

PERSONAL INFORMATION **Eleonora Grassucci**

Ph.D. Student in Information and Communication Technologies at Sapienza University of Rome.  
I am a third-year Ph.D. Student in Information and Communication Technologies (ICT) at the ISPAMM Lab, Sapienza University of Rome, advised by prof. Aurelio Uncini and prof. Danilo Comminiello. My research focuses on lightweight and efficient generative models by defining them in hypercomplex domains, such as the quaternion one, and exploiting hypercomplex algebras to capture latent internal relations in multidimensional inputs such as color images and multichannel audio. I am supervising Master thesis students and co-supervising younger Ph.D. students of the ISPAMM Lab. I am the Ph.D. students representative, the publicity chair of the IEEE MLSP 2023, and an IEEE graduate student member. I was awarded with the Best Manuscript Award at the IEEE ISCAS in June 2022.

## EXPERIENCE

Feb 2019 - March 2022 **Research Scientist**

Bambino Gesù Hospital, Rome, Italy

I have been part of the Innovation and Research team of the hospital, working in the EU-JAV project founded from the European Union's Health Programme. The aim of the project is to apply machine learning methods to study the spread of misinformation around vaccine hesitancy on social media platforms.

May 2018 - Sept 2019 **Intern**

Sapienza University of Rome, Rome, Italy

I have been part of the ERC project Inscribe which explored the three earliest Aegean scripts in Europe. The aim was to analyze through deep learning techniques the relationship between these scripts and to apply a multi-stepped decipherment strategy.

Apr 2019 **Data Science Course Lecturer**

Skienda, Rome, Italy

I held lectures on the data science main concepts and on introduction to Python to graduate students to be hired by the company.

## EDUCATION

Sept 2017 - July 2019 **Master's degree in Data Science**

Sapienza University of Rome, Italy

Thesis title: *Generative Adversarial Networks with flexible activation functions*. Thesis supervisors: Prof. Simone Scardapane, Prof. Aurelio Uncini. Final grade: 110/110 with honors.

Sept 2014 - July 2017 **Bachelor's degree in Statistics**

Sapienza University of Rome, Italy

Thesis title: *Economic mobility measures in Italy: Analysis for family typology*. Thesis supervisor: Prof. Roberto Zelli.

## PREPRINTS

- 2022 **Eleonora Grassucci**, Luigi Sigillo, Aurelio Uncini, Danilo Comminiello, "Generalizing Neural Networks via Quaternion Wavelets for Image Analysis and Synthesis", *under review in IEEE Trans. on Neural Netw. and Learning Systems*, Sept. 2022.
- 2022 **Eleonora Grassucci**, Gioia Mancini, Christian Brignone, Aurelio Uncini, and Danilo Comminiello, "Dual Quaternion Ambisonics Array for Six-Degree-of-Freedom Acoustic Representation", *under review in Pattern Recognition Letters*, (*arXiv preprint:2204.01851*), Apr. 2022.
- 2022 Eleonora Lopez, **Eleonora Grassucci**, Martina Valleriani, and Danilo Comminiello, "Multi-View Breast Cancer Classification via Hypercomplex Neural Networks", *under review in IEEE Trans. on Pattern Analysis and Machine Intell.* (*arXiv preprint:2204.05798*), Apr. 2022.

- 2021 **Eleonora Grassucci**, Aston Zhang, Danilo Comminiello, "PHNNs: Lightweight neural networks via parameterized hypercomplex convolutions", *under review in IEEE Trans. on Neural Netw. and Learning Systems (arXiv preprint:2110.04176)*, Oct. 2021.

