

Curriculum vitae

PERSONAL INFORMATION

Christopher Gerekos



📍 Avenue Albert, 211, 1190 Brussels, Belgium

☎ (+32) 485 65 23 75

✉ christopher.gerekos@alumni.unitn.it

🌐 christophergerekos.eu

Sex Male | Date of birth 15/01/1993 | Nationality Belgian, Greek

PREVIOUS POSITIONS

06/2021–Present

Postdoctoral researcher

University of Texas at Austin, Austin (United States)

01/2021–05/2021

Consultant / Project manager

SpaceTec Partners, Brussels (Belgium)

- I am conducting market strategy and innovation studies for institutional actors such as the European Commission or the North Atlantic Treaty Organisation on topics related to space.
- I am also project manager for the GOVSATCOM communication strategy implementation. GOVSATCOM (temporary name) is a project for a secure space-based communication system making use of telecommunication satellites in low Earth or geostationary orbit, and forms one of the components of the new EU Secure Connectivity Initiative to deploy a LEO constellation to provide global broadband internet.

01/2019–05/2019

Visiting PhD

University of Texas at Austin, Austin (United States)

I participated in science activities related to the Europa Clipper/REASON instrument, which included a study of the Europa roughness and its impact on radar backscattering. I was also part of the Science Data System (SDS) team in charge of creating and maintaining the scientific data processing codes of REASON. In particular, I helped the SDS improve their algorithms on high-precision radar altimetry with radar backscattering simulation tools I had previously developed.

11/2016–04/2020

PhD candidate

Università degli Studi di Trento, Trento (Italy)

My PhD work revolved around the definition, design, implementation and validation of acquisition strategies and data analysis methodologies for the Radar for Icy Moon Exploration (RIME) in the framework of the Jupiter Icy Moons Explorer (JUICE).

Main activities:

- Developed an efficient backscattering simulator for radar sounders taking into account complex subsurface structures. The simulator was later adapted to also simulate passive sounding.
- Built a model of the antenna pattern, position perturbation impact, and orbital configuration for an orbital radar sounder made of many smallsats in formation flying.
- Member of the RIME scientific team.
- Participated in the writing of the STRATUS (Satellite Radar Sounder for Earth Subsurface Sensing) proposal for ESA's 10th Earth Explorer call for missions.
- Analysed and interpreted data collected from ASI's P-band radar sounder during its 2018 Moroccan desert acquisition campaign.
- Wrote several papers published in international peer-reviewed journals, as well as conference proceedings.
- Reviewer for IEEE Transactions on Geoscience and Remote Sensing and IEEE Access.

Curriculum vitae

02/2015–04/2015

Research intern

European Space Agency, Noordwijk (the Netherlands)

I derived an analytical result in general relativity which could be applied to GNSS with inter-satellite links, such next-generation Galileo, to increase positioning/timing accuracy.

PROJECTS

REASON (Radar for Europa Assessment and Sounding: Ocean to Near-surface)

Instrument for NASA's flagship mission to the Jupiter system Europa Clipper. Part of Science Data System (SDS) and Science Verification and Validation (SVV) task forces. Europa Clipper postdoctoral affiliate.

RIME (Radar for Icy Moons Exploration)

Instrument for ESA's L-class mission JUICE (Jupiter Icy Moons Explorer).

P-band Radar

Helicopter-borne radar sounder developed by CORISTA (*Consorzio di Ricerca su Sistemi di Telesensori Avanzati*) and ASI (*Azienda Spaziale Italiana*). Contributed to: clutter simulations in preparation of the 2018 Moroccan desert acquisition campaign, subsequent data analysis and interpretation, preparation of documents.

STRATUS (Satellite Radar Sounder for Earth Subsurface Sensing)

Proposed mission concept for ESA's 10th "Earth Explorers" call for missions (rejected). Contributed to scientific literature, proposal writing, preparation of documents.

SRS (Subsurface Radar Sounder)

Instrument for the proposed EnVision spacecraft to Venus, ESA M5 mission.

PUBLICATIONS

My publication list, provided below, can also be consulted on my [personal website](#), my [ORCID](#) (0000-0003-1526-1249), or my [Google Scholar](#) profile.

