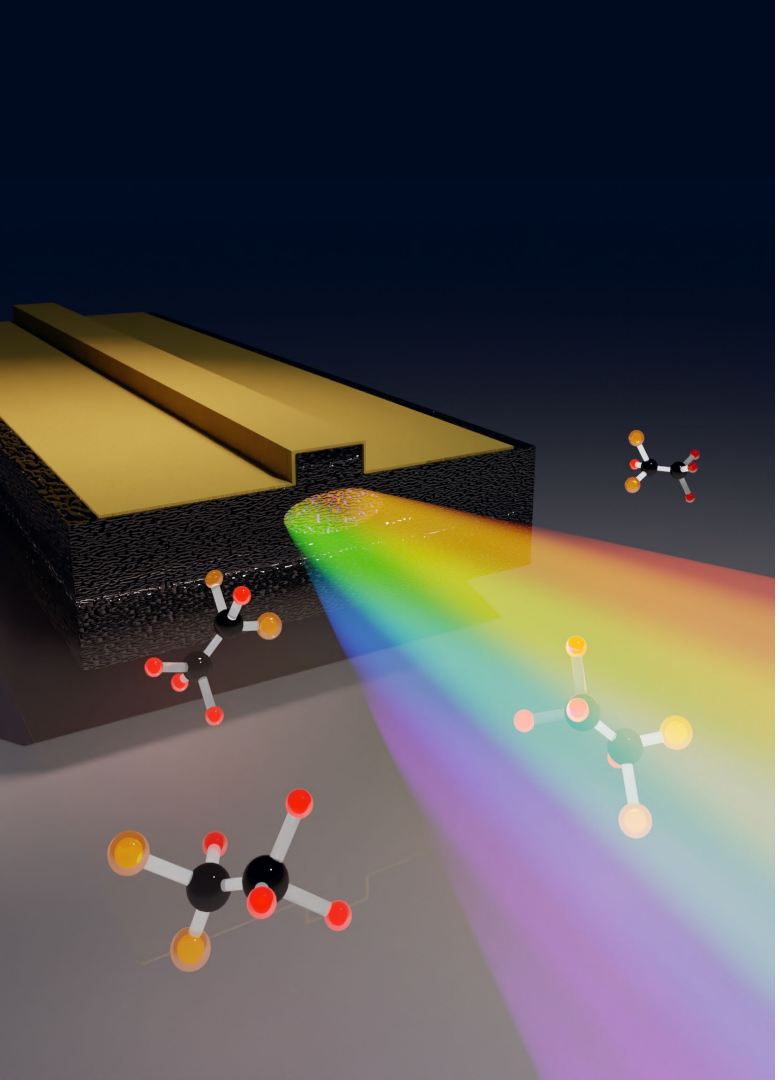


ERC Starting Grantee Testimonial

The Physical Sciences and Engineering Panel

Łukasz A. Sterczewski

Faculty of Electronics, Photonics, and Microsystems
Wroclaw University of Science and Technology
ul. Wybrzeże Stanisława Wyspiańskiego 27, 50-370 Wrocław

