

Nicholas Protonotarios

Research Scientist · Researcher Grade C (Assistant Professor level)

Mathematics Research Center (MaRC), Academy of Athens

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Research profile

His research focuses on applied mathematics, computational science and artificial intelligence in biomedical imaging, with particular emphasis on tomography, Radon-type inverse problems, regularisation and mathematical reconstruction methods for PET, SPECT, CT and MRI.

Education

2019 PhD in Applied Mathematics, School of Applied Mathematical and Physical Sciences, NTUA

2013 Postgraduate degree in Engineering Economics, School of Electrical and Computer Engineering, NTUA

2004 Diploma in Naval Architecture and Marine Engineering, NTUA

Research appointments

2024–present Research Scientist (Researcher Grade C / Assistant Professor level) — Mathematics Research Center (MaRC), Academy of Athens

2024 Postdoctoral researcher — NCSR “Demokritos”

2021–2023 Research Associate (postdoctoral researcher) — Department of Applied Mathematics and Theoretical Physics, University of Cambridge

2020–2021 Postdoctoral researcher — Mathematics Research Center, Academy of Athens

2019–2024 Scientific Associate — Department of Informatics and Telematics, Harokopio University of Athens

2015–2024 Research Associate — University of Piraeus Research Centre

2014–2019 Doctoral researcher — Mathematics Research Center, Academy of Athens

2012–2013 Scientific Associate — Computer Technology Institute and Press “Diophantus”

2005–2024 Scientific Associate — Institute of Communication and Computer Systems, NTUA

Professional experience

2004–present Naval architect and marine engineer (independent consultant)

2006–2024 3NA Naval Architects & Marine Engineers — founding member

Teaching experience

2022–present NTUA, MSc Translational Engineering in Health and Medicine (TEAM): Engineering for Biomedicine – Computational Thinking; Medical Imaging and Image Analysis – Mathematics of Medical Image Reconstruction.

2015–2017 NTUA, MSc Ship and Marine Technology: Special Topics in Applied Mathematics & Symbolic Languages in Problems of Mathematical Physics.

Doctoral student committees

2026 Sotirios Messinis — member of examining committee, NTUA. Thesis: A multi-agent distributed learning framework for the optimization of privacy and resilience in federated systems.

2025 Alexandros Vrachliotis — member of advisory committee, University of Patras. Thesis: Evaluation of an analytical image reconstruction algorithm in dynamic small animal PET.

Scientific publications — 20 journal articles

[J20] N. Temenos, S. Messinis, B. Hernández, I.K. Rallis, D. Kalogeras, A. Temenos, A. Doulamis, N. Doulamis and N.E. Protonotarios. A process-informed state-aware machine learning methodology for stringer machine energy estimation in PV manufacturing environment, *Energy AI* 26: 100943 (2026).

[J19] N.E. Protonotarios, S. Messinis, G.A. Kastis, N. Dikaios and A.S. Fokas. From the Radon transform to deep learning in medical image reconstruction, *Mathematics* 14(19): 3501 (2026).

