The Atanasoff Memorial Lecture Series

Bulgarian Academy of Sciences & ICMS Sofia

In Topological, Computational & Algebraic Aspects of Complex Systems and Machine Learning

Inaugural Atanasoff Lecturer — 2025: Amaury Hayat

About the Atanasoff Memorial Lectures

The *Atanasoff Memorial Lecture Series* is a new annual program of the Bulgarian Academy of Sciences and the International Center for Mathematical Sciences (ICMS Sofia). It aims to celebrate the intersection of mathematics, computation, and the sciences of complexity — the very domains that unite topology, geometry, and machine learning in the 21st century.

Each year, an internationally distinguished scientist is invited as the **Atanasoff Lecturer** to deliver a keynote lecture highlighting frontier ideas where mathematical structure meets computational innovation. The series provides an open platform for dialogue across fields: pure mathematics, physics, data science, and artificial intelligence. It also serves as a tribute to the scientific imagination of John Vincent Atanasoff, whose work laid the foundations of electronic computation.

John Vincent Atanasoff (1903–1995)

John Vincent Atanasoff, born in Hamilton, New York, to a Bulgarian father and American mother, was a physicist and inventor who conceived the first electronic digital computing device — the *Atanasoff–Berry Computer (ABC)* — during the late 1930s at Iowa State College. By combining binary arithmetic, electronic switching, and capacitor memory, Atanasoff transformed computation from mechanical to electronic logic. Although the ABC itself never entered production, its design principles became the blueprint for modern computing. In Bulgaria, Atanasoff is celebrated as a national scientific hero; his legacy continues to inspire generations of mathematicians, engineers, and computer scientists.

The Atanasoff Memorial Lectures honour this legacy by connecting Bulgaria's intellectual heritage with the global research frontier in mathematics and computation.

Amaury Hayat — Atanasoff Lecturer 2025

The 2025 Atanasoff Lecturer is **Amaury Hayat**, a French mathematician and applied scientist, Professor at the École des Ponts – Institut Polytechnique de Paris. Hayat's research unites the theory of partial differential equations, control, and inverse problems with the emerging interface between mathematics and artificial intelligence. His work explores how deep learning and optimization methods can reveal or approximate

complex physical phenomena governed by PDEs, providing new mathematical insight into learning dynamics and control systems.

Trained in both mathematics and engineering, Hayat exemplifies the cross-disciplinary ethos that the Atanasoff Lectures are meant to highlight — rigorous theoretical grounding combined with computational creativity. His forthcoming keynote lecture at ICMS Sofia on November 10, 2025, will bridge the analytic theory of control with data-driven computation, continuing the Atanasoff vision of mathematics as the engine of scientific transformation.

The 2025 Inaugural Event

The inaugural edition of the series will take place at the ICMS Sofia, Bulgarian Academy of Sciences, on **November 10, 2025**, featuring lectures by **Amaury Hayat, Ernesto Lupercio, Raphaël Douady, Carlos Simpson,** and **Yuri Tschinkel**. The program will weave together topics from topology to machine learning, control, and data-driven modelling of complex systems.

Organized by: ICMS Sofia — Bulgarian Academy of Sciences. **Series leadership:** Prof. Ernesto Lupercio and the Research Group on Topological, Computational & Algebraic Aspects of Complex Systems.

Venue: ICMS Sofia, Acad. G. Bonchev St. Bl. 8, Sofia. Admission is free with suggested registration (limited capacity).

Further information: https://icms.bg