15 July 2025

New chapter

European Research Council

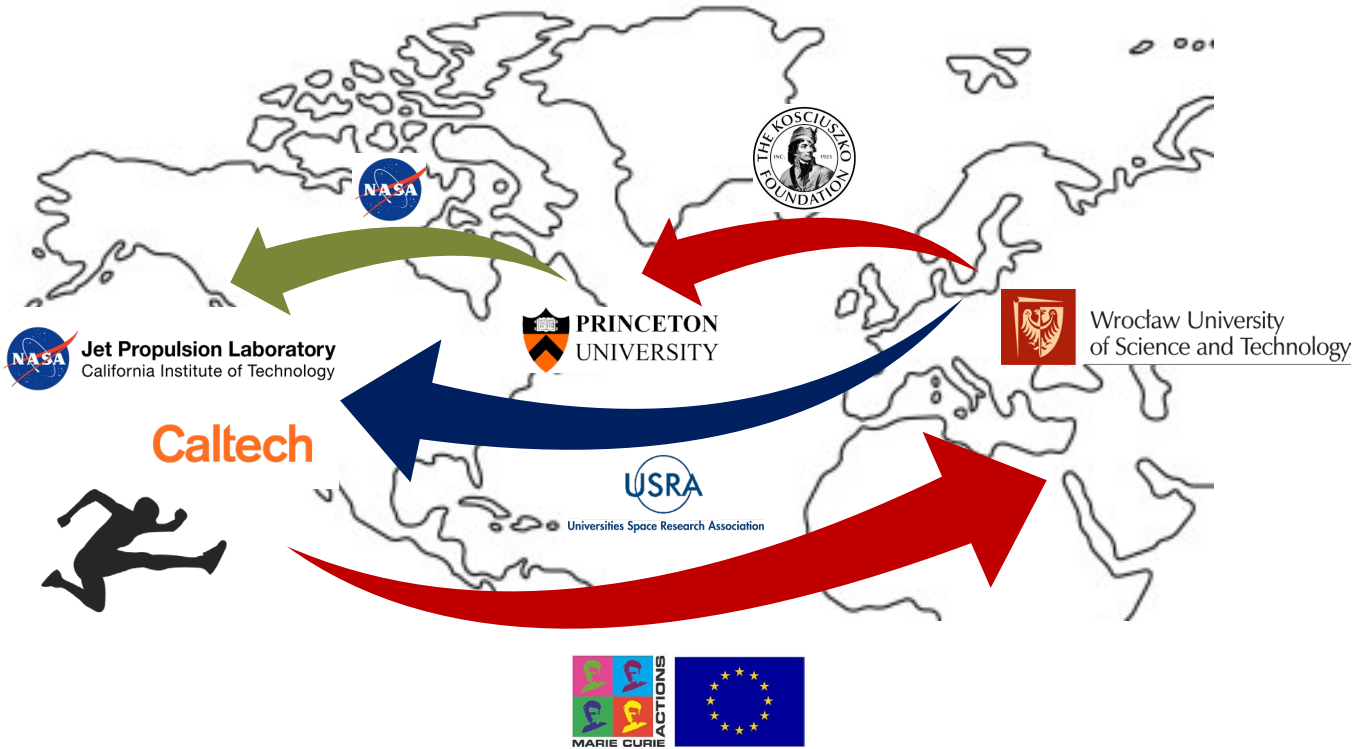
Established by the European Commission

TeraERC

Chip-based room-temperature terahertz frequency comb spectrometers (1 500 000 EUR).

Career planning

My career path (2015 – 2021)



I did it my way…

How to write an ERC proposal?

Pro tip: Start with the presentation. Try do put everything on 5 slides!
Also: find your mentor and participate in online ERC workshops

And then…

Ref. Ares(2023)3007906 - 28/04/2023

European Research Council
Executive Agency

Established by the European Commission

Brussels, 28 April 2023
Ares(2023)2737152

Lukasz STERCZEWSKI
WYBRZEZE WYSPIANSKIEGO 27
50-370 WROCLAW
Poland

Subject: Additional information on the interview

Dear Professor STERCZEWSKI,

As announced in our previous communication, please find below additional information regarding your interview.

Applicant name	Lukasz STERCZEWSKI
Applicant address	WYBRZEZE WYSPIANSKIEGO 27 50-370 WROCLAW Poland
Evaluation panel	PE7
Interview date	22 June 2023
Interview slot	11:30 - 12:50 Brussels time

Annex I: Specific requests from Panel PE7

Interview format and any other panel specific comments about your interview:

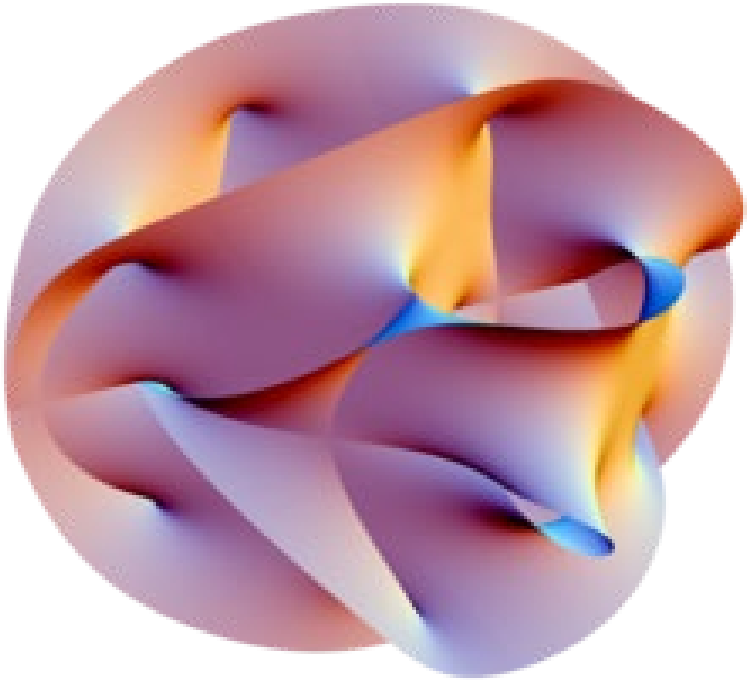
The panel will ask you to make a **5 minute presentation** of your proposal, followed by **20 minutes of questions and answers**.

These time limits will have to be strictly followed.

TOTAL INTERVIEW DURATION (Project Presentation + Q&A)	**25 minutes**
PROJECT PRESENTATION DURATION	**5 minutes**
QUESTIONS & ANSWERS DURATION	**20 minutes**

Multidimensional problem – preparing the presentation

- Short introduction
- Why important?
- Where is the breakthrough?
- What am I bringing as novelty?



Distilling information

Short introduction

Why important?

Where is the breakthrough?

What am I bringing as novelty?

Why me? Why now? Why Poland?