- [J18] N. Dikaïos, G.A. Kastis and N.E. Protonotarios. Brain-inspired learning and the dynamic interplay between neuroscience and computer science, *IT Prof.* 28(1): 20–25 (2026).
- [J17] S. Messinis, I. Rallis, N. Temenos, D. Kalogeras, G.A. Kastis, N. Doulamis and N.E. Protonotarios. Quantum neural networks meet federated learning for DNA mutation prediction. *Comput. Struct. Biotechnol. J.* 30: 122–133 (2025).
- [J16] S. Messinis, O. El Marai, N.E. Protonotarios, T. Taleb and N. Doulamis. Roads digital twin: Predictive situational awareness using 360° video streaming and graph neural networks. *IEEE Trans. Veh. Technol.* 74(4): 5558–5571 (2025).
- [J15] N.E. Protonotarios, N. Dikaïos, D. Kaponis and A. Charalambopoulos. Augmented total variation regularization in Radon-type inverse problems. *Stud. Appl. Math.* 154(4): e70053 (2025).
- [J14] A.M. Ganai, E.I. Vrettos, S.G. Kyrkou, V. Zoi, T.K. Pathan, R. Karpoormath, P. Bouziotis, G.A. Alexiou, G.A. Kastis, N.E. Protonotarios and A.G. Tzakos. Design principles and applications of fluorescent kinase inhibitors for simultaneous cancer bioimaging and therapy. *Cancers* 16(21): 3667 (2024).
- [J13] S. Messinis, N.E. Protonotarios and N. Doulamis. Differentially private client selection and resource allocation in federated learning for medical applications using graph neural networks. *Sensors* 24(16): 5142 (2024).
- [J12] A. Vrachliotis, A. Gaitanis, N.E. Protonotarios, G.A. Kastis and L. Costaridou. Noninvasive quantification of glucose metabolism in mice myocardium using the spline reconstruction technique. *J. Imaging* 10(7): 170 (2024).
- [J11] S. Messinis, N. Temenos, N.E. Protonotarios, I. Rallis, D. Kalogeras and N. Doulamis. Enhancing Internet of Medical Things security with AI: A comprehensive review. *Comput. Biol. Med.* 170: 108036 (2024).
- [J10] V. Marinakis, A.S. Fokas, G.A. Kastis and N.E. Protonotarios. Chebyshev interpolation using almost equally spaced points and applications in emission tomography. *Mathematics* 11(23): 4757 (2023).
- [J9] N.E. Protonotarios, G.A. Kastis, A.D. Fotopoulos, A.G. Tzakos, D. Vlachos and N. Dikaïos. Motion-compensated PET image reconstruction via separable parabolic surrogates. *Mathematics* 11(1): 55 (2023).
- [J8] N.E. Protonotarios, A.S. Fokas, G.A. Kastis and N. Dikaïos. Sigmoid and beyond: Algebraic activation functions for artificial neural networks based on solutions of a Riccati equation. *IT Prof.* 24(5): 30–36 (2022).
- [J7] N.E. Protonotarios, A.S. Fokas, A. Vrachliotis, V. Marinakis and G.A. Kastis. Reconstruction of preclinical PET images via Chebyshev polynomial approximation of the sinogram. *Appl. Sci.* 12(7): 3335 (2022).
- [J6] N.E. Protonotarios, I. Katsamenis, S. Sykiotis, N. Dikaïos, G.A. Kastis, S.N. Chatziioannou, M. Metaxas, N. Doulamis and A. Doulamis. A few-shot U-Net deep learning model for lung cancer lesion segmentation via PET-CT imaging. *Biomed. Phys. Eng. Express* 8(2): 025019 (2022).
- [J5] A. Vrachliotis, G.A. Kastis, N.E. Protonotarios, A.S. Fokas, S.G. Nekolla, C.D. Anagnostopoulos, L. Costaridou and A. Gaitanis. Evaluation of the spline reconstruction technique for preclinical PET imaging. *Comput. Methods Programs Biomed.* 217: 106668 (2022).
- [J4] N.E. Protonotarios, E. Tzabazidou, G.A. Kastis and N. Dikaïos. Discrete shearlets as a sparsifying transform in low-rank plus sparse decomposition for undersampled (k, t)-space MR data. *J. Imaging* 8(2): 29 (2022).
- [J3] N. Dikaïos, N.E. Protonotarios, A.S. Fokas and G.A. Kastis. Quantification of T1, T2 relaxation times from Magnetic Resonance Fingerprinting radially undersampled data using analytical transformations. *Magn. Reson. Imaging* 80: 81–89 (2021).
- [J2] N.E. Protonotarios, A.S. Fokas, K. Kostarelos and G.A. Kastis. The attenuated spline reconstruction technique for single photon emission computed tomography. *J. R. Soc. Interface* 15(148): 20180509 (2018).
- [J1] N.E. Protonotarios, G. Spyrou and G.A. Kastis. Automatic cumulative sums contour detection of FBP-reconstructed multi-object nuclear medicine images. *Comput. Biol. Med.* 85: 43–52 (2017).

