Federico Sabbatini

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WORK EXPERIENCES

October 2019 – Present
Software and Web Application Development Teacher *(High-school education)*
Liceo Scientifico, Musicale e Coreutico "Guglielmo Marconi", Pesaro (PU), Italy
Core concepts of computer science and software development metodologies, practice of the following programming languages: C, HTML, CSS, JavaScript, PHP.

April 2021 – October 2021
Research Fellow
University of Bologna "Alma Mater Studiorum", Cesena Campus, Cesena (FC), Italy
Knowledge engineering for the European AI. Design, modelling and development of a knowledge graph related to AI applications.

November 2020 – December 2020
Computer Science Teacher *(High-school education)*
Istituto Omnicomprensivo "Montefeltro", Sassocorvaro (PU), Italy
Theoretical concepts of computer science, MS Excel, binary code, HTML and CSS.

April 2020 – June 2020
Computer Science Teacher *(High-school education)*
Istituto di Istruzione Secondaria Superiore "M. Curie", Savignano sul Rubicone (FC), IT
Basic and advanced concepts of computer networks.

February 2020 – June 2020
PON Project – Additional Figure *(High-school education)*
Istituto di Istruzione Secondaria Superiore "M. Curie", Savignano sul Rubicone (FC), IT
Lessons on the ECDL; individual assistance for the creation of a digital book.

March 2017 – September 2017
Undergraduate Internship *(Computer science, data processing and acquisition)*
University of Urbino "Carlo Bo", Urbino (PU), Italy
Development of an interactive Python interface for FTP transfer and graphical representation of solar wind and interplanetary magnetic field data from the NASA website ftp://cdaweb.gsfc.nasa.gov.

OTHER ACTIVITIES

PC Member
Program committee member for the 1st AEQUITAS Workshop on Fairness and Bias in AI (AEQUITAS 2023)

PC Member
Program committee member for the 26th European Conference on Artificial Intelligence (ECAI 2023)

PC Member
Program committee member for the 38th Association for the Advancement of Artificial Intelligence Conference (AAAI 2024)

PC Member
Program committee member for the 5th International Workshop on EXplainable and TRAnsparent AI and Multi-Agent Systems (EXTRAAMAS 2023)

Peer Reviewer
Peer reviewer for the Modern Intelligent Times (MIT) journal

Journal Referee
Referee for the Aeronautics and Aerospace Open Access Journal (AAOAJ)

PC Member
Program committee member for the 37th Association for the Advancement of Artificial Intelligence Conference (AAAI 2023)

PC Member
Program committee member for the 4th International Workshop on EXplainable and TRAnsparent AI and Multi-Agent Systems (EXTRAAMAS 2022)

EDUCATION

November 2021 – Present
Ph.D. in Research Methods in Science and Technology
University of Urbino "Carlo Bo", Urbino (PU), Italy
Machine learning modeling of galactic cosmic-ray data gathered on board LISA Pathfinder. Study of solar energetic particle events observed on board Solar Orbiter. Development of a graphical user interface for the study of these events.

August 2 – 7, 2021
Cornell, Maryland, Max Planck Pre-doctoral School 2021 – *Saarbrücken/online*

July 13 – 23, 2021	**European Agent Systems Summer School 2021 –** *Porto/online*
2017 – 2020	**Master's Degree in Computer Science and Engineering**
	University of Bologna "Alma Mater Studiorum", Cesena Campus, Cesena (FC), Italy
	Thesis: "Interpretable Prediction of Galactic Cosmic-Ray Short-Term Variations with Artificial Neural Networks". **Final degree mark**: 110/110 *cum laude*
2011 – 2017	**Bachelor's Degree in Applied Computer Science**
	University of Urbino "Carlo Bo", Urbino (PU), Italy
	Thesis: "Monte Carlo Simulation of a Galactic Cosmic-Ray Flux Short-Term Depression Observed with LISA Pathfinder". **Final degree mark**: 110/110 *cum laude*
2006 – 2011	**High-school degree**
	Technical Institute "Enrico Mattei", Urbino (PU), Italy **Final mark:** 100/100