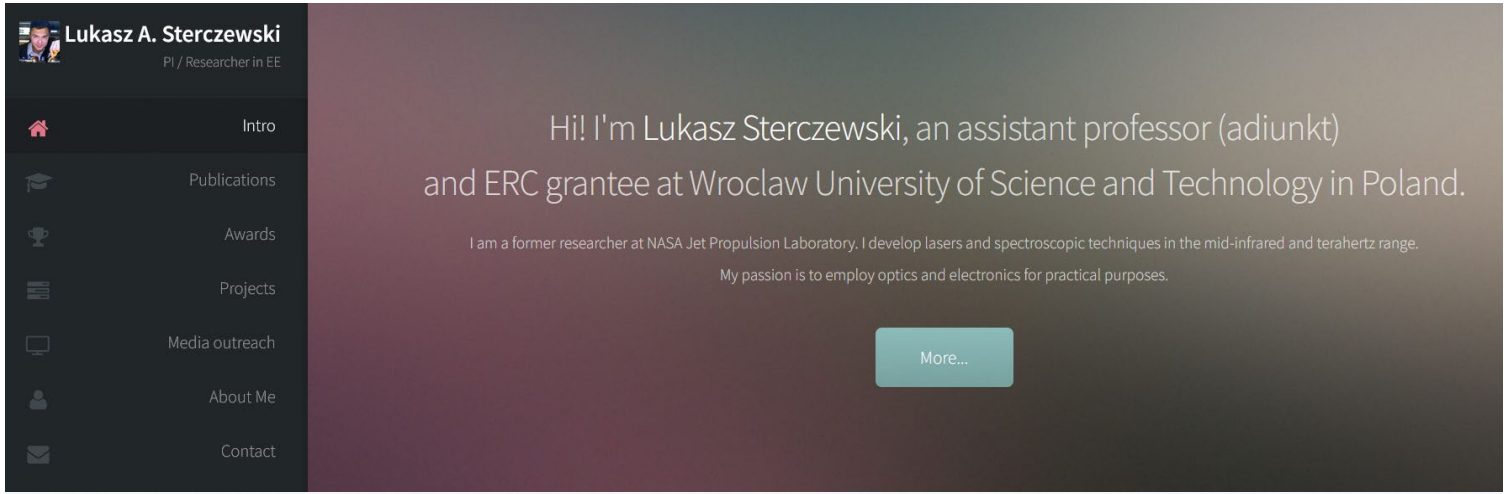
Style trick

Reference to literature

« *L'essentiel est invisible pour les yeux* »
[*What is essential is invisible to the eye*]

- The Little Prince, Antoine de Saint-Exupéry

Own brand – work on your website

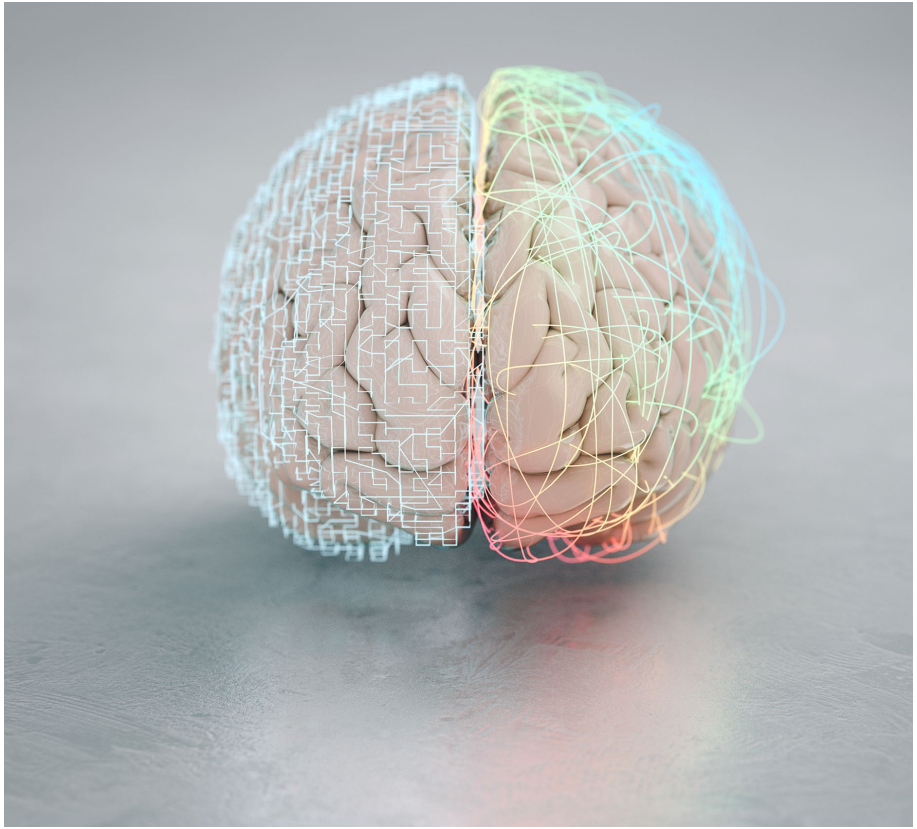


Publications

43. R. Li, H. Tian, Y. Liu, D. Dong, L. Sterczewski, and W. Zhou, "High-precision absolute distance measurement by cascaded synthetic wavelength interferometry using a single electro-optic frequency comb", *In Review* (2025).
42. H. Tian, and L. A. Sterczewski, "Impact of optical frequency comb noise on free-running dual-comb spectroscopy", *Optics Express* **33**, 5075-5087 (2025). (pdf) (supplementary) (OPG) (</> dataset)
41. T-L. Chen; C. Markus, D. Ober, L. Sterczewski, Y-J. Huang, M. Lisano, C. Canedy, I. Vurgaftman, C. Frez, J. Meyer, M. Bagheri, and M. Okumura, "Direct Frequency Comb Cavity Ring-Down Spectroscopy using Vernier Filtering", *Journal of Physical Chemistry A* **129**, 1452–1458 (2025). (pdf) (ACS) (supplementary)
40. 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**, 45801-45815 (2024). (pdf) (OPG) (arXiv) (</> dataset)

It is not enough! It is the idea that counts!