Book chapters — 3

- [B3] N.E. Protonotarios, V. Marinakis, N. Dikaïos and G.A. Kastis. Chebyshev polynomials of the first kind and applications in tomography. *Mathematical Analysis, Differential Equations and Applications, Series on Computers and Operations Research: Vol. 10*, World Scientific (2024).
- [B2] N.E. Protonotarios, G.A. Kastis, N. Dikaïos and A.S. Fokas. Piecewise polynomial inversion of the Radon transform in three space dimensions via plane integration and applications in positron emission tomography. *Nonlinear Analysis, Differential Equations, and Applications, Springer Optimization and Its Applications* 173: 381–396. Springer (2021).
- [B1] N.E. Protonotarios, G.A. Kastis and A.S. Fokas. A new approach for the inversion of the attenuated Radon transform. *Mathematical Analysis and Applications, Springer Optimization and Its Applications* 154: 433–457, Springer (2019).

Conference papers — 9

- [C9] S. Messinis, N.E. Protonotarios, I. Rallis, D. Kalogeras and N. Doulamis. Enhancing federated graph learning with adaptive differential privacy. *IEEE 45th International Conference on Distributed Computing Systems Workshops (ICDCSW)*, Glasgow, UK, 536–542 (2025).

- [C8] S. Messinis, N.E. Protonotarios, D. Kalogeras and N. Doulamis. Threshold multiparty private set intersection via federated graph neural networks. *Cybersecurity*, Praça, I., Bernardi, S., Inácio, P.R. (eds). EICC 2025, CentraleSupélec/Inria, Rennes, France. Communications in Computer and Information Science, 2500, 356–371, Springer (2025).
- [C7] S. Messinis, N.E. Protonotarios, E. Arapidis and N. Doulamis. Client Selection and Resource Allocation via Graph Neural Networks for Efficient Federated Learning in Healthcare Environments. *PETRA '24: Proceedings of the 17th International Conference on Pervasive Technologies Related to Assistive Environments*, Crete, Greece, 606–612 (2024).
- [C6] S. Taylor, M.J. Jaatun, K. Bernsmed, C. Androutsos, A. Castillo, D. Frey, S. Favrin, J. Rodrigues, D. Milojević, D.S. Karras, I. Siachos, P. Gedeon, G. Epiphaniou, N. Moukafih, C. Maple, S. Messinis, I. Rallis, N.E. Protonotarios, N. Matragkas and R. Delong. A Way Forward for the MDCG 2019-16 Medical Device Security Guidance. *PETRA '24: Proceedings of the 17th International Conference on Pervasive Technologies Related to Assistive Environments*, Crete, Greece, 593–599 (2024).
- [C5] S. Messinis, N.E. Protonotarios, I. Tzortzis, I. Rallis, D. Kalogeras and N. Doulamis. Lightweight machine learning for privacy-preserving and secure networked medical devices: The SEPTON project use cases. *PETRA '23: Proceedings of the 16th International Conference on Pervasive Technologies Related to Assistive Environments*, Corfu, Greece, 638–644 (2023).
- [C4] N.E. Protonotarios, K. Kalimeris and G.A. Kastis. Fokas on medical imaging: Analytic reconstructions for emission tomography. *Chaos, Fractals and Complexity*, Bountis, T., Vallianatos, F., Provata, A., Kugiumtzis, D., Kominis, Y. (eds). COSA-Net 2022. Springer Proceedings in Complexity, 169–187, Springer (2023).
- [C3] N.E. Protonotarios, A. Charalambopoulos, G.A. Kastis, K. Kacperski and A.S. Fokas. A spline approach to parallel-hole collimator deblurring for aSRT-reconstructed SPECT images. *2019 IEEE 19th International Conference on Bioinformatics and Bioengineering (BIBE)*, Athens, Greece, 326–333 (2019).
- [C2] N.E. Protonotarios, A.S. Fokas, A. Gaitanis and G.A. Kastis. aSRT: A new analytic reconstruction algorithm for SPECT. *2016 IEEE Nuclear Science Symposium, Medical Imaging Conference and Room-Temperature Semiconductor Detector Workshop (NSS/MIC/RTSD)*, Strasbourg, France, 1–6 (2016).
- [C1] N.E. Protonotarios, G.M. Spyrou and G.A. Kastis. Cumulative sums for edge determination of a single object in PET and SPECT images. *5th International Conference on Mathematical Modeling in Physical Sciences (IC-M2)*, Athens, Greece. *J. Phys.: Conf. Ser.* 738(15): 012010 (2016).