Scientific journals

- **C. Gerekos**, M. Haynes, "The phase response of a rough finite square facet in the linear phase approximation", *in preparation*, 2021.
- E. Donini, F. Bovolo, **C. Gerekos**, L. Carrer, L. Bruzzone, "An Unsupervised Fuzzy System for the Automatic Detection of Lava Tubes in Radar Sounder Data", *IEEE Transactions on Geoscience and Remote Sensing*, *in press*, 2021 (DOI: [10.1109/TGRS.2021.3062753](#)).
- **C. Gerekos**, C. Grima, G. Steinbrügge, S. Thakur, K. M. Scanlan, D. A. Young, L. Bruzzone, D. D. Blankenship, "Martian roughness analogues of European terrains and implications on radar backscatter", *Icarus* 358, 114197, 2021 (DOI: [10.1016/j.icarus.2020.114197](#)).
- **C. Gerekos**, L. Bruzzone, M. Imai, "A coherent method for simulating active and passive radar sounding of the Jovian icy moons", *IEEE Transactions on Geoscience and Remote Sensing*, *in press*, 2019 (DOI: [10.1109/TGRS.2019.2945079](#)).
- S. Perna, G. Alberti, P. Berardino, L. Bruzzone, D. Califano, I. Catapano, L. Ciofaniello, E. Donini, C. Esposito, C. Facchinetti, R. Formaro, G. Gennarelli, **C. Gerekos**, R. Lanari, F. Longo, G. Ludeno, M. M. d'Alessandro, A. Natale, C. Noviello, G. Palmese, C. Papa, G. Pica, F. Rocca, G. Salzillo, F. Soldovieri, S. Tebaldini, S. Thakur, "The ASI P-band helicopter-borne integrated sounder-SAR system: preliminary results of the 2018 Morocco desert campaign", *MDPI Remote Sensing*, 11(16), 1845, 2019 (DOI: [10.3390/rs11161845](#)).
- L. Carrer, **C. Gerekos**, F. Bovolo, L. Bruzzone, "Distributed radar sounder: a novel concept for subsurface investigations using sensors in formation flight", *IEEE Transactions on Geoscience and Remote Sensing*, vol. 57, no. 12, pp. 9791-9809, 2019 (DOI: [10.1109/TGRS.2019.2929422](#)).
- **C. Gerekos**, A. Tamponi, L. Carrer, D. Castelletti, M. Santoni, L. Bruzzone, "A coherent multilayer simulator of radargrams acquired by radar sounder instruments", *IEEE Transactions on Geoscience and Remote Sensing*, vol. 56, no. 12, pp. 7388-7404, 2018 (DOI: [10.1109/TGRS.2018.2851020](#)).
- L. Carrer, **C. Gerekos**, L. Bruzzone, "A multi-frequency radar sounder for lava tubes detection on the moon: design, performance assessment and simulations", *Planetary and Space Science* 152C (2018) pp. 1-17 (DOI: [10.1016/j.pss.2018.01.011pdf](#)).

Conferences

- L. Bruzzone, F. Bovolo, S. Thakur, L. Carrer, E. Donini, **C. Gerekos**, S. Paterna, M. Santoni, E. Sbalchiero, "EnVision mission to Venus: Subsurface Radar Sounding", *International Geoscience and Remote Sensing Symposium* (pp. 5960-5963), September 2020, Waikoloa, USA.
- C. Grima, **C. Gerekos**, K. M. Scanlan, G. Steinbrügge, D. A. Young, S. D. Kempf, D. D. Blankenship, "Mars as an analog to anticipate radar surface reflectivity at Europa", *51st Lunar and Planetary Science Conference* (No. 2326, p. 1471), March 2020, The Woodlands, USA.
- **C. Gerekos**, C. Grima, G. Steinbrügge, K. M. Scanlan, D. A. Young, L. Bruzzone, D. D. Blankenship, "Comparing the multifractal properties of European and Martian surfaces" *European Planetary Science Congress - Division for Planetary Sciences Joint Meeting 2019*, September 2019, Geneva, Switzerland.
- S. Perna, G. Alberti, P. Berardino, L. Bruzzone, D. Califano, I. Catapano, L. Ciofaniello, E. Donini, C. Esposito, C. Facchinetti, R. Formaro, G. Gennarelli, **C. Gerekos**, R. Lanari, F. Longo, G. Ludeno, M. M. d'Alessandro, A. Natale, C. Noviello, G. Palmese, C. Papa, G. Pica, F. Rocca, G. Salzillo, F. Soldovieri, S. Tebaldini, S. Thakur, "The ASI P-band helicopter-borne integrated sounder-SAR system: preliminary results of the 2018 Morocco desert campaign", *International Geoscience and Remote Sensing Symposium 2019* (pp. 8550-8553), July-August 2019, Yokohama, Japan.
- **C. Gerekos**, L. Bruzzone, "Radar sounding of Jovian icy moons: a simulation approach to active and passive sounding scenarios", *European Planetary Science Congress Vol.12*, September 2018, Berlin, Germany.
- **C. Gerekos**, A. Tamponi, L. Carrer, D. Castelletti, M. Santoni, L. Bruzzone, "A new technique for simulating radar echoes from layered subsurface targets", *International Geoscience and Remote Sensing Symposium 2018* (pp. 459-462), July 2018, Valencia, Spain.
- L. Carrer, **C. Gerekos**, L. Bruzzone, "Distributed radar sounder system: a novel approach to across-track resolution enhancement and clutter reduction" *International Geoscience and Remote Sensing Symposium 2018* (pp. 6765-6768), July 2018, Valencia, Spain.
- E. Donini, F. Bovolo, **C. Gerekos**, L. Carrer, L. Bruzzone, "An approach to lava tube detection in radar sounder data from the Moon", *International Geoscience and Remote Sensing Symposium 2018* (pp. 8424-8427), July 2018, Valencia, Spain.
- L. Carrer, **C. Gerekos**, L. Bruzzone, Detection of lunar lava tubes with orbiting radar sounder systems, *European Planetary Science Congress Vol. 11*, September 2017, Riga, Latvia.
- **C. Gerekos**, A. Heffernan, "The time transfer and Synge world functions in relativistic global navigation satellite systems", *Relativistic Geodesy 2016 conference*, March 2016, Bad Honnef, Germany.
- **C. Gerekos**, A. Heffernan, "The time transfer function in RPS", *593rd WE-Heraeus Seminar on Autonomous Spacecraft Navigation*, June 2015, Bad Honnef, Germany.