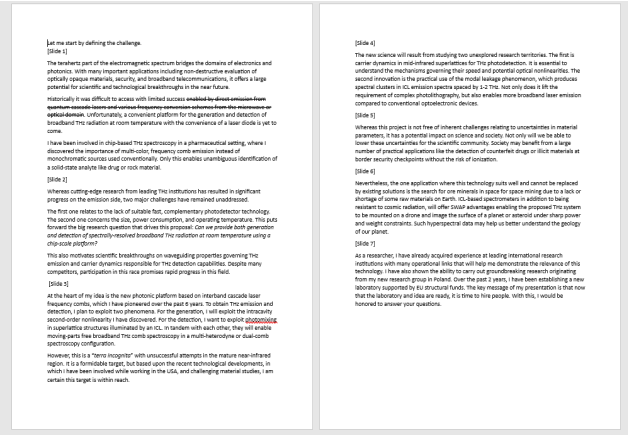
Humility and professionalism



Hints

- Modesty
- Invite an aggressive panelist
- Roast (grill) as a form of training
- Time! Short answers to more questions.

Practice, practice, practice…



Let me start by defining the challenge.
[Slide 1]

The terahertz part of the electromagnetic spectrum bridges the domains of electronics and photonics. With many important applications including non-destructive evaluation of optically opaque materials, security, and broadband telecommunications, it offers a large potential for scientific and technological breakthroughs in the near future.

Historically it was difficult to access with limited success ~~enabled by direct emission from quantum cascade lasers and various frequency conversion schemes from the microwave or optical domain~~. Unfortunately, a convenient platform for the generation and detection of broadband THz radiation at room temperature with the convenience of a laser diode is yet to come.

I have been involved in chip-based THz spectroscopy in a pharmaceutical setting, where I discovered the importance of multi-color, frequency comb emission instead of monochromatic sources used conventionally. Only this enables unambiguous identification of a solid-state analyte like drug or rock material.

[Slide 2]

Whereas cutting-edge research from leading THz institutions has resulted in significant progress on the emission side, two major challenges have remained unaddressed.

The first one relates to the lack of suitable fast, complementary photodetector technology. The second one concerns the size, power consumption, and operating temperature. This puts forward the big research question that drives this proposal: *Can we provide both generation and detection of spectrally-resolved broadband THz radiation at room temperature using a chip-scale platform?*

This also motivates scientific breakthroughs on waveguiding properties governing THz emission and carrier dynamics responsible for THz detection capabilities. Despite many competitors, participation in this race promises rapid progress in this field.

[Slide 5]

At the heart of my idea is the new photonic platform based on interband cascade laser frequency combs, which I have pioneered over the past 6 years. To obtain THz emission and detection, I plan to exploit two phenomena. For the generation, I will exploit the intracavity second-order nonlinearity I have discovered. For the detection, I want to exploit photomixing in superlattice structures illuminated by an ICL. In tandem with each other, they will enable moving-parts free broadband THz comb spectroscopy in a multi-heterodyne or dual-comb spectroscopy configuration.

However, this is a *"terra incognita"* with unsuccessful attempts in the mature near-infrared region. It is a formidable target, but based upon the recent technological developments, in which I have been involved while working in the UGA, and challenging material studies, I am certain this target is within reach.

[Slide 4]

The new science will result from studying two unexplored research territories. The first is carrier dynamics in mid-infrared superlattices for THz photodetection. It is essential to understand the mechanisms governing their speed and potential optical nonlinearities. The second innovation is the practical use of the modal leakage phenomenon, which produces spectral clusters in ICL emission spectra spaced by 1-2 THz. Not only does it lift the requirement of complex photolithography, but also enables more broadband laser emission compared to conventional optoelectronic devices.

[Slide 5]

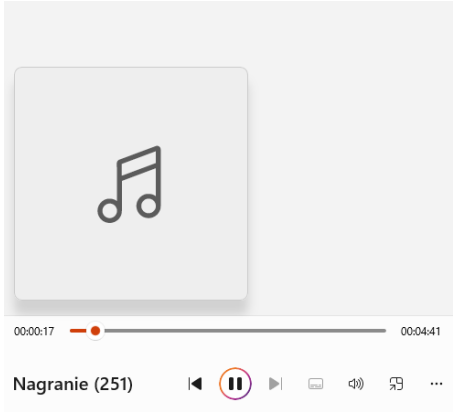
Whereas this project is not free of inherent challenges relating to uncertainties in material parameters, it has a potential impact on science and society. Not only will we be able to lower these uncertainties for the scientific community. Society may benefit from a large number of practical applications like the detection of counterfeit drugs or illicit materials at border security checkpoints without the risk of ionization.