Conference abstracts — 14

- [A14] A. Bougea, K. Margari, E. Tamvakopoulou, S. Golemati and N.E. Protonotarios. AI-driven approaches to medical image analysis in Parkinson's disease: From mathematical models to deep learning architectures. *37th National Conference of the Hellenic Neurological Society*, Kalamata, Greece (2026).
- [A13] G.A. Kastis, N.E. Protonotarios, P. Bouziotis and A. Vrachliotis. A spline-based method for noninvasive quantification of glucose metabolism in mice: A comparative study. *1st International Workshop on the Development of Innovative Theranostic Platforms for Glioblastoma Diagnosis and Treatment (Theranostic4GLIO)*, Ioannina, Greece (2025).
- [A12] N.E. Protonotarios, G.A. Kastis. PET image reconstructions via Chebyshev interpolation. *1st International Workshop on the Development of Innovative Theranostic Platforms for Glioblastoma Diagnosis and Treatment (Theranostic4GLIO)*, Ioannina, Greece (2025).
- [A11] N.E. Protonotarios, C.-B. Schönlieb, N. Dikaio and A. Charalambopoulos. Augmented total variation regularization in imaging inverse problems. *Applied Inverse Problems (AIP2023)*, Göttingen, Germany (2023).
- [A10] N.E. Protonotarios, S. Thalasselis and G.A. Kastis. SPECT imaging via spline-based inversion of the attenuated Radon transform. *Chemical Biology Workshop, Drug & Biomarker Discovery*, Athens, Greece (2023).
- [A9] N.E. Protonotarios. Introduction to the mathematics of medical image reconstruction. *29th Summer School "Dynamical Systems and Complexity"*, NCSR Demokritos, Athens, Greece (2023).
- [A8] N.E. Protonotarios, A.S. Fokas and G.A. Kastis. Attenuated spline reconstruction technique for nuclear emission tomography. *AUEB Statistics Seminar Series 2017-18*, Athens, Greece (2017).
- [A7] N.E. Protonotarios, G. Spyrou and G.A. Kastis. Cumulative sums for masking in nuclear medicine image reconstruction. *Conference on Biomedical Instrumentation and related Engineering and Physical Sciences (BIOMEPE 2017)*, Athens, Greece (2017).
- [A6] N.E. Protonotarios, A.S. Fokas and G.A. Kastis. Attenuated spline reconstruction technique for SPECT/CT. *9th Conference of the Eastern Mediterranean Region of the International Biometrics Society (EMR-IBS)*, Thessaloniki, Greece (2017).
- [A5] N.E. Protonotarios, A.S. Fokas, A. Gaitanis and G.A. Kastis. Inversion of the attenuated Radon transform using cubic splines. *1st European Congress of Medical Physics (ECMP)*, Athens, Greece (2016).
- [A4] N.E. Protonotarios, A.S. Fokas and G.A. Kastis. Attenuated Radon transform inversion through piecewise polynomial interpolation of SPECT/CT data. *5th International Conference on Mathematical Modeling in Physical Sciences (IC-MSquare)*, Athens, Greece (2016).
- [A3] A.S. Fokas, G.A. Kastis and N.E. Protonotarios. Analytic reconstructions for PET, SPECT, MEG and EEG. *Applied Inverse Problems (AIP2015)*, Helsinki, Finland (2015).

- [A2] N. Papaoulakis, N.E. Protonotarios, C. Androulaki and C.Z. Patrikakis. Socially Aware, collaboRative, scAlable Coding mEdia distribution (SARACEN). IEEE Global Communications Conference (GLOBECOM) (2012).
- [A1] P.D. Kaklis, A.I. Ginnis and N.E. Protonotarios. Quantifying the shape effect of a planar control point. 6th Dagstuhl Seminar on Geometric Modelling, Dagstuhl IBFI, Wadern, Germany (2005).

