

# Preface

The use of *Artificial Intelligence* (AI) within the context of safety-critical systems has experienced continuous growth in the last few years. On top of that, the research community is currently aiming to integrate sub-symbolic approaches with symbolic ones, to foster their usage in critical scenarios. These applications call for the adoption of *Formal Methods* (FM) techniques for the design, verification and synthesis of reliable and robust systems. The collaboration between the AI and the FM communities is therefore of increasing importance.

OVERLAY 2023 marks the 5th iteration of the *Workshop on Artificial Intelligence and fOrmal VERification, Logic, Automata, and sYnthesis*. Sponsored by the OVERLAY group (<https://overlay.uniud.it>), its primary objective is to establish and sustain a lasting scientific platform dedicated to topics at the intersection of AI and FM.

This year's edition (<https://overlay.uniud.it/workshop/2023/>) was held on November 7th, 2023 in Rome, Italy, and co-located with AIXIA 2023 (<https://www.aixia2023.cnr.it/>). Sixteen extended abstracts were accepted for presentation (one of which was not included in the proceedings on the author's request) out of a total of eighteen submissions, encompassing forty-five authors from nine different countries: Australia (1), Canada (2), France (1), Germany (9), Italy (28), Luxembourg (1), Netherlands (1), UK (1), and USA (1).

The accepted contributions exemplify seamless integration between artificial intelligence and formal methods, ranging from the application of machine learning techniques in formal methods to exploring epistemic and temporal reasoning in neural networks, and to the more general topic of symbolic/sub-symbolic AI integration. Notably, the invited talk by Luciano Serafini from Fondazione Bruno Kessler, titled "*NeuroSymbolic AI: Between Probability and Fuzziness*", presented a compelling discourse on integrating logic-based knowledge representation and reasoning with neural networks.

The OVERLAY 2023 workshop witnessed a vibrant participation of around 50 attendees, fostering engaging discussions among researchers bridging the realms of AI and FM. The works collected in these proceedings further attest to the outstanding quality of the submissions received.

We extend our gratitude to the many colleagues whose contributions made this event a success: the authors of the proposed extended abstracts, the dedicated PC members, and the invaluable adjoint session chairs — Andrea Mazzullo, Marco Montali, Angelo Montanari, and Nicola Saccomanno. Special appreciation goes to our invited speaker, Luciano Serafini. We are also thankful to the organizers of AIXIA 23 for kindly hosting this workshop. Lastly, but certainly not least, a thank-you goes to Nicola Gigante, whose exceptional support with the workshop website and formatting of these proceedings was invaluable.

The chairs,

Andrea Brunello  
Alessandro Gianola  
Fabio Mogavero