectroscopy technique with sub-nominal resolution for chip-sized optical frequency combs, where detection of envelope-carrier (CEO) frequencies is practically impossible.

- US provisional patent application (Caltech): M. Bagheri, L. A. Sterczewski, "Chip-Based Fourier Transform Spectrometry with Comb-Enhanced Resolution", CIT-8906-P2, date: 25/10/2022.

4. Implemented technologies.

—

5. Performed expert analyses or other studies prepared on request of public institutions or entrepreneurs

—

6. Participation in expert teams and selection committees for competitions

—

7. Artistic projects realized in a non-artistic environment

—

IV. SCIENTOMETRIC INFORMATION

1. Impact Factor (in the fields and disciplines in which this parameter is commonly used as a scientometric index).

Cumulative **Impact Factor**: **158.89**.

2. Number of citations of the applicant's publications, with and without self-citations

Scholar: **997** (https://scholar.google.pl/citations?user=KVk213kAAAAJ)

Scopus: **772**

Scopus excluding self-citations: **567**

3. Hirsch Index.

15

4. Number of points awarded by the Ministry of Science and Higher Education

2880 points since the year 2019 (average of 137.14 points per publication).

375 points until the year 2019 according to a different evaluation scheme (31.25 points per publication).

Signed by Łukasz Antoni Sterczewski (Qualified certificate) on 2024-12-17.

.....

(Applicant's signature)