Theses

- [T3] N.E. Protonotarios. The Radon transform, its generalizations and applications in PET and SPECT. PhD thesis, Department of Mathematics, NTUA (2019).
- [T2] N.E. Protonotarios. A new reputation-based incentive mechanism for media streaming over peerto-peer architectures: The SARACEN case. Master's thesis, School of Electrical and Computer Engineering, NTUA (2012).
- [T1] N.E. Protonotarios. Quantifying the shape effect of a moving control point. Bachelor's thesis, School of Naval Architecture and Marine Engineering, NTUA (2005).

Research projects — Principal Investigator

- [R1] Statistical analysis in medical imaging. National Development Program (NDP) 2021-25. ΟΠΣ 5223471, PI: Dr. N.E. Protonotarios, MaRC, Academy of Athens (2024-2025).

Research projects — Scientific Associate (39)

- [P39] NexMPI. Magnetic Particle Imaging for next-generation theranostics and medical research. COST ACTION CA23132 (2024-2027).
- [P38] CIRCMan5.0. Circular manufacturing 5.0: Human-centred AI-aided digital framework for closed-loop photovoltaic (PV) products value chains. HORIZON-CL4-2024-TWIN-TRANSITION- 01 (2024-2027).
- [P37] Radiogenomic analysis diagnostic and therapeutic potential of cancer. National Development Program (NDP) 2021-25. ΟΠΣ 5223471 (2024-2025).
- [P36] Applications of AI in medicine and biotechnology. National Development Program (NDP) 2021-25. ΟΠΣ 5223471 (2024-2025).
- [P35] Development and validation of reconstruction algorithms in magnetic particle imaging (MPI). National Development Program (NDP) 2024-25. ΟΠΣ 5223471 (2024-2025).
- [P34] SmartCHANGE. AI-based long-term health risk evaluation for driving behaviour change strategies in children and youth. HORIZON-HLTH-2022-STAYHLTH-01 (2023- 2027).
- [P33] AIMS5.0. Artificial intelligence in manufacturing leading to sustainability and industry 5.0. HORIZON-KDT-JU-2022-1-IA (2023-2026).
- [P32] EECONE. European ecosystem for green electronics. HORIZON-KDT-JU-2022-2 (2023-2026).
- [P31] EdgeAI. Edge AI technologies for optimised performance embedded processing. HORIZON-KDT- JU-2021-2 (2022-2025).
- [P30] SEPTON. Security protection tools for networked medical devices. HORIZON-HLTH-2022-IND- 13-01 (2022-2025).
- [P29] STAR. Safe and trusted human centric artificial intelligence in future manufacturing lines. H2020- ICT-2018-20 (2021-2023).
- [P28] DataPorts. A data platform for the connection of cognitive ports. H2020-ICT-2018-20 (2020-2023).
- [P27] ACCORDION. Adaptive edge/cloud compute and network continuum over a heterogeneous sparse edge infrastructure to support nextgen applications. H2020-ICT-2018-20 (2020-2022).
- [P26] Pledger. Performance optimization and edge computing orchestration for enhanced experience and quality of service. H2020-ICT-2018-20 (2019-2022).
- [P25] AFarCloud. Enabling farmers with agriculture intelligent systems. H2020-ECSEL-2017-2 (2019-2021).
- [P24] 5G-MOBIX. 5G for cooperative & connected automated mobility on X-border corridors. H2020- ICT-2018-20 (2018-2022).
- [P23] SerIoT. Secure and safe Internet of Things. H2020-IOT-2016-2017 (2018-2021).
- [P22] BigDataStack. High-performance data-centric stack for big data applications and operations. H2020-ICT-2016-2017 (2018-2020).
- [P21] SAFE STRIP. Safe and green sensor technologies for self-explaining and forgiving road interactive applications. H2020-MG-2016-2017 (2017-2020).
- [P20] DITAS. Data-intensive applications improvement by moving data and computation in mixed cloud/fog environments. H2020-ICT-2016-2017 (2017-2019).
- [P19] CloudPerfect. Enabling cloud orchestration, performance and cost efficiency tools for QoE enhancement and provider ranking. H2020-ICT-2016-2017 (2016-2018).
- [P18] BASMATI. Cloud brokerage across borders for mobile users and applications. H2020-EUK-2016 (2016-2018).
- [P17] City.Risks. Avoiding and mitigating safety risks in urban environments. H2020-FCT-2014-2015 (2015-2018).
- [P16] EuConNeCts 2. European conferences on networks and communications (EuCNC). H2020-ICT- 2014 (2015-2017).