#### PUBLISHED PAPERS

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- 2022 **Eleonora Grassucci**, Luigi Sigillo, Aurelio Uncini, and Danilo Comminiello, "Hypercomplex Image-to-Image Translation", in *IEEE World Congress on Computational Intelligence (WCCI)*, Jul. 2022.
- 2022 Christian Brignone, Gioia Mancini, **Eleonora Grassucci**, Aurelio Uncini, Danilo Comminiello, *Efficient sound event localization and detection in the quaternion domain*, IEEE Trans. on Circuits and Systems II: Express Briefs, vol. 69 no. 5, pp. 2453-2457, 2022.
- 2022 Lorenza Parisi, Francesca Comunello, **Eleonora Grassucci**, Vittoria Bernardini, Carla Nisi, Arianna Bussoletti, Simone Mulargia, Ileana Croci, Barbara Lanfranchi, and Francesco Gesualdo, "Analyzing vaccine-related engagement on Tiktok among Italian users", accepted to *ECREA 2022*, Oct. 2022.
- 2021 **Eleonora Grassucci**, Edoardo Cicero and Danilo Comminiello, *Quaternion Generative Adversarial Networks*, in *Generative Adversarial Learning: Architectures and Applications*, R. Razavi-Far, A. Ruiz-Garcia, V. Palade, and J. Schmidhuber, Springer International Publishing, pp. 57–86, 2022.
- 2021 **Eleonora Grassucci**, Danilo Comminiello, and Aurelio Uncini, *An Information-Theoretic Perspective on Proper Quaternion Variational Autoencoders*, Entropy 23, no. 7: 856, July 2021.
- 2021 **Eleonora Grassucci**, Danilo Comminiello and Aurelio Uncini, *A Quaternion-valued Variational Autoencoder*, ICASSP 2021 - 2021 IEEE Int. Conf. on Acoustics, Speech and Signal Process. (ICASSP), 2021, pp. 3310-3314.
- 2021 **Eleonora Grassucci**, Simone Scardapane, Danilo Comminiello, and Aurelio Uncini, *Flexible Generative Adversarial Networks with Non-Parametric Activation Functions*, in *Progress in Artificial Intelligence and Neural Systems*, (A. Esposito, M. Faundez-Zanuy, F. C. Morabito, E. Pasero, Eds.), vol. 184 of Smart Innovation, Systems and Technologies, Springer, 2021.

#### INVITED TALKS

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- Aug 2022 *Simplify by hypercomplex: going beyond the real domain*, Belmont University, Nashville, TN, USA.
- Apr 2021 *Generative Deep Learning in the Quaternion Domain*, IBM Reserach, Zurich.
- Nov 2020 *Quaternion Variational Autoencoders*, Sussex University, Brighton, UK.

#### AWARDS

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- 2022 **Best Paper Award** in the track for the paper "Efficient Sound Event Localization and Detection in the Quaternion Domain", IEEE International Symposium on Circuits And Systems (ISCAS).
- 2021 Component of the winner team for *Progetti di Ricerca Grandi* with the project "Social media and vaccine confidence: exploring knowledge needs, media use, and social representations of health and vaccine-related issues among Italian teens", Sapienza University of Rome, Italy.
- 2020 Component of the winner team for *Progetti di Ricerca Medi* with the project "DYCOS - Deep Hypercomplex Compressive Sensing", Sapienza University of Rome, Italy.
- 2019 Top 5% of the students of the Data Science Master's degree at Sapienza University of Rome, Italy.

#### OTHER ACADEMIC ACTIVITIES

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- 2023 Publicity Chair of IEEE MLSP 2023, Rome, Italy.
- 2021-2022 Invited Reviewer IEEE WCCI 2022, IEEE Trans. Signal Process., IEEE ICASSP, Springer Cognitive Computation.

- Oct - Dec 2021 Teaching Assistant, Neural Networks master's degree course, Sapienza University of Rome.
- Feb - May 2021 Teaching Assistant, Machine Learning for Signal Processing master's degree course, Sapienza University of Rome.
- Feb - May 2020 Teaching Assistant, Machine Learning for Signal Processing master's degree course, Sapienza University of Rome.