Curriculum Vitae

PERSONAL INFORMATION

Andrea Ciardiello

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GitHub: github.com/pumazzo

Gender M | Date of birth 14/07/1989 | Nationality Italian

CURRENT POSITION

09/2024 – Present

Fixed-term Researcher

Istituto Superiore di Sanità (Italian National Institute of Health)

Development and performance analysis of algorithms for explainable and interpretable AI in healthcare-related applications

PROFESSIONAL EXPERIENCE

03/2023 -09/2024

Fixed-term Researcher

Department of Physics – University of Rome “La Sapienza”

Study and development of quantum machine learning algorithms on NISQ-type variational circuits. Optimization of experimental parameters for photonic platforms (PNRR National Centre 1, Spoke 10)

03/2022 -03/2023

Research Fellow

National Institute for Nuclear Physics (INFN) – Rome Section

Research grant on "Methods for explainability and interpretability of Artificial Intelligence models"

Design and application of algorithms to assess the reliability of AI systems, with the aim of increasing user trust in their use

11/2019 – 03/2022

Research Fellow

National Institute for Nuclear Physics (INFN) – Rome Section

Department of Physics – University of Rome “La Sapienza”

Research grant on "Techniques from Elementary Particle Physics applied to Fluorine-19 Magnetic Resonance Imaging (MRI)" from INFN
Research grant on "Techniques from Elementary Particle Physics applied to Fluorine-19 Magnetic Resonance Imaging (MRI)" from Sapienza University

Application of AI techniques for denoising low-SNR 19F MRI
Experimental NMR data analysis for the characterization of fluorinated tracers useful for imaging
In vitro internalization experiments of fluorinated tracers using 19F NMR spectroscopy

11/2018 – 10/2019 **Research Fellow**

National Institute for Nuclear Physics (INFN) – Rome Section

Research grant on "Application of machine learning algorithms in the context of doctor-patient communication, within the FILOBLU project"

Application of Natural Language Processing techniques to assist medical staff during clinical patient follow-ups

04/2018 – 10/2018 **Research Fellow**

Department of Physics – University of Rome “La Sapienza”

Research grant on "Applications of Machine Learning to the analysis of diagnostic images"
Design and implementation of deep neural networks for automatic segmentation of anatomical structures in pelvic MRI images

EDUCATION AND TRAINING

2021 **Ph.D. in Physics** QEQ 8

Scuola dottorale in scienze astronomiche, chimiche, fisiche, matematiche e della terra "Vito Volterra",

University of Rome “La Sapienza” - XXXIII Ciclo

Grade: Excellent

Thesis title: *Improvements and deep learning applications in 19F-NMR*

Advisor: Prof. Riccardo Faccini

2017 **Laurea Magistrale in Fisica** QEQ 7

University of Rome “La Sapienza”, Faculty of Mathematical, Physical and Natural Sciences

Grade: 110/110

Thesis topic: *Overloaded Memory with Stabilizing Environment in Hopfield Networks*

Supervisor: Prof. Paolo Del Giudice

COMPETENZE PERSONALI

Mother tongue: Italian

Other Languages: English – C2

TECHNICAL SKILLS

Proficient in Python and its scientific ecosystem
Skilled in quantum computing frameworks: Qiskit, Pennylane
Experienced with differentiable programming and deep learning frameworks: PyTorch, TensorFlow, JAX
Good knowledge of Matlab and MathWorks toolkits for modeling and data analysis
Experience with OpenAI APIs
Experience with Wolfram Mathematica for symbolic computation
Familiar with software development best practices, including version control (Git), testing, and documentation
Proficient in OpenCV and ITK for computer vision and medical imaging applications
Hands-on experience with diagnostic imaging software: ImageJ, 3D Slicer, FSL, FreeSurfer
Experience with Bruker Paravision 5.1 and TopSpin for NMR/MRI data acquisition and analysis
Working knowledge of SQL (MySQL) and data handling for research purposes
Basic experience in system administration for Linux and Windows environments

PUBLICATIONS PROCEEDINGS

2019 R. Ferrari et al., “MR-based artificial intelligence model to assess response to therapy in locally advanced rectal cancer,” *european journal of radiology*, vol. 118, pp. 1–9, Sep. 2019.

2020 A. Ciardiello et al., “Preliminary results in using Deep Learning to emulate BLOB, a nuclear interaction model,” Physica Medica: European Journal of Medical Physics, vol. 73, pp. 65–72, May 2020.

R. Ammendola et al., “L0TP+: the Upgrade of the NA62 Level-0 Trigger Processor,” *EPJ Web of Conferences*, vol. 245, p. 1017, 2020.

2021 M. Bassi et al., “Role of radiomics in predicting lung cancer spread through air spaces in a heterogeneous dataset,” *Translational Lung Cancer Research*, vol. 0, Art. no. 0, Jan. 2021.

2022 R. Ammendola et al., “Progress report on the online processing upgrade at the NA62 experiment,” *Journal of Instrumentation*, vol. 17, Art. no. 04, Apr. 2022

A. Ciardiello et al., “Multimodal evaluation of 19F-BPA internalization in pancreatic cancer cells for boron capture and proton therapy potential applications,” *Physica Medica*, vol. 94, pp. 75–84, Feb. 2022.