- [P15] WAIE. Wireless access infrastructures expansions through opportunistic networks of moving access points. U.S. Office of Naval Research (2015-2016).
- [P14] SLALOM. Service level agreement – Legal and open model. H2020-ICT-2014 (2015-2016).
- [P13] Inverse problems and medical imaging. Research Committee of the Academy of Athens (2014-2021).
- [P12] Consensus. Multi-objective decision making tools through citizen engagement. FP7-ICT-2013 (2013-2016).
- [P11] COSMOS. Cultivate resilient smart objects for sustainable city applications. FP7-ICT-2013 (2013-2016).
- [P10] XIFI. Cultivate resilient smart objects for sustainable city applications. FP7-ICT-2012 (2013-2015).
- [P9] EXPERIMEDIA. Experiments in live social and networked media experiences. FP7-ICT-2011 (2011-2014).
- [P8] VISION Cloud. Virtualized storage services foundation for the future internet. FP7-ICT-2009 (2010-2013).
- [P7] SARACEN. Socially aware, collaborative, scalable coding media distribution. FP7-ICT-2009 (2010-2013).
- [P6] SCOVIS. Self-configurable cognitive video supervision. FP7-ICT-2007 (2008-2011).
- [P5] ISISEMD. Intelligent system for independent living and selfcare of seniors with cognitive problems or mild dementia. CIP-ICT-PSP-2008 (2009-2011).
- [P4] My-e-Director 2012. Real-time context-aware and personalized media streaming environments for large scale broadcasting applications. FP7-ICT-2007 (2008-2011).
- [P3] MAGNET BEYOND. My personal adaptive global net and beyond. IST-2004 (2006-2008).
- [P2] POLYMNIA. Personalised leisure and entertainment over cross media intelligent platforms. IST- 2002 (2005-2007).
- [P1] NEXTGRID. The next generation grid. IST-2002 (2005-2007).

Editorial and reviewing service

- 2025** Guest Editor, Mathematics special issue “Computational Methods for Computer Vision and Medical Image Analysis”.
- 2024** Associate Editor, IEEE International Symposium on Biomedical Imaging (ISBI).
- 2023** Guest Editor, Journal of Imaging, “SPECT and PET Imaging of Small Animals”, Volume II.
- 2021** Guest Editor, Journal of Imaging, “SPECT and PET Imaging of Small Animals”.
- since 2023** IOP Trusted Reviewer, Institute of Physics.
- since 2017** Referee for international journals including IEEE Transactions on Medical Imaging, Physics in Medicine & Biology, Inverse-problem-related and computational journals.

Languages and technical skills

Languages Greek (native), English (C2), French (B2)

Programming Fortran, Python

Software MATLAB, Maple, LaTeX, AutoCAD, Rhino, STIR, Tribon, Maxsurf, Shipconstructor

Memberships and distinctions

- 2023–2025** Board of Advisors, Socialinnov.
- 2005–present** Technical Chamber of Greece.
- 2005–2010** Society of Naval Architects and Marine Engineers (USA).
- 1995** Third prize, Euclid Mathematics Competition, Hellenic Mathematical Society.

Public outreach

- 2011–2021** Co-founder and organiser, Hub Science public lecture series, The Hub Events, Athens (72 lectures; approximately 11,000 attendees).

Research metrics

Google Scholar (as recorded in the CV dated 19 October 2026): 404 citations; h-index 8.

Source information current to 19 October 2026.