[Slide 6]

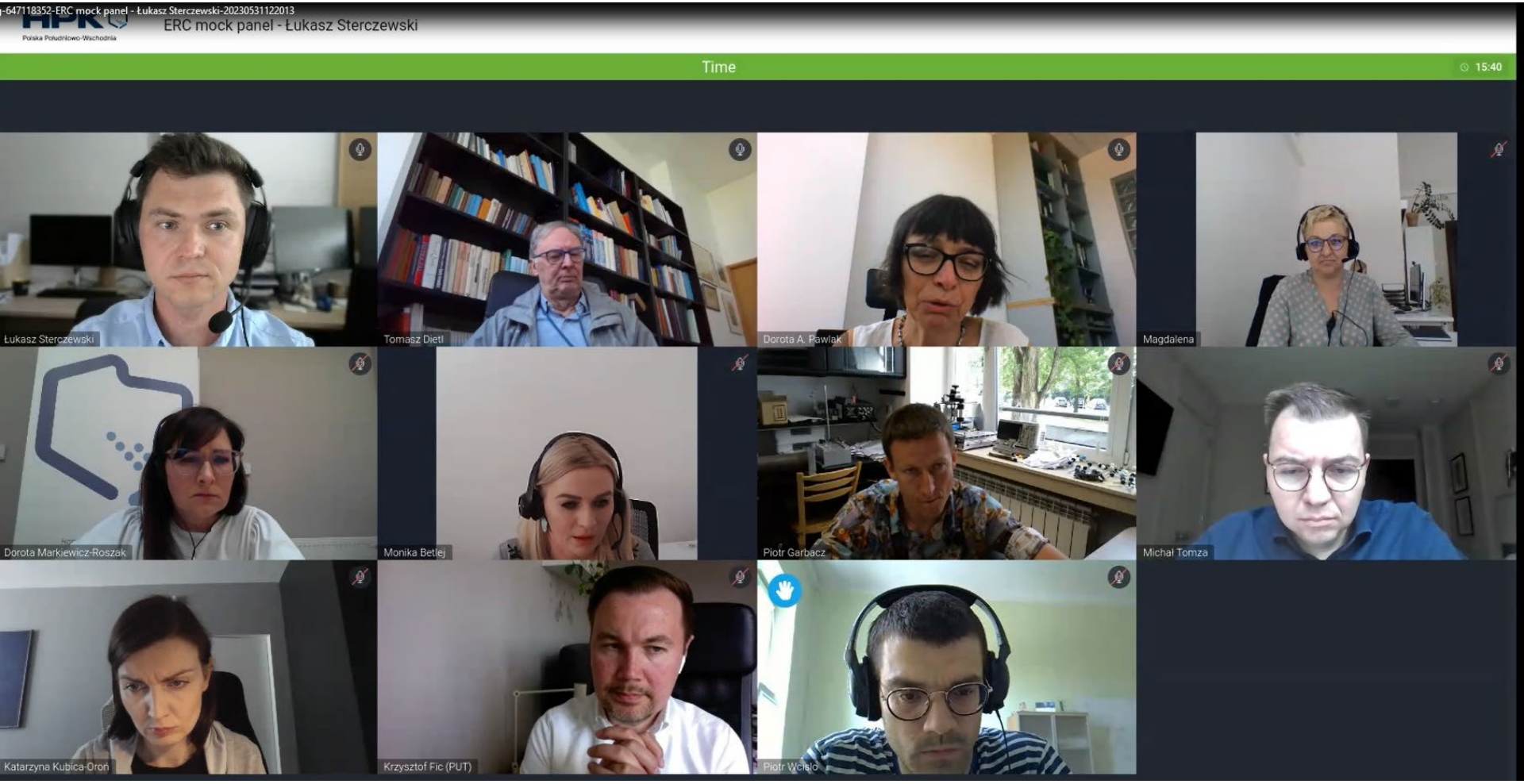
Nevertheless, the one application where this technology suits well and cannot be replaced by existing solutions is the search for ore minerals in space for space mining due to a lack or shortage of some raw materials on Earth. ICL-based spectrometers in addition to being resistant to cosmic radiation, will offer SWAP advantages enabling the proposed THz system to be mounted on a drone and image the surface of a planet or asteroid under sharp power and weight constraints. Such hyperspectral data may help us better understand the geology of our planet.

[Slide 7]

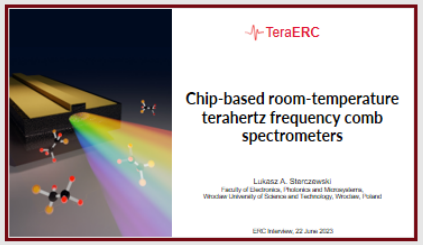
As a researcher, I have already acquired experience at leading international research institutions with many operational links that will help me demonstrate the relevance of this technology. I have also shown the ability to carry out groundbreaking research originating from my new research group in Poland. Over the past 3 years, I have been establishing a new laboratory supported by EU structural funds. The key message of my presentation is that now that the laboratory and idea are ready, it is time to hire people. With this, I would be honored to answer your questions.