2023 .L. Arsini, B. Caccia, A. Ciardiello, S. Giagu, and C. M. Terracciano, “Nearest Neighbours Graph Variational AutoEncoder,” *Algorithms*, vol. 16, Art. no. 3, Mar. 2023.

E. Agrimi et al., “COVID-19 therapy optimization by AI-driven biomechanical simulations,” *The European Physical Journal Plus*, vol. 138, Art. no. 2, Feb. 2023.

2024 R. Ammendola et al., “APEIRON: A Framework for High Level Programming of Dataflow Applications on Multi-FPGA Systems,” *EPJ Web of Conferences*, vol. 295, p. 11002, 2024.

G. Grillo, T. Torda, C. Voena, A. Ciardiello, and S. Giagu, “Integrating ChatGPT-4: A Novel XAI Interface for Enhanced Clinician Understanding of MRI Image Segmentation Results,” in *2024 IEEE 37th International Symposium on Computer-Based Medical Systems (CBMS)*, Jun. 2024, pp. 320–325.

I. Ligato et al., “Convolutional Neural Network Model for Intestinal Metaplasia Recognition in Gastric Corpus Using Endoscopic Image Patches,” *Diagnostics*, vol. 14, Art. no. 13, Jun. 2024.

L. Arsini et al., “Fast and precise dose estimation for very high energy electron radiotherapy with graph neural networks,” *Frontiers in Physics*, vol. 12, 2024.

2025 A. Maiuro et al., “Endometrial cancer tissue features clusterization by kurtosis MRI,” *Medical Physics*, 2025.,DOI: 10.1002/mp.17718

T. Torda et al., “Influence based explainability of brain tumors segmentation in magnetic resonance imaging,” *Progress in Artificial Intelligence*, Mar. 2025, https://doi.org/10.1007/s13748-025-00367-y

PARTECIPAZIONI A SEMINARI,CONGRESSI

3-12-2018 **Intervento**: “Machine Learning application to doctor-patient interaction”, Ciclo seminari “Artificial Intelligence in Medicine”, Sapienza Università di Roma

25-10-2019 **Comunicazione**: SIF 105° Congresso nazionale, L'aquila “FiloBlu: Sentiment Analysis application to doctor-patient interaction”.

26-10-2022 **Talk** : 6th BigBrain workshop: “Explainable deep learning inference to decode decision-making processes from multidimensional patterns of neural activities”, Zadar, Croatia

29-11-2022 **Invited talk** : Workshop November 2022 “Emerging Techniques in Radiotherapy”, “Artificial Intelligence in Radiotherapy: Current Challenges”, German Cancer Research Center, Santiago, Chile

30-05-2023 MSNN 2023, “Explainable deep learning inference to decode decision-making processes from multidimensional patterns of neural activities” Torino, Italia

30-05-2023 MSNN 2023, “From “Which” to “Why”: Interpretation map for Explainable Deep Learning based on Influence methods ” Torino, Italia

ACADEMIC TEACHING

2024/2025 **MSc in Physics (LM-17)** – *Advanced Machine Learning for Physics* (3 ECTS)
Course Code: 10611918 – University of Rome "La Sapienza"

2024/2025 **BSc in Physics (L-30)** – *Computational Physics Laboratory I* (3 ECTS)
Course Code: 1012086 – University of Rome "La Sapienza"

2024/2025 **BSc in Physics (L-30**) – Artificial Intelligence and Machine Learning Methods for Physics (3 ECTS)
Course Code: 10616786 – University of Rome "La Sapienza"

2023/2024 **MSc in Physics (LM-17)** – *Advanced Machine Learning for Physics* (3 ECTS)
Course Code: 10611918 – University of Rome "La Sapienza"

2023/2024 **Ph.D. in Physics** – *Advanced Machine Learning for Physics* (3 or 6 ECTS)
University of Rome "La Sapienza"

OTHER TEACHING ACTIVITIES

05-2024 **Introduction to Deep Learning for Health Sciences** (ID No. 100C24-P)
Istituto Superiore di Sanità
github.com/pumazzo/ML-ISS2024

08-2023 Cycle of lessons (18 hours) Introduction to Machine Learning and Deep Learning for Health Science, Pontifical Catholic University of Chile, Santiago de Chile (UC)
github.com/pumazzo/ML4HS-UC

05-2023 **Introduction to Deep Learning for Health Sciences** (ID No. 211C23-P)
Istituto Superiore di Sanità
github.com/pumazzo/ML-ISS2023

11-2022 HandsOn on “Deep learning and Generative networks for dose distribution emulation in radiotherapy” as part of the Workshop November 2022 “Emerging Techniques in Radiotherapy” at the Pontifical Catholic University of Chile, Santiago de Chile (UC)

ULTERIORI INFORMAZIONI

Personal Data

I authorize the processing of my personal data pursuant to Legislative Decree No. 196 of June 30, 2003 ("Personal Data Protection Code") and the EU General Data Protection Regulation (GDPR – Regulation EU 2016/679), and I consent to its publication within the limits established by law.

Roma, 21/03/2025