Seminars

- **C. Gerekos**, "Multilayer coherent simulator of radar echoes", Jet Propulsion Laboratory, on invitation of Mark Haynes (March 2019, Pasadena, USA).
- **C. Gerekos**, "Advanced radar backscattering simulation methods and applications to the future Jovian sounders", University of Texas Institute for Geophysics, on invitation of Cyril Grima (November 2019, Austin, USA).

EDUCATION

11/2016–04/2020

Doctor in Information and Communication Technology

Università degli Studi di Trento, Trento (Italy)

- Thesis: "Advanced backscattering simulation methods for the design of spaceborne radar sounders".
 - Advisor: Prof. Lorenzo Bruzzone.
- Obtained *con lode* (highest possible grade).

09/2014–08/2016

Master's degree in Physics

Université Libre de Bruxelles, Brussels (Belgium)

- Subjects: Quantum field theory, general relativity, statistical physics, astrophysics, fluid dynamics,

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signal theory, optical engineering, non-linear physics, instrumentation techniques.

- Thesis: "Investigating the impact of beta-stabilisation in JET hybrid plasmas through non-linear gyrokinetic simulations".
- Advisors: Profs. Sara Moradi and Bernard Knaepen.

Obtained *avec Distinction*.

09/2010–08/2013 **Bachelor's degree in Physics**

Université Libre de Bruxelles, Brussels (Belgium)

- Subjects in physics: classical mechanics, classical electromagnetics, thermodynamics, special relativity, quantum mechanics, solid-state physics, atomic and nuclear physics, particle physics.
- Subjects in mathematics: calculus, algebra, statistics, group theory, PDE theory.
- Laboratory training: general physics, nuclear physics, particle physics, optics.

Obtained *avec Distinction*.

06/2010 **High school diploma**

Athénée Robert Catteau, Brussels (Belgium)

PERSONAL SKILLS

Mother tongue(s) French, Greek

Foreign language(s)

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C2	C2	C2	C2	C2
Italian	B1	B2	A2	A2	A2
Dutch	A1	A2	A1	A1	A1

Levels: A1 and A2: Basic user - B1 and B2: Independent user - C1 and C2: Proficient user
Common European Framework of Reference for Languages

- Digital skills
- **Programming languages:** Python, Mathematica, Matlab, FORTRAN 90/95, IDL.
 - **Shells:** Bash, Command prompt.
 - **Publishing:** Latex, HTML/CSS.
 - **Others:** Xfdd, ANSYS, DesignSpark PCB, Arduino (C++).

ADDITIONAL INFORMATION

Hobbies

I enjoy tinkering with electronics, music, and hiking. During most of my time at the University of Brussels, I worked on high-voltage and/or electronics projects in my spare time. This gave me valuable hands-on experience with printed circuit board design, electronics, and electrical parts selection. I have documented these projects on a website¹, which I continue to maintain. One of my devices, a large Tesla coil, was acquired by the Physics museum of the University of Brussels in 2012². I have taken private lessons of piano for two years, before moving to Italy. In Trento, my main hobbies having been hiking, cycling, and indoor climbing.

¹<http://hazardousphysics.christophgerekos.eu>

²<http://www.experimentarium.be/?p=237>