COMPUTER SKILLS

Programming languages	Most widespread languages belonging to both imperative and declarative paradigms: Python, C, C++, C#, Java, VB, Fortran, HTML, CSS, PHP, JavaScript and VBScript, Lua, LaTeX, SQL, Prolog, Scala, R, Kotlin, Assembly.
Software applications	MS Office and similar, most widespread IDEs, text editors and browsers, Windows and Linux command shells, simple graphics programs.

FOREIGN LANGUAGE SKILLS

Italian native speaker

	Listening	Reading	Spoken interaction	Spoken production	Writing
English	B2	C2	B2	C1	C2
Spanish	C2	C2	C2	C2	C2
French	B1	B2	B1	B1	B2
German	A1	A1	A1	A1	A1

SEMINARS

April 2019	**Geometrical Patterns in Nature – Lecturer**
	University of Urbino "Carlo Bo", Urbino (PU), Italy
	Discussion and numerical reproduction of the most widespread matematical and geometrical patterns found in animal and plant kingdom, in particular fractals, golden ratio, spirals, symmetries and Fibonacci sequence [link].
April 2018	**Monte Carlo Simulations – Lecturer**
	University of Urbino "Carlo Bo", Urbino (PU), Italy
	Main features of the Monte Carlo method, advantages and limitations of its application. Short history of the method evolution, from first applications (Buffon's needle problem, 1777) to current use in Astrophysics [link].

PUBLICATIONS

Submitted	F. Sabbatini; R. Calegari, "Unveiling Opaque Predictors via Explainable Clustering: The CReEPy Algorithm." BEWARE 2023
Submitted	F. Sabbatini; R. Calegari, "An Extension for Hypercube-Based Symbolic Knowledge-Extraction Models to Achieve Completeness." AAAI 2023
Submitted	F. Sabbatini; R. Calegari, "The ICE Score to Evaluate Symbolic Knowledge Quality." AAAI 2023
Submitted	F. Sabbatini; C. Grimani, "Solar Wind Speed Estimate with Machine Learning Ensemble Models for the ESA LISA Space Mission." AAAI 2023
Submitted	F. Sabbatini *et al.*, "Bridging Machine Learning and Diagnostics of the ESA LISA Space Mission with Equation Discovery via Explainable Artificial Intelligence." AAAI 2023
Submitted	G. Ciatto *et al.*, "Symbolic Knowledge Extraction and Injection with Sub-symbolic Predictors: a Systematic Literature Review" ACM Computing Surveys
Submitted	M. Menichelli *et al.*, "Development of thin hydrogenated amorphous silicon

