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COLLOQUIUM

One Equation to 'Rule' Them All:
A New Perspective on Einstein's Field Equations

Dr Andronikos Paliathanasis (Catholic University of the North, Chile)

DATE: Monday, 12 May 2025 | 16h00–17h00 SAST

VENUES:
- Neelsie Cinema, Stellenbosch University
- Online

--- A recording of the talk will be published on the NITheCS YouTube channel afterwards ---

ABSTRACT

We present a novel geometric framework for the global linearization of point-like Hamiltonian dynamical systems. This approach leverages the Jacobi metric and the Eisenhart-Duval lift to establish a connection between linearization and maximally symmetric spacetimes. We focus on the Noether symmetries of constraint Hamiltonian systems and demonstrate how this methodology leads to new linearized dynamical systems. Our results are applied to explore the common solution space of General Relativity, offering fresh insights into Einstein's field equations. geometric framework for the global linearization of point-like Hamiltonian dynamical systems. This approach leverages the Jacobi metric and the Eisenhart-Duval lift to establish a connection between linearization and maximally symmetric spacetimes. We focus on the Noether symmetries of constraint Hamiltonian systems and demonstrate how this methodology leads to new linearized dynamical systems. Our results are applied to explore the common solution space of General Relativity, offering fresh insights into Einstein's field equations.

BIOGRAPHY

Dr Andronikos Paliathanasis is a researcher in theoretical and mathematical physics, with a strong background in the geometric and algebraic analysis of differential equations, symmetry methods, and their applications in cosmology and gravitational theories. He holds a PhD in Mathematical Physics from the Department of Physics at the University of Athens, where his doctoral research focused on the role of symmetries and integrability in the analysis of physical systems. His research spans a wide range of topics in mathematical physics and cosmology. He has published over 270 peer-reviewed articles in international journals, with a strong citation record and an h-index 48. He is an active reviewer for many journals in mathematical and theoretical physics and has served on organizing committees for international conferences. In addition, he has supervised undergraduate and postgraduate students, contributed to the teaching of physics and mathematics courses, and has a growing interest in the application of statistical and machine learning methods to cosmological data analysis.

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