Contribution ID: **13** Type: **not specified**

”Reliable and Sustainable AI: From Mathematical Foundations to Next Generation AI Computing”

Tuesday, 21 October 2025 11:30 (1 hour)

“The current wave of artificial intelligence is transforming industry, society, and the sciences at an unprecedented pace. Yet, despite its remarkable progress, today’s AI still suffers from two major limitations: a lack of reliability and excessive energy consumption.
This lecture will begin with an overview of this dynamic field, focusing first on reliability. We will present recent theoretical advances in the areas of generalization and explainability - core aspects of trustworthy AI that also intersect with regulatory frameworks such as the EU AI Act. From there, we will explore fundamental limitations of existing AI systems, including challenges related to computability and the energy inefficiency of current digital hardware. These challenges highlight the pressing need to rethink the foundations of AI computing.
In the second part of the talk, we will turn to neuromorphic computing - a promising and rapidly evolving paradigm that emulates biological neural systems using analog hardware. We will introduce spiking neural networks, a key model in this area, and share some of our recent mathematical findings. These results point toward a new generation of AI systems that are not only provably reliable but also sustainable.”

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