Please wait…


-647118352-ERC mock panel - Łukasz Sterczewski-20230531122013
Polska Południowo-Wschodnia
ERC mock panel - Łukasz Sterczewski
Time
15:40
Łukasz Sterczewski
Tomasz Dietl
Dorota A. Pawlak
Magdalena
Dorota Markiewicz-Roszak
Monika Betlej
Piotr Garbacz
Michał Tomza
Katarzyna Kubica-Oroń
Krzysztof Fic (PUT)
Piotr Wcisło

Version 1 – 5 minutes?



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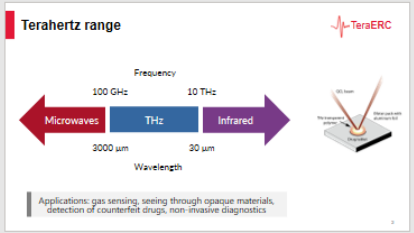

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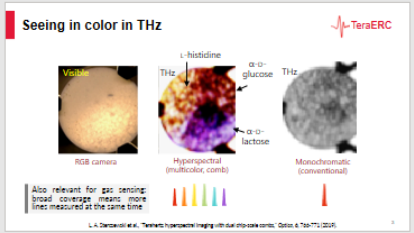

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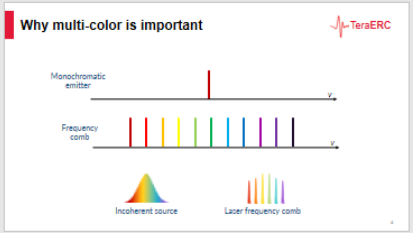

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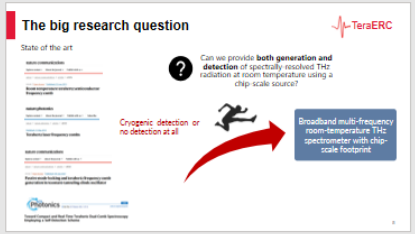

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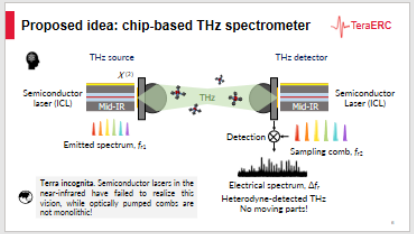

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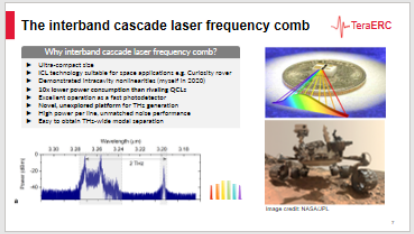

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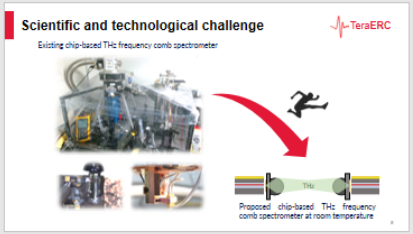

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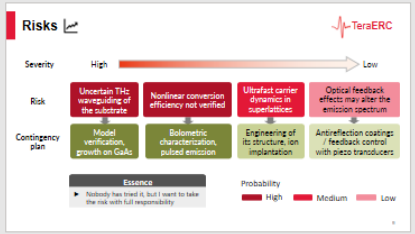

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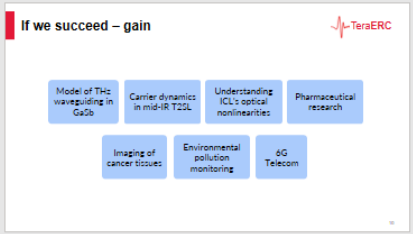

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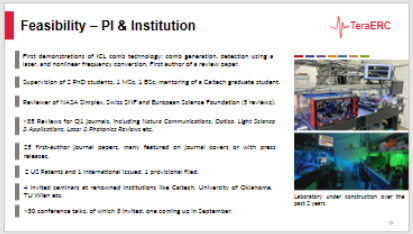

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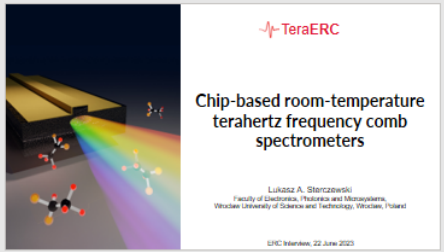
Final version



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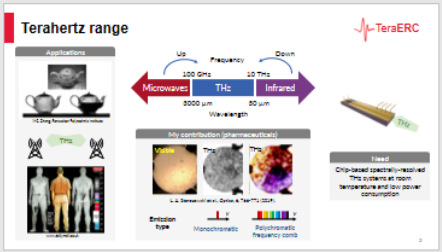

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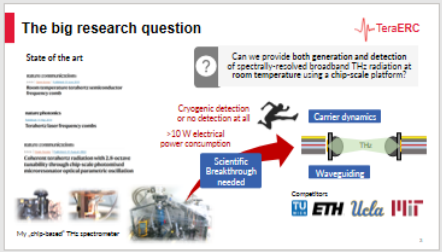

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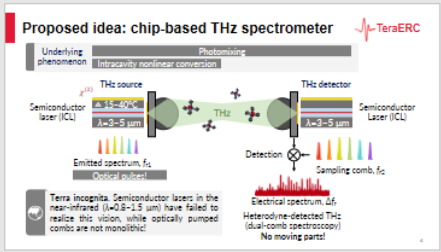