	detectors on a flexible substrate." Proceedings of IEEE-RTSD 2022
Submitted	F. Sabbatini; C. Grimani, "Solar Wind Speed Estimate with Machine Learning Ensemble Models for LISA." Environmental Modelling & Software
Submitted	C. Grimani *et al.*, "Particle monitoring capability of the Solar Orbiter Metis coronagraph through the increasing phase of solar cycle 25." Astronomy & Astrophysics
Accepted	F. Sabbatini; R. Calegari, "Symbolic Knowledge-Extraction Evaluation Metrics: The FiRe Score." ECAI 2023
Accepted	F. Sabbatini; R. Calegari, "Achieving Complete Coverage with Hypercube-Based Symbolic Knowledge-Extraction Techniques." XI-ML 2023
Accepted	F. Sabbatini; R. Calegari, "ExACT Explainable Clustering: Unravelling the Intricacies of Cluster Formation." KoDis 2023
Accepted	F. Sabbatini; R. Calegari, "Bottom-Up and Top-Down Workflows for Hypercube- and Clustering-based Knowledge Extractors." EXTRAAMAS 2023
Accepted	F. Sabbatini; R. Calegari, "On the Evaluation of the Symbolic Knowledge Extracted from Black Boxes." AITA 2023
Accepted	C. Grimani *et al.*, "A Hydrogenated amorphous silicon detector for Space Weather Applications." Astrophysics and Space Science
August 2023	F. Sabbatini; R. Calegari, "Explainable Clustering with CREAM." Proceedings of KR 2023 [link]
June 2023	M. Menichelli *et al.*, "X-ray qualification of hydrogenated amorphous silicon sensors on flexible substrate." Proceedings of IWASI 2023 [link]
June 2023	M.J. Large *et al.*, "Hydrogenated amorphous silicon high flux x-ray detectors for synchrotron microbeam radiation therapy." Physics in Medicine and Biology [link]
June 2023	F. Sabbatini *et al.*, "Towards a unified model for symbolic knowledge extraction with hypercube-based methods." Intelligenza Artificiale [link]
December 2022	M. Villani *et al.*, "Modelization of Galactic Cosmic-Ray Short-Term Variations for LISA." Experimental Astronomy [link]
November 2022	R. Calegari; F. Sabbatini, "The PSyKE Technology for Trustworthy Artificial Intelligence." Proceedings of AIxIA 2022 [link]
November 2022	F. Sabbatini *et al.*, "Hypercube-Based Methods for Symbolic Knowledge Extraction: Towards a Unified Model." Proceedings of WOA 2022 [link]
October 2022	A. Cesarini *et al.*, "Interplanetary Medium Monitoring with LISA." Journal of Space Weather and Space Climate [link]
September 2022	F. Sabbatini *et al.*, "Semantic Web-Based Interoperability for Intelligent Agents with PSyKE." Proceedings of EXTRAAMAS 2022 [link]
August 2022	C. Grimani *et al.*, "Bridging the Gap between Monte Carlo Simulations and Measurements of the LISA Pathfinder Test-Mass Charging for LISA." Astronomy & Astrophysics [link]
July 2022	F. Sabbatini; R. Calegari, "Symbolic Knowledge Extraction from Opaque Machine Learning Predictors: GridREx & PEDRO." Proceedings of KR 2022 [link]
July 2022	F. Sabbatini; C. Grimani, "Symbolic Knowledge Extraction from Opaque Predictors Applied to Cosmic-Ray Data Gathered with LISA Pathfinder." Aeronautics and Aerospace Open Access Journal [link]
July 2022	F. Sabbatini *et al.*, "Symbolic Knowledge Extraction from Opaque ML Predictors in PSyKE: Platform Design & Experiments." Intelligenza Artificiale [link]
December 2021	C. Grimani *et al.*, "Cosmic-Ray Flux Predictions and Observations for and with Metis on board Solar Orbiter." Astronomy & Astrophysics [link]
September 2021	F. Sabbatini *et al.*, "On the Design of PSyKE: A Platform for Symbolic Knowledge Extraction." Proceedings of WOA 2021 [link]
May 2021	F. Sabbatini *et al.*, "GridEx: An Algorithm for Knowledge Extraction from Black-Box Regressors." Proceedings of EXTRAAMAS 2021 [link]
November 2020	C. Grimani *et al.*, "Recurrent Galactic Cosmic-Ray Flux Modulation in L1 and

	Geomagnetic Activity during the Declining Phase of the Solar Cycle 24." The Astrophysical Journal [link]
February 2018	M. Armano *et al.*, "Characteristics and Energy Dependence of Recurrent Galactic Cosmic-Ray Flux Depressions and of a Forbush Decrease with *LISA Pathfinder*." The Astrophysical Journal [link]

INTERNATIONAL TALKS

April 2023	F. Sabbatini; C. Grimani, "Machine learning ensemble models for solar wind speed prediction." EGU 2023 [link]

AWARDS

June 2018	Prize for the best academic *curriculum* in Applied Computer Science at the University of Urbino "Carlo Bo" for the year 2016/2017