Bucharest 2025 PhD School:

“Modern Methods in Quantum Gravity and Cosmology”

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Lecture series:

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Structure Formation in the Universe: from Dark Matter to Dark Energy

Abstract: The goal of these lectures is twofold: (1) to review how dark matter, dark energy, and fundamental physics are constrained by measurements of the large-scale structure, and (2) to introduce statistical techniques that are widely used in cosmology. I will first give an informal review of large-scale structure, and outline what aspects of its measurements can be connected to underlying theory. Then I will focus on some of the most useful statistical techniques in connecting cosmological data to theory, and provide a few practical "from scratch" exercises that the students will have an option to complete on their own.