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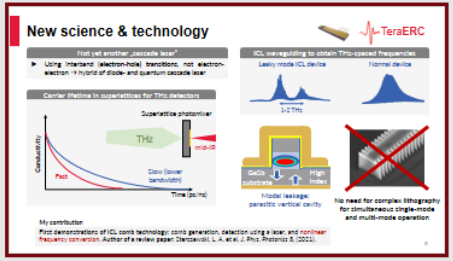

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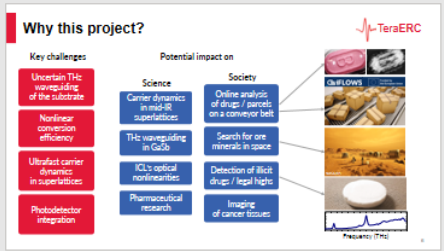

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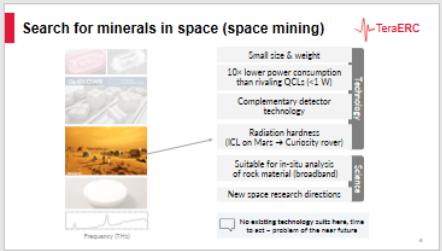

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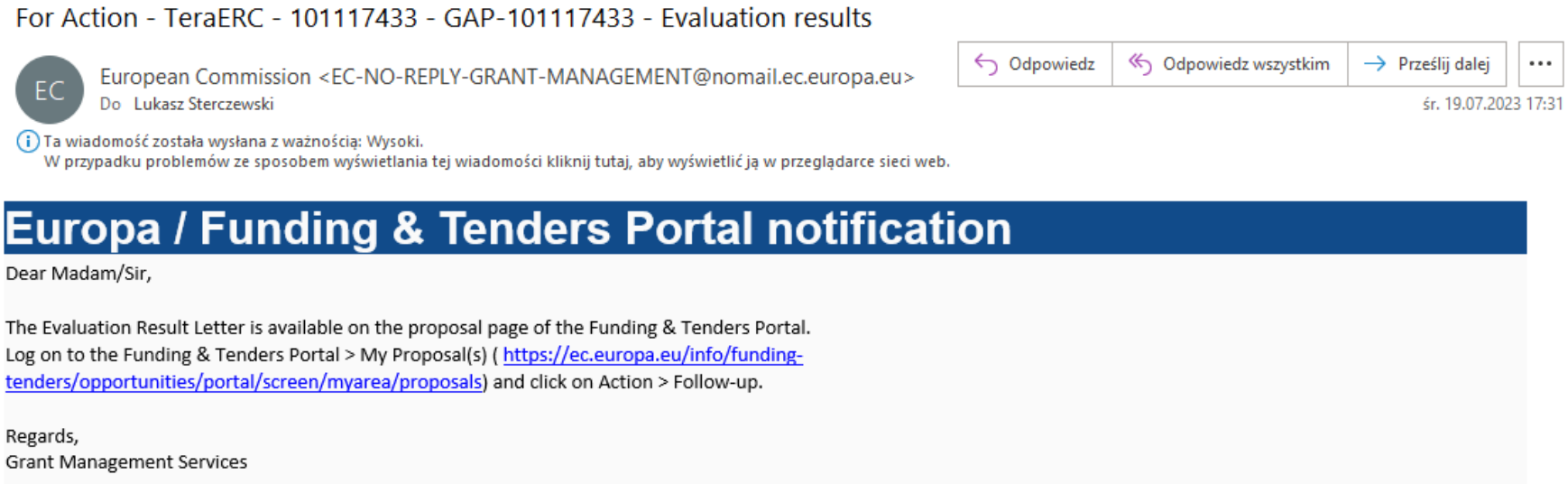
If we succeed



For Action - TeraERC - 101117433 - GAP-101117433 - Evaluation results

EC European Commission <EC-NO-REPLY-GRANT-MANAGEMENT@nomail.ec.europa.eu>
Do Lukasz Sterczewski

Odpowiedz | Odpowiedz wszystkim | Prześlij dalej | ...

śr. 19.07.2023 17:31

Ta wiadomość została wysłana z ważnością: Wysoki.
W przypadku problemów ze sposobem wyświetlania tej wiadomości kliknij tutaj, aby wyświetlić ją w przeglądarce sieci web.

Europa / Funding & Tenders Portal notification

Dear Madam/Sir,

The Evaluation Result Letter is available on the proposal page of the Funding & Tenders Portal.
Log on to the Funding & Tenders Portal > My Proposal(s) (https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/myarea/proposals) and click on Action > Follow-up.

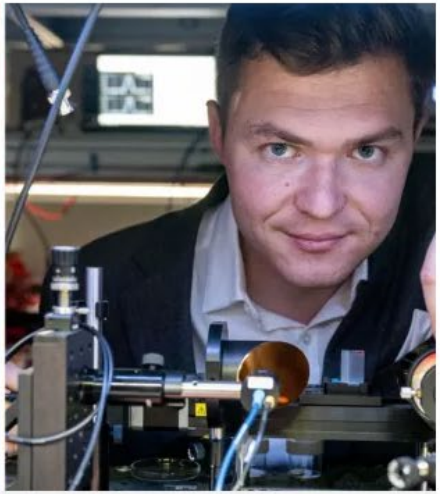
Regards,
Grant Management Services

Log in to find out the evaluation results…

Summary

- Brilliant idea and clear objectives. „Easy reading results from good writing”
- Support from national contact points and local university
- Let others criticize your idea
- Contribute actively to the community. Build your reputation.

NAJNOWSZE ARTYKUŁY

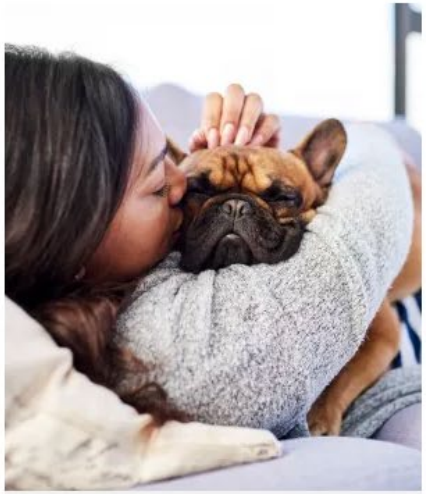



NAUKA 06.09.2023

Prestiżowe granty dla polskich inżynierów. Dostaną 3 mln euro na supernowoczesne badania

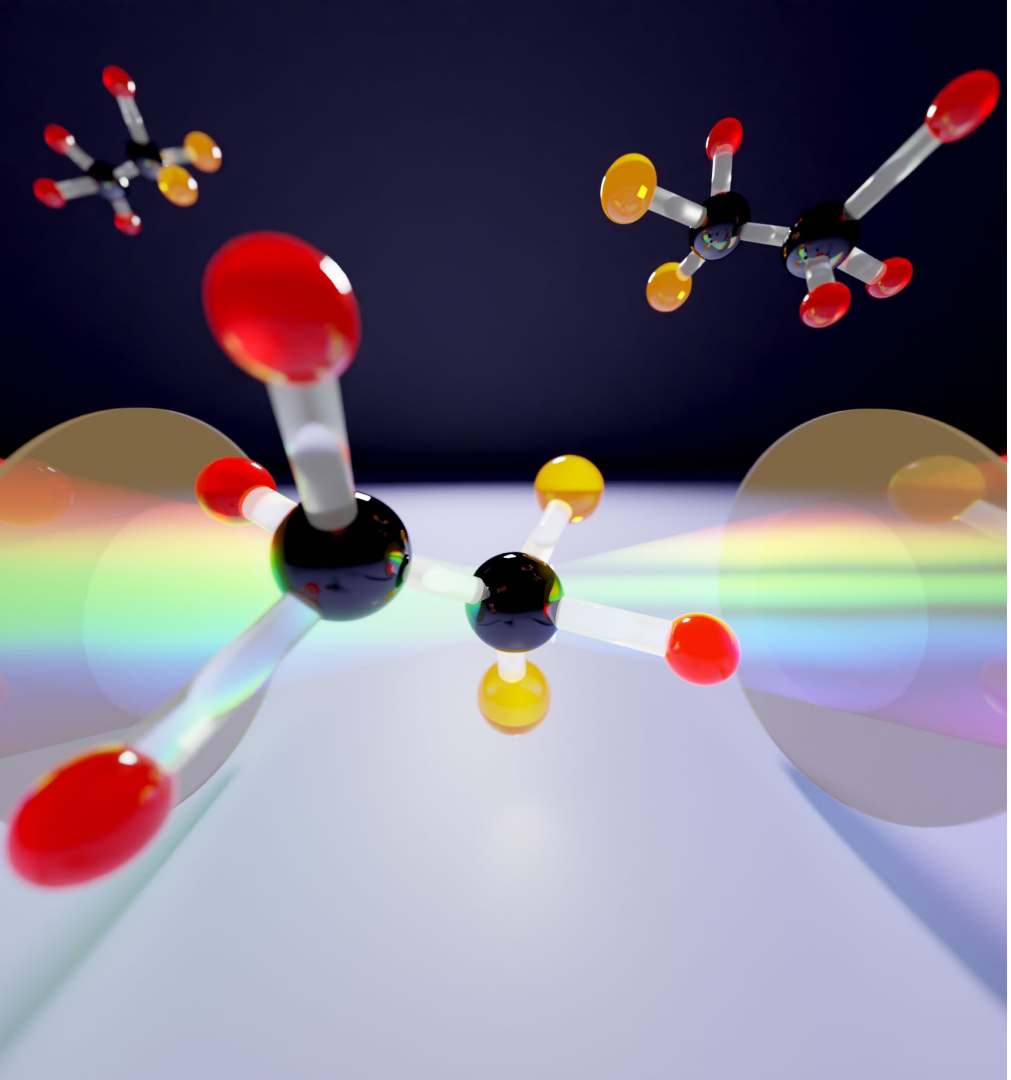
HISTORIA 06.09.2023

Znalezione, nie kradzione. Jakie skarby udało się odnaleźć po II wojnie światowej?



NAUKA 05.09.2023

Lubisz całować swojego zwierzaka? Uważaj, to może być niebezpieczne



Politechnika Wrocławska

lukasz.sterczewski@pwr.edu.pl
teraerc.eu